APPENDIX M

LA ENTRADA WATER SUPPLY ASSESSMENT, MEMORANDUM OF UNDERSTANDING 2009, AND MEMORANDUM OF UNDERSTANDING 2013

La Entrada Water Supply Assessment

- **La Entrada Water Supply Assessment**
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  - *Part 1: Final Delivery Reliability Report 2011, June 2012*
  - *Part 2: Final Subsequent Program Environmental Impact Report Coachella Valley Water Management Plan Update, June 2012*
  - *Part 3: 2010 Urban Water management Plan Final Report, July 2011*
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La Entrada
Water Supply Assessment
DRAFT

City of Coachella

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ACRONYMS and ABBREVIATIONS

AB	Assembly Bill
AF	Acre Feet
AFY	Acre Feet per Year
APA	Administrative Procedure Act
BDCP	Bay Delta Conservation Plan
BIOps	Biological Opinions
BOR	Bureau of Reclamation
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CIP	Capital Improvement Plan
CR	Colorado River
CRA	Colorado River Aqueduct
CUWCC	California Urban Water Conservation Council
CVP	Central Valley Project
CVRWMG	Coachella Valley Regional Water Management Group
CVSC	Coachella Valley Stormwater Channel
CVWD	Coachella Valley Water District
CVWMP	Coachella Valley Water Management Plan
CWA	Coachella Water Authority
CWC	California Water Code
DFG	Department of Fish and Game
DMM	Demand Management Measures
DWR	Department of Water Resources
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FWS	Fish and Wildlife Service
GPCD	Gallons per Capita per Day
GPD	Gallons per Day
GPM	Gallons per Minute
HDR	High Density Residential
ID	Improvement District
IID	Imperial Irrigation District
IRWMP	Integrated Regional Water Management Plan
IWA	Indio Water Authority
LAFCO	Local Agency Formation Commission
LDR	Low Density Residential
MCL	Maximum Contaminant Limit
MDR	Medium Density Residential
MG	Million Gallons
MGD	Million Gallons Per Day
MOU	Memorandum of Understanding
MU	Mixed Use
MVP	Mid-Valley Pipeline
MWD	Metropolitan Water District
MWDSC	Metropolitan Water District of Southern California
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service

PEIR	Programmatic Environmental Impact Report
PPR	Present Perfected Rights
PVID	Palo Verde Irrigation District
PWS	Public Water System
QSA	Quantification Settlement Agreement
RAC	Replenishment Assessment Charge
RCTLMA	Riverside County Transportation and Land Management Agency
RO	Reverse Osmosis
RPA	Reasonable and Prudent Alternative
RUWMP	Regional Urban Water Management Plan
RV	Recreational Vehicle
SB	Senate Bill
SCADA	Supervisory Control and Data Acquisition
SCAG	Southern California Association of Governments
SCH	State Clearinghouse
SDCWA	San Diego County Water Authority
SOI	Sphere of Influence
SPEIR	Subsequent Program EIR
SWP	State Water Project
SWRCB	State Water Resources Control Board
UWMP	Urban Water Management Plan
VLDR	Very Low Density Residential
VSD	Valley Sanitary District
WRP	Water Reclamation Plant
WSA	Water Supply Assessment
YCWA	Yuba County Water Agency

SECTION 1
INTRODUCTION

1.1 Introduction

In 2002, California Water Code (CWC) Sections 10910 through 10915 were amended by the enactment of Senate Bill 610 (SB 610) to improve the link between information on water supply availability and certain land use decisions made by cities and counties. SB 610 provides that when a city or county determines that a "project" as defined in CWC Section 10912 is subject to review under the California Environmental Quality Act (CEQA), the city or county must identify the water supply agency that will provide retail water service to the project and request that water supplier to prepare a Water Supply Assessment (WSA).[1] The proposed La Entrada development project (referred to herein as the "Project" or "La Entrada") includes 7,800 dwelling units (mixture of high, medium, low and very low density), mixed-use development with up to 1,520,000 square feet of commercial floor area, schools, parks/recreation, and open space, and thus qualifies as a "project" under SB 610. Generally, a WSA must evaluate whether the total projected water supplies available to the water supplier during normal, single dry, and multiple dry water years during a 20-year projection will meet the projected water demand associated with the proposed project, in addition to the water supplier's existing and planned future uses, including agricultural and manufacturing uses.

This WSA has been prepared in accordance with the requirements of SB 610. Accordingly, the information, analyses and conclusions contained herein utilize and rely upon, in part, the information, analyses and conclusions set forth in other water supply planning documents that have been prepared and duly adopted by agencies such as the City of Coachella (City), the Coachella Valley Water District (CVWD), and the California Department of Water Resources (DWR). Those documents include, without limitation, the City's 2010 Urban Water Management Plan (City 2010 UWMP), CVWD's 2010 Urban Water Management Plan (CVWD 2010 UWMP), CVWD's 2010 Coachella Valley Water Management Plan Update (2010 CVWMP), the 2011 Subsequent Programmatic Environmental Impact Report for the 2010 CVWMP (2011 SPEIR), the 2010 Coachella Valley Integrated Regional Water Management Plan (2010 IRWMP), and DWR's 2011 Final State Water Project Delivery Reliability Report (DWR 2011 Report). Moreover, in relation to the exchange agreements (see Section 4 below), the ability of the Metropolitan Water District of Southern California (MWD) to carry out its role is

[1] For purposes of CWC Section 10912(a), a "project" includes any of the following: (1) a proposed residential development of more than 500 dwelling units; (2) a proposed shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space; (3) a proposed commercial office building employing more than 1,000 persons or having more than 250,000 square feet of floor space; (4) a proposed hotel or motel, or both, having more than 500 rooms; (5) a proposed industrial, manufacturing, or processing plan, or industrial park planned to house more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area, except for certain solar or wind generation facilities that would demand no more than 75 acre feet of water annually; (6) a mixed-use project that includes one or more of the above-specified projects; or (7) a project that would demand an amount of water equivalent to, or greater than, the amount of water required by a 500 dwelling unit project.

supported by MWD's water supply planning documents, including its 2010 Regional Urban Water Management Plan (MWD 2010 RUWMP) and 2010 Integrated Resources Plan.[2] The environmental review document being prepared pursuant to CEQA for the La Entrada Project is a Programmatic Environmental Impact Report. Accordingly, the water supply analysis provided in this document pursuant to the WSA statute is intended to support that CEQA review.

1.2 Water Supplier

The City of Coachella Water Department was established in 1957, and is administered and managed by the Utilities General Manager under direct supervision of the City Manager. The City is responsible for providing water service to its residents, and will be the water supplier for the La Entrada Project.

As a public water supplier in the Coachella Valley, the City maintains a close and cooperative relationship with CVWD. CVWD was formed in 1918 to protect and conserve local water sources. Since then, the district has grown into a multi-faceted agency that delivers irrigation and domestic water (including drinking water), collects and recycles wastewater, provides regional storm water protection, replenishes the groundwater basin and promotes water conservation. CVWD is a special district established by the state legislature and governed by a five-member Board of Directors. While a large part of CVWD's history is in agricultural irrigation, today it meets the water-related needs of more than 107,000 homes and businesses across 1,000 square miles in various areas of service, including: domestic water; groundwater replenishment and imported water; wastewater treatment; recycled water; stormwater protection and flood control; agricultural irrigation and drainage, and water conservation. (Additional information regarding CVWD is provided in Sections 1.4.2 through 1.4.4 below.)

In September 2009, CVWD and the City signed a Memorandum of Understanding (2009 MOU) to assist in ensuring a sufficient and reliable water supply for development projects within the City and a major portion of its sphere of influence (SOI) in a manner consistent with CVWD's CVWMP as amended from time to time.[3] Under the terms of the 2009 MOU, various means are identified by which the City can provide for the supply of supplemental water to offset the demands associated with development projects approved by the City. For instance, under the 2009 MOU the City can participate in funding CVWD's acquisition of supplemental water supplies to offset demands associated with newly approved projects within the City's SOI. (See, e.g., CVWD 2010 CVWMP, p. 3-3.) In February 2013, CVWD and the City signed a Memorandum of Understanding (2013 MOU) regarding implementation of the 2009 MOU.[4] Among other things, the 2013 MOU further specifies the mechanism by which the City can finance and acquire supplemental water supplies from CVWD to meet the projected demands of new development projects, and establishes a process for preparing and adopting Water Supply Assessments and Written Verifications for such projects. As further set forth

[2] Copies of these documents are made part of the record in support of this WSA and are incorporated and included herein as Appendix A.
[3] A copy of the 2009 MOU between the City and CVWD is incorporated and included herein as Appendix B.
[4] A copy of the 2013 MOU between the City and CVWD is incorporated and included herein as Appendix C.

below, the 2013 MOU expressly acknowledges and applies to the La Entrada Project, and the supplemental water supplies referred to in the 2013 MOU have been considered by CVWD as part of the 2010 CVWMP Update and related 2011 SPEIR.

1.3 Purpose of Document

As mentioned above, this WSA is required under SB 610 because, among other features, the Project includes more than 500 residential dwelling units. Moreover, in accordance with SB 610 and applicable provisions of CEQA, the WSA will be included as part of the CEQA documentation being prepared for the Project. In the following sections, this WSA will evaluate whether the total projected water supplies available to the City during normal, single dry, and multiple dry water years during a 20-year projection will meet the projected water demand associated with La Entrada, in addition to the City's existing and planned future uses, including agricultural and manufacturing uses. Notably, the water demands of the Project previously have been accounted for as part of the City's 2006/2007 water supply planning process, at a time when La Entrada was referred to as the Lomas del Sol project. Since that time, the number of dwelling units for the Project has been reduced by 442 and the Project now has a lower total water demand than what was projected in 20067/2007. Furthermore, the water demands associated with the La Entrada Project have been accounted for and are part of the projected growth analyzed by CVWD in its recent 2010 UWMP and 2011 SPEIR analyses, which are further discussed below.

1.4 Existing Water Management Plans

In accordance with Water Code Section 19010(c)(1), the City has reviewed whether the projected water demand associated with the Project was included as part of the City's most recently adopted 2010 Urban Water Management Plan. Because the City's 2010 UWMP included very conservative demand projections, it did not specifically reflect the demands associated with La Entrada. Notably, however, the La Entrada Project is identified in CVWD's 2010 CVWMP (referred to then as the Lomas del Sol project). (See 2010 CVWMP, p. 3-3.) Accordingly, the demands associated with the Project have been accounted for as part of CVWD's regional water supply planning efforts, which specifically include population projections within the City and the City's SOI through the year 2045 in accordance with the Riverside County Center for Demographic Research RCP 06 planning process. (See 2010 CVWMP, pp. 3-3 to 3-4.) Therefore, and as set forth herein, the projected water demands of La Entrada have already been considered in preparing and adopting CVWD's 2010 CVWMP and 2011 SPEIR. These and other documents are described in more detail in the following sections.

1.4.1 City of Coachella 2010 Urban Water Management Plan

As indicated above, the City has completed its 2010 UWMP. Water Code Section 10910(c)(2) provides that if demand associated with a proposed project is accounted for in the most recently adopted UWMP, the water supplier may incorporate information from the UWMP in preparing certain elements of a WSA for the project. At the time the City's 2010 UWMP was prepared, the City had been hit hard by the economic recession. As such, demand projections contained in the City's 2010 UWMP were very conservative and did not expressly anticipate the increased growth generated by a project such as La Entrada in the immediate future. Population and housing projections had dropped from a high of 15% in 2006 to a low of 1% in 2009. Notably, however, the water demands associated with La Entrada have been accounted for as part of CVWD's water supply planning efforts and have been analyzed in CVWD's 2010 CVWMP Update (where the Project is referred to as the Lomas del Sol project) and 2011 SPEIR, which are further discussed below.

Although the City's 2010 UWMP included very modest growth projections, the Plan emphasized the City's ability to accommodate development through careful long-term water supply planning and aggressive demand management. Indeed, water conservation efforts are allowing water agencies to plan for growth in new and improved ways, where State law now requires water agencies to do more with less. SBx7-7 (sometimes referred to as the new "20 percent by 2020" law) is one of four policy bills enacted as part of the November 2009 Comprehensive Water Package (see California Water Code section 10608 et seq.). Among other things, SBx7-7 established the goal of achieving a 20 percent reduction in statewide urban per capita water use by the year 2020, and the interim goal of achieving a 10 percent reduction by 2015. In an effort to achieve those goals, SBx7-7 requires each urban retail water supplier to determine technical information, such as existing baseline water consumption, to establish future water use reduction targets (in gallons per capita per day (gpcd)), and to report that and other information in their 2010 UWMPs. SBx7-7 also requires each urban wholesale water supplier to include in its UWMP an assessment of its present and proposed future measures, programs, and policies to help achieve the water use reductions required by SBx7-7. These new reporting requirements began with the 2010 UWMPs. Under SBx7-7, an urban retail water supplier is defined as a water supplier that directly provides potable municipal water to more than 3,000 end users or that supplies more than 3,000 acre-feet of potable water annually at retail for municipal purposes. An urban wholesale water supplier is defined as a water supplier that provides more than 3,000 acre-feet of water annually at wholesale for potable municipal purposes.

The two primary calculations required by SBx7-7 are (1) the Base Daily Per Capita Water Use Calculation (average gpcd used in past years), and (2) Compliance Water Use Targets (targets for gpcd in 2015 and 2020). The Base Daily Per Capita Water Use Calculation is based on gross water use by an agency in each year and can be based on a ten-year average ending no earlier than 2004 and no later than 2010, or a 15 year average if ten percent of 2008 demand was met by recycled water. As indicated above, an urban retail water supplier must then set a 2020 water use target and a 2015 interim water use target in terms of gpcd. SBx7-7 establishes four alternative methods for water agencies to use in calculating their Compliance Water Use Targets, as follows: (1) 80% of Base Daily Per Capita Use; (2) adherence to specified performance standards; (3) 95% of the applicable state hydrologic region target as set forth in the State's 20x2020 Water Conservation Plan; or (4) the provisional target method and procedures developed by DWR pursuant to SBx7-7.

In accordance with SBx7-7, the City will strictly manage its per capita water use throughout the year 2020 and beyond, and those management activities will substantially enhance the City's ability to ensure sufficient and reliable water supplies and accommodate long-term growth. As set forth in Section 3 below, the City's base daily per capita water use for purposes of SBx7-7 was calculated as 191 gpcd, and its 2015 and 2020 targets were established as 186 gpcd and 181 gpcd respectively. In addition to SBx7-7, the 2009 Comprehensive Water Package also included new laws that require increased monitoring of groundwater basins, the development of agricultural water management plans, and a stricter reporting regime for water diversions and uses in the Delta.

The City's 2010 UWMP includes various water supply planning data, future projects, and basin management activities that are geared toward meeting the 20 percent reduction in per capita water consumption under SBx7-7. For example, the City has prepared a draft Water Treatment Plant Feasibility Study to evaluate alternative supply sources such as the Coachella Branch of the All American Canal (the Canal). The City also participates in groundwater recharge activities with CVWD through replenishment assessments, and has implemented a variety of water use efficiency programs, including demand management measures and a Water Shortage Contingency Plan that can be executed by the City Council during water shortages. The purpose of the Plan is to provide procedures with voluntary and mandatory provisions to minimize the effect of a water shortage to the City's service area. The four stage approach to reducing demand ranges from a voluntary 10 percent reduction in water use to a mandatory 50 percent reduction.

The City of Coachella universally acknowledges and embraces the importance of water issues, and as such is managing 14 cost-effective demand management measures (DMMs). These DMMs include technologies and methodologies that have been sufficiently documented in multiple demonstration projects and result in more efficient water use and conservation (e.g., residential plumbing retrofits, system water audits, leak detection, and repair, large landscape conservation programs and incentives, and public information and school education programs).

The City of Coachella has adopted a landscape irrigation policy as part of the City's "Landscape Guidelines" that address all landscaping for public parkways, median islands, and common area landscaping improvements for residential and commercial developments in the City. The City worked with the Coachella Valley Association of Governments and adopted the Coachella Valley "Model Landscape Ordinance" as a policy document. The guidelines used by the City encourage minimal turf areas, use of native plant materials reminiscent of the "desert wash" plant palette which are used in all of the newer residential common areas including retention basins, parkways and perimeter landscaped planters. The City has also implemented a model of sustainability in landscaping its largest public parks with smart irrigation systems and permeable pavers. The newly constructed Rancho Las Flores Park, the expanded Bagdouma Park, and the re-designed De Oro Park all incorporate a blend of native and drought-tolerant plants, trees and ground covers into an attractive, low-maintenance, water-saving resource for the community. Additionally, the Coachella Water Authority offers three water conservation programs to its residents. These include the Turf Removal Rebate Program, the Indoor/Outdoor Water Fixture Kits, and the Toilet Rebate Program.

Further, the City understands the need to investigate future water projects to meet demands associated with projected growth. As indicated above and as further discussed in this analysis, the City is evaluating and will continue to evaluate various source substitution projects to reduce overall demands on native groundwater supplies, such as the use of treated canal water for municipal purposes. The City's Water Master Plan and Capital Improvement Program (CIP) will continue to be updated to identify and implement future projects as they become needed to serve new demands within the City.

1.4.2 Coachella Valley Water District 2010 Urban Water Management Plan

CVWD has also completed its 2010 UWMP in accordance with the UWMP Act. The 2010 UWMP shows that CVWD has instituted various planning efforts regarding water supply and infrastructure opportunities. As discussed throughout this analysis, a key component of CVWD's water management strategy is the acquisition of additional imported water supplies to augment existing resources. As further set forth in CVWD's 2010 CVWMP Update, CVWD may seek to acquire up to 50,000 acre-feet per year (AFY) of additional water supplies through either long-term leases or entitlement purchases from willing parties. CVWD may also pursue water transfers and exchanges, and has identified possible ways to develop new sources of water. CVWD also anticipates the future use of local desalinated water as part of its water supply portfolio, whereby CVWD could use treated agricultural drainage water for irrigation purposes. Such projects would either make additional potable supplies available for municipal purposes or help offset groundwater pumping in the basin. (CVWD 2010 UWMP, p. 4-21.)

CVWD's 2010 UWMP identifies recycled water as another significant local resource that can be used to supplement the water supply of the Coachella Valley. Wastewater that is highly treated and disinfected can be reused for a variety of landscape irrigation and other purposes. Recycled water has been used for irrigation of golf courses and municipal landscaping in the Coachella Valley since 1968. It is expected that golf course irrigation will remain the largest use of recycled water in the future. Current and projected future uses of recycled water include irrigation of urban landscape and golf course lands. Recycled water use is limited by the lack of urban development in the east valley. As urbanization occurs in the future, a recycled water distribution system will be developed to serve recycled water for urban golf course irrigation and municipal irrigation. (CVWD 2010 UWMP, p. 4-23.)

Further, CVWD and DWA operate groundwater recharge programs in the upper Whitewater River and Mission Creek subbasins. As part of the CVWMP, CVWD intends to significantly expand its groundwater recharge program in the Whitewater River subbasin. CVWD recently completed construction the Thomas E. Levy (Levy) Groundwater Replenishment Facility in the lower Whitewater River Subbasin with a capacity to 40,000 AFY. CVWD is also conducting pilot recharge tests in the lower Whitewater River subbasin at the Martinez Canyon Pilot Recharge Facility. CVWD is presently recharging approximately 32,500 AFY at this facility. CVWD completed construction of a pilot recharge facility and several monitoring wells in the Martinez Canyon alluvial fan in March 2005. This facility is designed to recharge approximately 3,000 AFY. According to the 2010 CVWMP (see further discussion below), CVWD plans to construct a full-scale facility at Martinez Canyon to recharge 20,000 AFY by 2025. (CVWD 2010 UWMP, p. 3-12.)

As set forth throughout CVWD's planning documents, water demands in the Coachalla Valley will continue to be met in a sustainable manner by using the groundwater basin as a conjunctive use resource. In practice, that involves the use of groundwater wells to produce amounts that are continually supplemented and recharged with Colorado River, State Water Project, and local water supplies. As an overall water supply system, CVWD's service area (including the City and the La Entrada Project) is uniquely insulated from drought conditions and is capable of ensuring sufficient and reliable water supplies to meet demand because of the large storage volume of the basin (about 25 million AF). As noted herein, CVWD is also planning ways to deliver treated Colorado River water directly to the urban distribution system, and untreated Colorado River water directly for landscape irrigation and other non-potable uses, both of which will further reduce the need to rely on the groundwater basin. (CVWD 2010 UWMP, p. 4-31.)

As with the City, CVWD's water conservation efforts are a critical component of its water management strategy. CVWD has had a water conservation program since the 1960s and recognizes the importance of conserving water to reduce demand on the groundwater supply and decrease reliance on imported supplies. With the enactment of SBx7-7, CVWD's demand management measures (DMMs) have become even more comprehensive. As noted above, SBx7-7 establishes the goal of achieving a 20 percent reduction in statewide urban per capita water use by the year 2020, and the interim goal of achieving a 10 percent reduction by 2015. As a retail water supplier, CVWD complies with SBx7-7 by establishing and implementing per capita water use reduction targets, and by identifying present and future measures, programs, and policies to help achieve the water use reductions required by SBx7-7. Among various other actions, CVWD carries out the following DMMs:

- Water survey program for single-family and multi-family residential customers;
- Metering with commodity rates for all new connections and retrofit of existing connections program;
- Large landscape conservation programs and incentives program
- Public information program;
- School education program;
- Conservation programs for CII accounts program;
- Conservation pricing program;
- Water conservation coordinator program;
- Water waste prohibition program.

As noted in its 2010 UWMP, CVWD will continue existing water conservation programs and implement new programs to enhance water conservation and meet reduced urban per capita water consumption. (CVWD 2010 UWMP, p. 6-3.) While the City of Coachella and the La Entrada Project are not within CVWD's retail service area, the foregoing discussion of CVWD's 2010 UWMP is provided to illustrate the extraordinary water supply planning and demand management efforts that are undertaken by the District in its role as an urban water supplier.

1.4.3 2010 Coachella Valley Water Management Plan

The 2010 CVWMP serves as a 35-year blueprint for wise water management and the basis for all CVWD's efforts to preserve the valley's groundwater resources. The basic goal of the CVWMP remains similar to that of previous WMPs: "to reliably meet current and future water demands in a cost-effective and sustainable manner." New factors facing water resources managers throughout California have led to refined objectives.

The programs and projects identified in the 2010 CVWMP Update are based on the following objectives:

- meet current and future water demands with a 10 percent supply buffer;
- eliminate long-term groundwater overdraft;
- manage water quality;
- comply with state and federal regulations;
- manage future costs; and
- minimize potential adverse environmental impacts.

The 2010 CVWMP calls for a multifaceted approach to water management and water conservation, including:

- increased water conservation by all types of water users;
- increased imported water supply from the Coachella Canal and State Water Project;
- increased use of the imported supply and recycled water, instead of groundwater, for irrigation; and
- expanded groundwater replenishment efforts, especially in the East Valley.

The 2010 CVWMP Update identifies several water conservation measures with the goal to reduce overall water consumption by 20 percent by 2020, and the goal to maintain this level of reduction through 2045. These measures include water efficient landscaping and irrigation controls, water efficient plumbing, tiered or seasonal water pricing, public information and education programs, alternative water supplies, water restrictive municipal development policies, appointing a CVWD conservation coordinator, and refining the maximum water allowance budgets for landscaped and recreational areas. The 2010 CVWMP Update shows reduced reliance on groundwater sources over the long term by utilizing more Colorado River water, SWP water and recycled water, by expanding source substitution, and through increased water conservation. (2010 CVWMP, pp. 6-3 to 6-13.)

The 2010 CVWMP Update emphasizes cooperation with municipalities, local water agencies, and tribes in regional planning and implementation. The following are among some of the recommended activities outlined in the update for the board of directors to consider over the next 35 years:[5]

- Provide incentives and support to agricultural customers to conserve water, such as through converting from flood/sprinkler irrigation to more efficient micro-sprinkler/drip systems;
- Encourage existing golf courses to convert landscaping to meet the 2007 Landscape Ordinance, requiring no more than 4 acres of grass per hole and 10 acres of grass per practice area;
- Expand landscape conversion rebates for domestic customers to encourage less grass and more desert appropriate landscaping;

[5] Coachella Valley Water District, *2010 Coachella Valley Water Management Plan Update* (December 2010).

- Complete construction on subsequent phases of the Mid-Valley Pipeline system to provide a blend of recycled and Colorado River water to up to 50 golf courses in lieu of groundwater;
- Turn the pilot Martinez Canyon replenishment facility into a full-scale facility with a capacity of up to 40,000 acre-feet of replenishment annually;
- Implement East Valley source substitution projects such as expansion of the Canal water distribution system in the Oasis area to serve agricultural operations that are not currently served with Canal water, this system is expected to deliver about 27,000 AFY of Canal water to offset groundwater pumping.

The 2010 CVWMP Update shows that CVWD has many current and future programs that are designed to maximize the water resources available to the region, such as recharge of its Colorado River and SWP supplies, expanded use of recycled water, desalinated agricultural drain water, conversion of groundwater uses to Canal water and water conservation measures, including tiered water rates, landscaping ordinance, outreach and education. The 2010 CVWMP Update and CVWD's Replenishment Assessment Programs establish a comprehensive and managed effort to eliminate overuse of local groundwater while ensuring a sufficient and sustainable water supply to meet projected demands. These programs allow CVWD to maintain the groundwater basin as its primary urban water supply and to recharge the groundwater basin as its other supplies are available.

The 2010 CVWMP Update presented a number of recommended programs and features to enhance water supply development and reduce groundwater overdraft. The continuation and expansion of existing projects and programs is summarized below. (2010 CVWMP Section 8.)

- An agricultural conservation program including elements such as: training, system upgrades and retrofits, economic incentives, and regulatory programs that can achieve up to a 14 percent reduction in consumptive use by 2020.
- An urban conservation program including elements such as: installing automated meters, extending landscape ordinances, implementing water budget-based tiered water rates, and various rebate programs, all of which are aimed at achieving the State's requirement for a 20 percent reduction in per capita use by 2020.
- Continue and expand the golf course conservation program that is expected to achieve a savings of 11,600 AFY by 2045.
- Additional water supply development programs such as: acquisition of additional imported supplies, increased recycled water use, and development of desalinated drain water. Groundwater recharge will increase over time at the existing Whitewater and Thomas E. Levy Groundwater Replenishment Facilities, and the construction of the proposed Martinez Canyon Recharge Facility.
- Source substitution will continue to be an important element for offsetting groundwater use. Examples of new projects and programs include: using canal water for urban irrigation, implementing groundwater recharge in the Indio area, investigating groundwater storage opportunities with IID, pursuing additional groundwater treatment for arsenic, developing a salt/nutrient management plan, improved brine disposal, mitigation of canal water losses, maintaining and

developing improved drainage control, increasing stormwater capture and recharge, and developing local groundwater supplies for non-potable use.

As further set forth below, the 2010 CVWMP serves as a blueprint for ensuring a sufficient and sustainable water supply to meet the needs of projected growth throughout the Coachella Valley, including the City and the City's sphere of influence, for the next 30 years and beyond.

1.4.4 2011 Coachella Valley Water Management Plan Subsequent Program Environmental Impact Report and 2012 Final Subsequent Program Environmental Impact Report

As noted above, CVWD first adopted the Coachella Valley Water Management Plan and the related Program Environmental Impact Report (PEIR) in September 2002. The CVWMP is a multi-faceted plan to allow CVWD to meet its responsibilities for securing and protecting Coachella Valley water supplies into the future. The CVWD Board of Directors recognizes the need to update the Plan periodically to respond to changing external and internal conditions. The 2010 CVWMP Update has been prepared to meet that need. The 2010 CVWMP defines how the project goals will be met given changing conditions and new factors affecting water supply reliability, water demands and evolving federal and state regulations. The planning time horizon for the 2010 CVWMP Update is 35 years, from 2010 to 2045. As with the 2002 CVWMP, CVWD analyzed the potential environmental impacts associated with implementing the 2010 CVWMP pursuant to the California Environmental Quality Act (CEQA). That document is the 2011 Subsequent Program EIR (2011 SPEIR) (State Clearinghouse (SCH) No. 1999041032, SCH No. 2000031027). (2011 SPEIR, pp. 1-1 and 2-1.)

As shown in Table 1-2 of the 2011 SPEIR, it has been determined that, overall, the 2010 CVWMP will have less than significant environmental impacts, and in certain key respects will have beneficial effects. For example, in addressing regional groundwater overdraft issues, the 2010 CVWMP will result in decreasing annual overdraft conditions in the West and East Valley areas, and water levels will change at a slower rate than under current condition and will increase in some areas. (2011 SPEIR, p. 1-25.)

The goal of the 2010 CVWMP is to allow CVWD and other water agencies in the Valley to reliably meet current and future water demands within their service areas in a cost effective and sustainable manner for the period 2010 to 2045. As noted above, the programs and projects identified in the 2010 CVWMP fulfill this goal by meeting the following objectives: meet current and future water demands with a 10 percent supply buffer; reduce/eliminate long-term groundwater overdraft; manage and protect water quality; comply with state and federal laws and regulations; manage future costs; and minimize adverse environmental impacts. The 2010 CVWMP differs from the 2002 CVWMP in that a 10 percent supply buffer is applied to the projected water demands while eliminating overdraft. This buffer compensates for potential uncertainties such as demands higher than forecast or supplies that cannot be implemented or do not deliver as much water as planned. The supply buffer would be established through a combination of additional supplies and water conservation measures. (2011 SPEIR, pp. 1-2 and 2-12.)

The 2011 SPEIR identifies various external factors that have affected or may affect water supplies available to the Coachella Valley. Key factors include: annual fluctuation in imported State Water Project (SWP) supplies due to drought and environmental needs in the Sacramento-San Joaquin Delta (Delta); recent environmental rulings to protect sensitive fish species in the Delta that restrict the State's ability to move water through the Delta to the SWP; preparation of the Bay-Delta Conservation Plan, which is intended to restore the Delta's ecosystem and improve water supply reliability; the Quantification Settlement Agreement (QSA), signed in 2003 to allocate California's allotment of Colorado River water and meet its contractual limitation; litigation concerning the QSA; and effects of climate change on the long term availability and reliability of SWP and Colorado River water supplies. (2011 SPEIR, p. 1-2.) These factors are fully addressed in the 2011 SPEIR and are further described in this WSA.

The 2010 CVWMP Update identifies approaches for meeting future water needs in the study area in light of changing environmental conditions and other water supply factors. To meet revised future needs, the CVWMP includes new features in the areas of water conservation, source substitution, new supplies and groundwater recharge. (2011 SPEIR, p. 1-7.) The 2010 CVWMP incorporates both a "bookends" approach and "building block" approach to deal with potential uncertainties in future demands and supplies. The Plan also incorporates enhanced cooperation and implementation among cites, local water agencies, and tribes in the Coachella Valley. (2011 SPEIR, p. 1-7.) For example, the 2010 CVWMP Update includes an aggressive program of water conservation for urban, golf course and agricultural water users. However, there are limits in terms of cost, effectiveness and acceptability of water conservation activities. As those limits are reached, other Plan elements for meeting future needs also can be adjusted. One source of supply is desalination of drain water, the most expensive alternative for providing new supplies. This approach only will be implemented as other sources of supplies reach practical limits. Therefore, the Plan includes a range of 55,000 to 80,000 acre-feet per year (AFY) for desalination of drain water. The actual amount of water from this source will depend upon how much can be obtained first from other, lower cost sources. (2011 SPEIR, p. 1-8.)

The 2010 CVWMP Update has the same five major elements as the 2002 CVWMP, but with a building block approach of implementing elements to better respond to changes in the planning environment. As indicated above, a key element is water conservation (urban, agricultural and golf, but at higher rates than in the 2002 Plan). Urban measures are water efficient plumbing and landscape water use audit programs. For golf, measures are scientific irrigation scheduling, water audits and monitoring of maximum water allowance compliance, turf limitations for new course as well as water audits. Agricultural water conservation methods include scientific irrigation scheduling, salinity management, salinity field mapping, conversion to micro-irrigation, distribution uniformity evaluations, grower training and engineering evaluations of irrigation efficiency. Another element is additional water sources, including increasing surface supplies for the Valley from outside sources (Colorado River and SWP transfers and leases), exchanges, dry-year purchases, water development projects, stormwater capture, and desalination. A third element is source substitution of surface water supplies for groundwater. This may involve providing recycled water or Canal water or other sources to additional urban, golf and agricultural users to reduce groundwater pumping. Source substitution can also involve additional use of the Mid-Valley Pipeline Project, Phase I of which was completed in 2009. The fourth element is groundwater recharge, including: constructing and operating recharge basins to augment stored groundwater; continued and increased recharge at the Whitewater Recharge Facility; construction and operation of a new facility at Martinez Canyon; increased recharge at the Levy facility; and a possible new City of Indio recharge facility at Posse Park. The fifth element is monitoring and data management, which includes monitoring and evaluation of subsidence and groundwater levels and quality to provide the information needed to manage the Valley's groundwater resources. (2011 SPEIR, p. 1-8.)

In developing the 2010 CVWMP, CVWD utilized the latest population projections developed by Riverside County and adopted by the Southern California Association of Governments (SCAG) in 2008. CVWD does not develop population growth projections for use in water management planning. The 2008 SCAG projections could not have taken into account the current recession, which has slowed growth and will continue to have negative effects on growth in the near term. Over the long term, growth will continue; however, population projections will need to be adjusted in terms of the timing of growth. These realities necessitate adjustment of Plan implementation to meet actual near term needs and continued updates of the CVWMP in the future to reflect revised population projections. (2011 SPEIR, pp. 1-8 to 1-9; see also Table 1-1, Summary of the 2010 Water Management Plan Update and Implementation Plan, pp. 1-9 to 1-13.)

Riverside County embarked on major revisions to the County's General Plan and General Plan EIR (Riverside County, 2009). In the absence of these completed documents, CVWD has been required to make assumptions in the 2010 CVWMP Update regarding the effects of projected growth on land use, particularly the conversion of agricultural land to urban use in the East Valley. Consequently, the 2010 CVWMP Update projects a reduction in agricultural water demand combined with a significant increase in urban water demand. Increased urbanization also increases domestic wastewater generation in the East Valley. Expansion of the CVWMP planning area to include land annexed or within the spheres of influence of the cities of Coachella and Indio also adds to the potential for growth in the Valley. Although the 2007 Riverside County/CVAG growth forecasts did not anticipate significant growth in this area, the potential for development could result in additional population growth and water demand during the 2010 CVWMP Update planning period. While there has been an economic slowdown over the past two years, these projected population and land use changes are anticipated to be fulfilled in the long term, but at a slower pace. (2011 SPEIR, p. 3-2.)

Agricultural water demands are projected to decrease, while urban demands will increase in response to anticipated population growth. Factoring potential variations in future land use and growth forecasts into these demand projections, water demands in 2045 could range from 793,600 acre-feet per year (AFY) to 971,500 AFY with a mid-range planning value of 885,400 AFY. These projections incorporate reduced outdoor water use for new development as required by the CVWD-CVAG water efficient Landscape Ordinance (2009). In the absence of this ordinance and other on-going conservation measures, water demands in the Valley would be nearly 1,040,000 AFY by 2045. (2011 SPEIR, pp. 3-3 to 3-4.)

Implementation of the 2010 CVWMP Update has been divided into near-term elements and long-term elements. Even with the current recession and lack of growth, continuation of existing elements and some new elements are needed to reduce overdraft and its adverse affects. Ongoing elements that will continue are: recharge at

Whitewater Recharge Facility with SWP Exchange water and SWP purchases; implementation of the QSA; levy facility recharge at current levels of 32,000 AFY; Martinez Canyon recharge at current Pilot Facility Level of 3,000 AFY; water conservation programs at current levels, including implementation of the Landscape Ordinance; effluent recycling in the West Valley; increased use of Canal water by golf courses with existing Canal water connections to reduce groundwater pumping; conversion of East Valley agriculture to Canal water, as opportunities arise, to reduce groundwater pumping; groundwater level/quality monitoring; and subsidence monitoring. (2011 SPEIR, p. 1-14.)

Assuming that the Coachella Valley study area growth rate remains relatively low, during the next five years CVWD will focus on three new or expanded activities to reduce overdraft, such as: increased use of the Mid-Valley Pipeline project to reduce overdraft in the West Valley by connecting golf courses and reducing groundwater pumping by those courses; implementation of additional water conservation measures, including the Landscape Ordinance, to meet the State's requirement of 20 percent conservation by 2020; and preparation of a salt/nutrient management plan for the Valley by 2014 to meet SWRCB Recycled Water Policy requirements to improve implementation of wastewater effluent recycling. Of these three elements, only the increased use of the Mid-Valley Pipeline would have a second tier CEQA document. Implementation of Proposed Project elements, such as a desalination plant or additional water transfers, which would trigger second tier CEQA documents, are anticipated after 2015. (2011 SPEIR, p. 1-14.)

Due to potential variability associated with imported water supplies from the Colorado River and the SWP, which are further discussed in this WSA, the 2010 CVWMP Update evaluates an array of water supply scenarios to determine a likely range of future supply needs. These scenarios assume different combinations of a Delta conveyance solution and QSA validity to determine the future amount of imported water available to the Valley. (2011 SPEIR, p. 3-7.) Based upon the scenarios, additional water supplies and conservation would be required to meet projected demands in 2045 while providing 10 percent supply buffer, eliminating groundwater overdraft and improving the salt balance of the basin. (2011 SPEIR, p. 3-7.) The 2010 CVWMP Update evaluates a wide range of water conservation and supply options based on potential yield, reliability, cost, water quality and other feasibility factors. Based on this evaluation, a range of water supply mixes was established for each planning scenario. Each scenario maximizes the use of local sources and recycled water. Water conservation and drain water desalination are variable, based on the availability of existing and future imported water supplies including potential water transfers and acquisitions. (2011 SPEIR, pp. 3-8 to 3-9.)

Water conservation is a major component of water management in the Coachella Valley. As a desert community heavily reliant upon imported water supplies, the Coachella Valley must use its water resources as efficiently as possible to meet California Water Code requirements and State legislation such as "20x2020" (requiring 20 percent per capita water use reduction by the year 2020), as well as to maintain eligibility for State funding opportunities through compliance with Assembly Bill (AB) 1420 demand management measures (DMMs) required in Urban Water Management Plans. (2011 SPEIR, p. 3-9.) According to the 2010 CVWMP, agricultural water conservation remains the most cost-effective approach for extending the existing water supplies of the Valley. Under the 2010 CVWMP, an agricultural conservation program will be implemented that achieves up to a 14 percent reduction in consumptive use by 2020. The savings would be achieved using a staged approach. Initially, low cost, voluntary programs would be initiated followed by increasingly more expensive and mandatory programs. (2011 SPEIR, pp. 3-9 to 3-10.)

The following building blocks have been identified for implementation: grower education and training (grower meetings and training programs combined with confidential grower audits funded by the District); District-provided services (including scientific irrigation scheduling, scientific salinity management, moisture monitoring and farm water distribution evaluations funded by the District); irrigation system upgrades/retrofits (partial or full funding and/or financial support of growers that convert from flood/sprinkler to micro-sprinkler/drip irrigation systems); economic incentives (such as tiered pricing, water budget pricing, or seasonal pricing); and regulatory programs (regulations that support and provide for agriculture conservation, including farm management plans, mandatory drip/micro-spray systems for new permanent crops, and conversion of existing crops over time). (2011 SPEIR, pp. 3-9 to 3-10.)

These program features will be incrementally expanded until the target reduction is achieved. To achieve the maximum return on investment from conservation activities, initial emphasis will be placed on those agricultural operations with the lowest irrigation efficiency. The agricultural conservation program is anticipated to save about 39,500 AFY of water by 2020. The savings are projected to decrease to approximately 23,300 AFY by 2045 as agricultural land transitions to urban uses. CVWD is developing methods for tracking the effectiveness of agricultural water conservation. These methods will include determining average water use per acre of farmed land and average irrigation efficiency. The methods will reflect variations in annual/seasonal evapotranspiration and cropping patterns. Progress toward meeting agricultural conservation goals will be evaluated and reported annually. (2011 SPEIR, p. 3-10.)

Urban conservation is also critical. Under the 2010 CVWMP, the urban water conservation program will be expanded and enhanced to meet the State's requirement of a 20 percent reduction in per capita use by 2020 (SBx7-7). The baseline for this reduction is the 10-year average per capita usage for the period of 1995 through 2004. This will be accomplished by: continued public education and outreach programs promoting water conservation; improved landscape irrigation scheduling and efficiency; implementation of irrigation system retrofit rebates; implementation of appropriate water rate structures that provide the economic incentives needed to encourage efficient water use; coordinated regional water conservation programs involving Valley water purveyors, cities and Riverside County; continued implementation of the CVWD Valley-wide Landscape Ordinance (Ordinance 1302-1; revised Ordinance 1374); installation of automated or "smart" water meters; extension of the Landscape Ordinance to include all landscaping regardless of size (current limit is 5,000 square feet or larger for homeowner furnished landscaping); further decreases in the water allocations for landscape irrigation consistent with good irrigation practices and desert landscaping; landscape retrofit rebates (i.e., economic incentives for replacing high water use landscaping, also known as "cash for grass"); restrictions on the total amount of turf allowed; audits of new development to assure continued compliance with the Landscape Ordinance; plumbing retrofits for existing properties including mandatory retrofit (ultra low flush toilets, showerhead replacement, etc.) prior to sale of property; conservation rebates for high-efficiency clothes washers; compliance with California Green Building Code Standards

(California Code of Regulations Title 24, Part 11, 2010); and water distribution system audits and loss reduction programs. (2011 SPEIR, p. 3-10 to 3-11.)

Once the conservation targets are achieved, continued implementation of those measures will result in even greater savings per capita as new growth occurs. Projections indicate that continued implementation of these measures in conjunction with the State's 2010 CALGREEN Building Code requirements will result in per capita water use reduction of nearly 40 percent compared to the baseline per capita use defined in SBx7-7. This could potentially result in additional water savings of 55,000 AFY by 2045 if growth occurs as projected. To provide the water supply buffer, this target is increased to 73,500 AFY by 2045. Additional water conservation beyond this amount will be implemented if needed to offset unanticipated reductions in other water supplies during the planning period. Pursuant to SBx7-7, Valley water agencies will track the effectiveness of urban water conservation. Progress toward achieving the urban water conservation goals will be evaluated annually and reported in UWMPs prepared on five-year intervals. If progress shows that additional conservation is being achieved, then the water supply needs will be reassessed. (2011 SPEIR, p. 3-11.)

The 2011 SPEIR identifies golf course conservation as another key component of the management plan. Under the 2010 CVWMP, Valley water agencies are expected to do the following: implement a water conservation program to achieve a 10 percent reduction in water use by existing golf courses (built prior to 2007) by 2020 (this would be accomplished through golf course irrigation system audits and soil moisture monitoring services); encourage existing golf courses to reduce water use by reducing their acreage of turf; implement the 2009 CVWD/CVAG Landscape Ordinance objectives for all new golf courses (built in 2007 and later); conduct landscaping and irrigation system plan checks to verify compliance; and develop and implement methods to evaluate the effectiveness of golf course water conservation such as measuring water use per irrigated acre. These measures are expected to achieve a savings of 11,600 AFY by 2045. Conservation by future courses has been incorporated into the water demand projections. Progress toward meeting golf course conservation goals will be evaluated and reported annually. (2011 SPEIR, pp. 3-11 to 3-12.)

The 2010 CVWMP Update strategy for water supply development consists of a balanced portfolio that retains flexibility to adapt to future changes in supply reliability. Sufficient water supplies are planned to provide a 10 percent buffer on an average basis to meet unanticipated reductions in existing supplies or difficulties in developing new supplies. The additional supplies needed to provide the buffer would be implemented when required based on an on-going analysis of projected demands and supplies. (2011 SPEIR, p. 3-12.) A summary of the water supply development efforts of the 2010 CVWMP is set forth below.

Acquisition of Additional Imported Supplies

Additional imported water supplies will be required to eliminate groundwater overdraft and meet the future demands of the Valley. The 2002 CVWMP established an average water supply target of 140,000 AFY from the SWP, of which about 103,000 AFY would be used for recharge at Whitewater and 35,000 AFY would supply the Mid-Valley Pipeline (MVP) project. CVWD and DWA have made significant progress since 2002 toward achieving these targets with the acquisition of SWP Table A entitlement water from Metropolitan (100,000 AFY), Tulare Lake Basin Water Storage District (16,900 AFY) and Berrenda Mesa Water District (16,000 AFY).

This has increased the Valley's SWP Table A Amounts from 61,200 AFY to 194,100 AFY. In addition, periodic one-time purchases of water totaling 50,200 AF have been made after 2002. As described in the 2011 SPEIR, given recent factors affecting the California water supply picture, the average amount of additional imported supply required is in the range of 45,000 to 80,000 AFY. The higher value assumes successful implementation of the BDCP and Delta conveyance facilities while the lower value is based on reduced future SWP reliability (to 50 percent). (2011 SPEIR, p. 3-12.)

Additional supplies will be obtained through the following actions: acquire additional imported water supplies through long-term lease or purchase where cost effective; continue to purchase SWP Turnback Pool and SWP Article 21 (Interruptible) waters; continue to purchase supplemental SWP water under the Yuba River Accord Dry Year Water Purchase Program as available; work with Metropolitan to define the frequency and magnitude for SWP Table A call-back under the 2003 Water Transfer Agreement, and continue to play an active role with U.S. Bureau of Reclamation (Reclamation), DWR, the State Water Contractors and other agencies in developing the BDCP and Delta Habitat Conservation and Conveyance Program. (2011 SPEIR, p. 3-13.)

Increased Recycled Water Use

The 2002 CVWMP had a recycled water use target of 30,000 AFY for the West Valley and 8,000AFY for the East Valley in 2035. Essentially all available recycled water in the West Valley is currently being put to beneficial use either through direct non-potable uses like urban and golf course irrigation or through percolation. As urban growth occurs, the following activities will be implemented under the 2010 CVWMP Update: in the West Valley, implement a joint agency goal to increase recycling of all generated wastewater for non-potable irrigation from 60 percent to at least 90 percent where feasible; in the East Valley, maximize the use of recycled water generated by future growth for irrigation as development occurs and customers become available by constructing tertiary treatment and distribution facilities at the CVWD Water Reclamation Plant No. 4 (WRP-4),City of Coachella and Valley Sanitary District (VSD) facilities; evaluate the feasibility of delivering recycled water in the existing Coachella Canal water distribution system while avoiding potential conflicts with future urban water treatment and use of Canal water; determine the minimum amount of recycled and other water flow that must be maintained in the CVSC to support riparian and wetland habitat; and fully utilize all wastewater generated by development east of the San Andreas Fault for irrigation uses to meet demands in that area and reduce the need for additional imported water supplies. (2011 SPEIR, p. 3-13.)

Based on these recommendations, up to 34,500 AFY of recycled water would be used in the West Valley, up to 33,000 AFY of recycled water would be used in the East Valley and up to 10,800 AFY of recycled water would be used in the area east of the San Andreas fault for direct non potable uses by 2045, for a total of 78,300 AFY. (2011 SPEIR, p. 3-14.)

Develop Desalinated Drain Water

The 2002 CVWMP had a planning target of 11,000 AFY of desalinated drain water usage by 2035. Measures will include: developing a program to recover, treat and distribute desalinated drain water and shallow (semi-perched) groundwater for non-potable and potable uses in the East Valley; developing a disposal system to dispose of brine generated by the desalination process; and constructing a demonstration facility to gain operational experience in drain water desalination and brine disposal. Under the 2010 CVWMP Update, the amount of water recovered through drain water desalination may range from 55,000 to 85,000 AFY by 2045, depending on the effectiveness of water conservation measures and the availability of other supplies. The lower end of the range reflects the successful implementation of the BDCP and Delta conveyance facilities. The high end of the range is close to the maximum amount of drain water expected to be generated in the Valley and would be implemented if SWP Exchange water reliability remains low. The desalination program will be phased so that it can be expanded in response to future water supply conditions and needs of the Valley. (2011 SPEIR, p. 3-14.)

Groundwater Recharge Programs

The 2002 CVWMP had a planning target of 103,000 AFY of SWP water at the Whitewater Recharge Facility and 80,000 AFY of Canal water recharge at East Valley recharge facilities by 2035. Whitewater recharge varies annually, but the SWP Exchange supply can currently provide about 77,700 for recharge. Canal water recharge is currently 32,000 AFY at the Levy Facility and 3,000 AFY at the Martinez Canyon Pilot facility. Groundwater recharge continues to be a significant component of water management in the Coachella Valley. Existing and proposed recharge activities identified in the 2002 CVWMP will continue with the modifications identified below. (2011 SPEIR, p. 3-14.)

Whitewater Recharge Facility

The Whitewater Recharge Facility is a series of earthen recharge basins and distribution channels fed by the Whitewater River, into which CVWD and DWA recharge SWP Exchange water (see discussion below). The 2010 CVWMP Update includes the following elements regarding the Whitewater Recharge Facility: continued operation of the Whitewater Recharge Facility to recharge SWP Exchange water, at least 100,000 AFY over a long-term (20-year) average; transfer and exchange any unused desalinated drain water and SWP water obtained through the QSA for CRA water delivered to Whitewater for recharge; and use of additional acquired water transfers or leases to supplement the existing SWP Exchange water. (2011 SPEIR, p. 3-15.)

Thomas E. Levy Groundwater Replenishment Facility

CVWD operated a pilot recharge facility at Dike 4 near Avenue 62 and Madison in the City of La Quinta beginning in 1997. Construction of the 180-acre, full scale Levy facility was completed inmid-2009 and has an estimated average recharge capacity of 40,000 AFY. Currently the capacity is limited by hydraulic and water delivery constraints within the Canal water distribution system to a long-term average of about 32,000 AFY. Consequently, construction of an additional pipeline and pumping station from Lake

Cahuilla may be required in the future. The 2010 CVWMP Update includes the following elements regarding the Levy Replenishment Facility: continued operation of the Levy Facility and recharge 40,000 AFY on a long-term basis as system conveyance capacity allows; monitoring groundwater levels in shallow and deep aquifers for signs of rising shallow groundwater; develop operating criteria to minimize chances for shallow groundwater mounding; and if the existing conveyance system is not capable of sustaining 40,000 AFY of deliveries for recharge at the Levy facility, constructing a second pumping station and pipeline from Lake Cahuilla to provide a supplemental supply. (2011 SPEIR, p. 3-15.)

Martinez Canyon Recharge

The Martinez Canyon recharge facility is a pilot project underway since 2005. Upon completion of a full-scale facility, estimated to be 240 acres in area, this project is expected to recharge 20,000to 40,000 AFY on average. The recharge facility would be located adjacent to the pilot facility west of the community of Valerie Jean in the East Valley, at the Martinez Canyon alluvial fan between Avenues 74 and 76. (2011 SPEIR, p. 3-15.)

The 2010 CVWMP Update includes the following elements regarding the Martinez Canyon Recharge Facility: conducting siting and environmental studies, land acquisition and design for the full-scale Martinez Canyon facility with a design capacity of up to 40,000 AFY; completing construction of the Martinez Canyon facilities in phases such that the facility can be initially operated at 20,000 AFY, with potential future expansion to as much as40,000 AFY based on groundwater overdraft conditions and implementation of East Valley source substitution projects; and coordinating pipeline and pumping station construction with expansion of the Canal distribution system in the Oasis area. (2011 SPEIR, p. 3-16.)

Source Substitution Programs

Source substitution also continues to be an important means to reducing groundwater overdraft. Due to the expected changes in water use patterns in the Valley as a result of continued development, source substitution will receive increased emphasis in the future. The following source substitution actions are proposed in the 2010 CVWMP Update. (2011 SPEIR, p. 3-16.)

Mid-Valley Pipeline

The MVP is a pipeline distribution system to deliver Canal water to the Mid-Valley area for use with CVWD's recycled water for golf courses and open space irrigation in lieu of groundwater pumping for these uses. Construction of the first phase of the MVP from the Coachella Canal in Indio toWRP-10 (6.6 miles in length) was completed in 2009. MVP Canal water is blended with WRP-10 recycled water for golf course irrigation. Implementation of later phases will expand the MVP to serve approximately 50 golf courses in the Rancho Mirage - Palm Desert - Indian Wells area that currently use groundwater as their primary source of supply with a mixture of Colorado River water and recycled water as anticipated in the 2002 CVWMP. (2011 SPEIR, p. 3-16.)

The 2010 CVWMP Update continues to include the MVP project, which will serve about 37,000 AFY of imported water and 15,000 AFY of WRP-10 recycled water on average by 2045. The MVP will meet approximately 72 percent of the West Valley golf course demand by 2045. Under the 2010 CVWMP Update, it is proposed to: prepare a MVP system master plan to lay out the future pipeline systems; implement near-term (next five years) project expansions to connect 14 golf courses along the MVP alignment and extensions of the existing non-potable distribution system; and complete the construction of the remaining phases of the MVP system to provide up to 37,000 AFY of Canal water and 15,000 AFY of WRP-10 recycled water on average to West Valley golf courses. (2011 SPEIR, pp. 3-16 to 3-17.)

Conversion of Agricultural and Golf Course Uses to Canal Water

The 2010 CVWMP Update includes the following elements regarding conversion of agricultural and golf course uses to Canal water: working with existing East Valley golf courses to increase Canal water use to 90 percent of demand; connecting new East and West Valley golf courses having access to Canal water and meet 80-90 percent of demand; working with large agricultural groundwater pumpers to provide access to Canal water and encourage them to reduce their groundwater pumping; revising and update the Oasis distribution system feasibility study, considering possible future conversion to urban use; and upon completion of cost-effectiveness feasibility analyses, designing and constructing the Oasis distribution system to deliver up to 27,000 AFY of Canal and desalinated drain water by 2020. These projects will deliver up to 71,000 AFY of additional Canal water to reduce groundwater pumping. (2011 SPEIR, p. 3-17.)

Treatment of Colorado River Water for Urban Use

The Plan includes treatment of Canal water for urban uses: CVWD, the City of Coachella and Indio Water Authority (IWA) will develop coordinated plans to treat Canal water for urban use in the East Valley; conduct a feasibility study to determine the economic tradeoffs between large-scale centralized treatment facilities and small scale satellite treatment facilities including potential delivery from the MVP system; evaluate opportunities for regional water treatment projects among CVWD, the City of Coachella and IWA to capture economies of scale, and determine the amount of Canal water desalination needed to minimize taste, odor and corrosion. These projects will deliver up to 90,000 AFY of treated Canal water for urban use by 2045 to reduce existing and future groundwater pumping. (2011 SPEIR, pp. 3-17 to 3-18.)

New Projects and Programs

In addition to those programs identified in the 2002 CVWMP that will continue or be expanded, the following projects and programs are elements of the 2010 CVWMP: Canal water use for urban irrigation; groundwater recharge in the Indio area; investigation of groundwater storage opportunities with IID; additional groundwater treatment for arsenic; development of a salt/nutrient management plan; desalination brine disposal; evaluation of Canal water loss reduction; drainage control; evaluation of stormwater capture feasibility; and development of local groundwater supplies for non-potable use. (2011 SPEIR, p. 3-18.)

Canal Water Use for Urban Irrigation

As development proceeds in the East Valley, CVWD and the other Valley water purveyors will require new development to install dual piping systems for distribution of non-potable water (Canal or recycled water) for landscape irrigation. This program will offset the reduced Canal water use by agriculture as land use transitions to urban development. It will also reduce groundwater pumping for urban use. From at least two-thirds to as much as 80 percent of the landscape demand of new development will be connected to non-potable water delivery systems. This will result in the utilization of 91,000 to 108,000 AFY of non-potable water by 2045. This program is essential to continued full use of the Valley's Colorado River water supplies as agricultural land use declines. (2011 SPEIR, p. 3-18.)

Groundwater Recharge in the Indio Area

The City of Indio is evaluating the feasibility of constructing a groundwater recharge project within its service area. Pursuant to the Indio-CVWD settlement agreement (2009), CVWD will work with the City of Indio to evaluate the feasibility of developing a groundwater recharge project that reduces groundwater overdraft in the Indio area. Indio has no water rights, so the supply will be Canal water, either purchased from CVWD or purchased from another rights holder and exchanged for Canal water. The 2010 CVWMP Update assumes that an Indio area groundwater recharge project could offset pumping by 10,000 AFY. The actual amount will depend on the feasibility study results. (2011 SPEIR, pp. 3-18 to 3-19.)

Investigation of Groundwater Storage Opportunities with IID

As part of the QSA, CVWD and IID signed an agreement that allows IID to store surplus Colorado River water in the Coachella Valley groundwater basin. Under the agreement, CVWD will store water for IID, subject to available storage space, delivery and recharge capacity and the prior storage rights of CVWD, DWA and Metropolitan. Stored water would incur a 5 percent recharge loss and a 5 percent per year storage loss. IID may also request CVWD to investigate and construct additional locations for direct or in-lieu recharge facilities and possible water extraction facilities. IID is currently investigating several sites in the East Valley near the Coachella Canal. Because of the uncertain nature of the facilities, the potential impacts of this water storage program are not evaluated in the 2010 CVWMP and SPEIR but would be considered in a separate, project-level document if a storage program is determined to be feasible. (2011 SPEIR, p. 3-19.)

Additional Groundwater Treatment for Arsenic

The quality of Coachella Valley groundwater generally is high and most of the groundwater delivered to urban customers receives only disinfection. Currently, the only other groundwater treatment is for arsenic removal in a portion of the East Valley. Naturally-occurring arsenic is found in the eastern Coachella Valley groundwater from Mecca to Oasis and appears to be associated with local faults and geothermal activity. CVWD identified six of its domestic water wells with arsenic levels above the revised federal maximum contaminant limit (MCL) of 0.01mg/L. In early 2006, CVWD completed construction of three groundwater treatment facilities that use an ion-exchange process with a brine minimization and treatment process to remove arsenic. The facilities can be expanded to treat additional wells in the future. In response to elevated arsenic levels in private wells (chiefly serving mobile home and recreational vehicle (RV) parks and certain tribal wells), CVWD is pursuing federal grants to fund a portion of the cost to extend the potable water system to serve these affected communities. CVWD is also assisting the communities in connecting to the potable water system to the extent feasible. CVWD is evaluating the feasibility of treating Colorado River water (Coachella Canal water) for delivery to urban water users. To the extent Canal water is used for urban indoor use, additional arsenic removal will not be needed for those areas. However, as required to meet future demands and provide adequate redundancy, CVWD may need to expand its existing arsenic treatment facilities or construct new facilities to treat water from additional wells. (2011 SPEIR, p. 3-19.)

Development of Salt/Nutrient Management Plan

The State Water Resources Control Board (SWRCB) Recycled Water Policy (adopted February 11, 2009) requires every region in the State to develop a salt/nutrient management plan by 2014.The goal of the plans is to responsibly increase the use of recycled water. The salt/nutrient management plans are intended for management of all sources contributing salt/nutrients on a basin-wide basis to ensure that ground and surface water quality objectives are achieved. The Coachella Valley plan will assess the salt contributions of imported water, including that used for groundwater recharge and evaluate the feasibility of reducing salt in recharge water. The Coachella Valley Regional Water Management Group (CVRWMG), of which CVWD is a member, will take the lead in developing a salt/nutrient management plan with participation from interested Tribes and other parties that meets the SWRCB requirements to increase cost-effective recycling of municipal wastewater in the Valley. (2011 SPEIR, pp. 3-19 to 3-20.)

Brine Disposal

The 2010 CVWMP Update proposes desalination of agricultural drain water from the CVSC for use in the East Valley. Desalination of Canal water may also be required for East Valley potable water delivery. Treatment to potable levels would produce large volumes of brine, which would need to be disposed of in a cost-effective and environmentally sound manner and in compliance with State and Federal regulations. At the same time, groundwater treatment for arsenic and for nitrate removal, if pursued, requires a salt brine to regenerate the treatment resins, a potential use for the desalination brine. In addition, creation of salt or brackish water wetlands near the Salton Sea may also use the brine on a pass-through basis. Consequently, a brine disposal system is required to safely convey salts to an acceptable point of disposal. Concepts for brine conveyance and disposal and their feasibility will be evaluated in conjunction with the salt/nutrient management plan described above. (2011 SPEIR, p. 3-20.)

Canal Water Loss Reduction

Allocated losses and unaccounted-for water in the All-American Canal, the Coachella Canal and the distribution system are due to seepage, leakage and evaporation and may be as high as 31,000AFY. Under the 2010 CVWMP Update, to increase the amount of water delivered to the Coachella Valley, CVWD will conduct a study to determine the amount of water lost to leakage in the first 49 miles of the Coachella Canal and evaluate the feasibility of corrective actions to capture the lost water. This may require the installation of additional flow metering locations along the Canal. If feasible, CVWD will implement the recommendations of this study and work with IID to develop a transparent system for allocating losses along the All-American Canal. (2011 SPEIR, p. 3-20.)

Drainage Control

Both basin management (shallow groundwater level control and salt export) and the prevention of adverse impacts to shallow groundwater require that CVWD's existing agricultural drainage system be maintained in some form or replaced as urban development proceeds to prevent water logging of clayey soils. Funding will be needed to replace, expand, enhance and maintain the drainage system for urban development in the future. CVWD is evaluating alternative methods for funding the drainage system and will undertake a study of the improvements needed to continue system operation in the future. (2011 SPEIR, p. 3-20.)

Stormwater Capture

Stormwater capture has been identified in the 2010 CVWMP Update as a viable method for increasing the amount of local water available for either groundwater recharge or direct use. The amount of additional stormwater that could be captured and used has not been documented. Based on this, CVWD will undertake the following measures: conduct a feasibility study to investigate the potential for additional stormwater capture in the East Valley; and if cost effective, implement stormwater capture projects in conjunction with flood control facilities as development occurs in the East Valley.

Proposals to capture stormwater will only be considered to offset groundwater pumping or provide replenishment if they can clearly demonstrate that the water captured is "new water" that otherwise would have been lost to the Salton Sea or evapotranspiration, rather than water already considered in the Valley water balance. (2011 SPEIR, pp. 3-20 to 3-21.)

Development of Local Groundwater Supplies for Non-Potable Use

An investigation of groundwater development in the Fargo Canyon Subarea of the Desert Hot Springs Subbasin will be conducted to determine the available supply and suitability for use in meeting non-potable demands of future development east of the San Andreas fault. CVWD will propose that a study be performed jointly with the cities of Coachella and Indio. Preliminary estimates prepared for the 2010 CVWMP Update indicate that up to 10,000 AFY of local groundwater supply, which includes returns (excess) from irrigation use, might be developed, depending upon the ultimate level of development in this area. (2011 SPEIR, p. 3-21.)

Potential Future CVWMP Elements

Several programs and projects have been identified for possible inclusion in future updates to the CVWMP, pending the results of feasibility studies and environmental compliance documents. These include: SWP Extension (Construction of a pipeline to convey SWP water directly to the Coachella Valley); Desalination of Recharge Water (Construction of desalination facilities to reduce the salt load of imported water used for groundwater recharge); Nitrate Treatment (Pumping and treatment of high nitrate groundwater to reduce the potential for basin contamination); and Seawater Desalination (Participation in a future coastal seawater desalination project and delivery of water to the Coachella Valley through water exchanges or transfers.) Although feasibility studies of some of these projects are underway, none of the projects have advanced sufficiently through the implementation process to be included in the 2010 CVWMP Update. Consequently, they were not specifically evaluated in the SPEIR. (2011 SPEIR, p. 3-21.)

Other Programs

Other water management programs in the Coachella Valley are monitoring and data management activities, well management programs, and stakeholder input. These are presented in CVWD's 2010 CVWMP for information purposes, but were not subject to CEQA review. (2011 SPEIR, p. 3-22.)

Monitoring and Data Management

According to the 2010 CVWMP, the following new programs/projects should be implemented to improve monitoring and data management in the Valley: develop water resources database to facilitate data sharing among participating agencies and Tribes; construct additional monitoring wells in conjunction with new recharge facilities; develop a water quality assessment that identifies on-going monitoring activities in the basin; update and recalibrate Coachella Valley groundwater model based on current data and conduct a peer review of updated model; develop a new planning interface and database that can be linked with land use plans and agricultural activities to better distribute pumping and return flows to the model; develop and calibrate a water quality model capable of simulating the changes in salinity and possibly other conservative water quality parameters in conjunction with the salt/nutrient management plan; and develop a coordinated approach among the water purveyors and CVAG for calculating urban per capita water usage. (2011 SPEIR, pp. 3-22 to 3-23.)

Implementation Plan

The implementation strategy for the 2010 CVWMP is a function of water needs and the feasibility of specific programs. CVWD, in conjunction with the Tribes and the other Valley water districts as appropriate, will implement new Plan elements on an established schedule. (2011 SPEIR, p. 3-23.)

In developing the 2010 CVWMP, CVWD relies on the latest population projections developed by Riverside County. The 2008 SCAG projections, generated in 2007, did not account for the recent and/or current recession, which has slowed growth and will continue to have downward effects on growth in the near term. Over the long term, growth will continue; however, population projections will need to be adjusted in terms of the timing of growth. These factors will require adjustment of Plan implementation to reflect revised population projections. (2011 SPEIR, p. 3-23.)

Near Term Projects to Meet Water Management Needs

Even with recessionary forces and slowed growth, existing and planned CVWMP projects will continue to be implemented. Ongoing actions that will continue include: Whitewater recharge with SWP Exchange water and SWP purchases; implementation of the QSA; Levy Facility recharge at current levels of 32,000 AFY; Martinez Canyon recharge at current pilot level of 3,000 AFY; water conservation programs at current levels, including implementation of the adopted Landscape Ordinance and recycling in the West Valley; increased use of Canal water by golf courses with Canal water connections; conversion of East Valley agriculture to Canal water as opportunities arise; groundwater level/quality monitoring; and subsidence monitoring. (2011 SPEIR, p. 3-23.)

SECTION 2
LA ENTRADA DEVELOPMENT

2.1 Project Description

The proposed La Entrada Project includes 7,800 dwelling units on approximately 2,200 acres of vacant land located within the northeast section of the City of Coachella, south of Interstate 10 and northeast of the All American Canal. The Project is located within the City limits and sphere of influence. The Coachella Water Authority (CWA), which is part of the City's Utilities Department, will serve as the public water system for the Project. Figure 2-1 shows the general Project location within the Coachella Valley region.

2.2 Project Land Use Summary

The Project includes a mixture of residential development (very low density, low density, medium density, and high density), mixed-use development with up to 1,520,000 square feet of commercial floor area, schools, parks/recreation, and open space. Table 2-1 outlines the land uses proposed for the Project. Figure 2-2 illustrates the land uses proposed for the Project.

Table 2-1
La Entrada Summary of Proposed Land Uses[1]

Land Use	Area (Acres)	Units
High-Density Residential	91.6	1,832
Medium-Density Residential	374.2	3,060
Low-Density Residential	448.7	2,055
Very Low-Density Residential	66.4	133
Mixed-Use[2]	135	720
Schools	69.8	-
Parks/Recreation (Irrigated)	263.8	-
Parks/Recreation (Non-Irrigated)	80.9	-
Open Space (Non-Irrigated)	381.1	-
Channels	175.8	-
Right-of-Way[3]	99.9	-
Interchange[3]	12.3	-
Total:	**2,199.5**	**7,800**

[1] Based on the La Entrada Specific Plan, April 2013.
[2] The mixed use areas will include up to 1,520,000 square feet of commercial floor area.
[3] Includes non-irrigated areas for total site acreage.

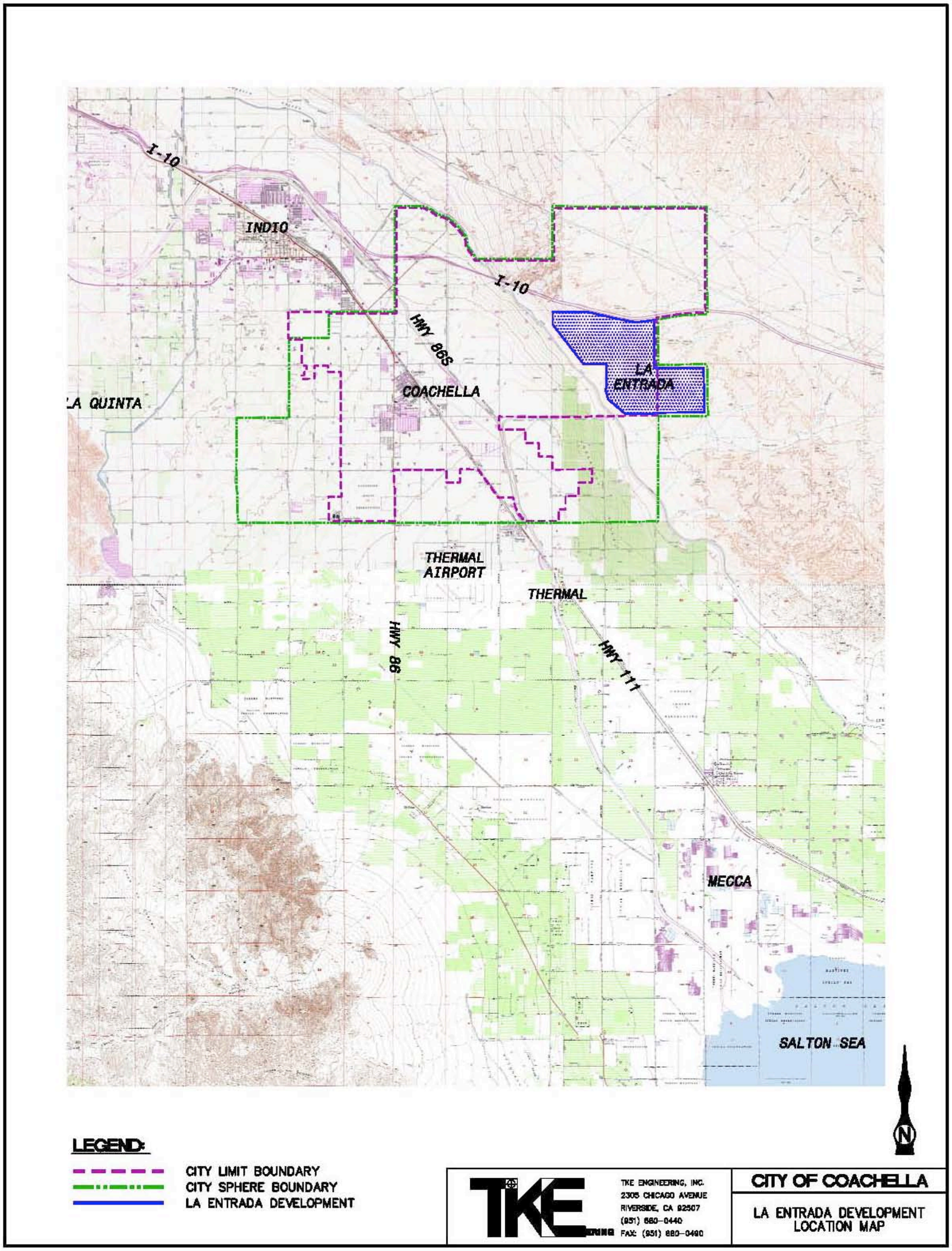

Figure 2-1 La Entrada Location Map

2.3 Project Water Demand

As indicated in Table 2-1 above, the La Entrada Project includes a mixture of residential development (very low-density, low-density, medium-density, high-density), mixed-use areas, schools, parks/recreation and open space (non-irrigated). The City's Public Works Department has developed "Standard Specifications and Procedures" which, among other things, provide benchmark water use factors that can be used to estimate total water demands for a project according to the number of dwelling units and/or number of acres of non-residential uses such as schools and parks. Table 2-2 below summarizes what the total water demands of the Project could be under the assumption that the City's Standard Specifications and Procedures and following water use factors were applied to the Project:

- Residential factor of 685 gal/day/du used for Very Low Density Residential (VLDR), Low Density Residential (LDR), and Medium Density Residential (MDR);
- Residential factor of 550 gal/day/du used for High Density Residential (HDR) and Mixed Use (MU);
- Non-Residential factor of 2500 gal/day/acre used for Schools and Parks/Recreation areas.

Table 2-2
La Entrada Average Water Demands

Land Use	Units	Area (Acres)	City Consumption Factor (gal/day/du or Acre)	Demand w/ City Factors (gpd)	Demand w/ City Factors (AFY)
High-Density Residential	1,832	91.6	550.00	1,007,600	1,128.7
Medium-Density Residential	3,060	374.2	685.00	2,096,100	2,348.1
Low-Density Residential	2,055	448.7	685.00	1,407,675	1,576.9
Very Low-Density Residential	133	66.4	685.00	91,105	102.1
Mixed-Use	720	135	550.00	396,000	443.6
Schools	-	69.8	2,500.00	174,500	195.5
Parks/Recreation (Irrigated)	-	263.8	2,500.00	659,500	738.8
Parks/Recreation (Non-Irrigated)	-	80.9	-	N/A	N/A
Open Space (Non-Irrigated)	-	381.1	-	N/A	N/A
Channels	-	175.8	-	N/A	N/A
Right-of-Way	-	99.9	-	N/A	N/A
Interchange	-	12.3	-	N/A	N/A
Total:	**7,800**	**2,199.5**	**-**	**5,832,480**	**6,533.7**

Despite the data presented above and in Table 2-2, it must be noted that the City's Standard Specification and Procedures were developed many years ago, and certainly before the enactment of SBx7-7 and the requirements of that law to achieve a statewide reduction in per capita water use of 20 percent by the year 2020. To this end, the City is currently reviewing its Standard Specifications and Procedures and water use factors in relation to new development proposals. In the meantime, however, CVWD recently completed a water system backup facilities charge study and, as part of that effort, updated and established water use factors that apply to new development within CVWD's retail service area. (See CVWD Water System Backup Facilities Charge Study, December 2012.) As shown in the Study, CVWD's updated water use factors are lower than the City's historic water use factors due to conservation efforts implemented to meet the regional and statewide goals of SBx7-7.

For a variety of reasons, the City has determined that CVWD's updated water use factors can be applied to the La Entrada Project in lieu of the City's historic factors. As noted above, CVWD's updated factors are consistent with the per capita water use reduction goals of SBx7-7, whereas the City's Standard Specifications and Procedures were adopted prior to the enactment of SBx7-7. Furthermore, and as further illustrated in Section 2.4 below, the Project applicant has committed to ensuring that buildout of the La Entrada Project will occur in a manner consistent with CVWD's efficient landscape ordinance. Indeed, the 2009 and 2013 MOUs between the City and CVWD illustrate that projects relying on CVWD's Supplemental Water Supply program must strive to achieve consistency with the conservation programs identified in CVWD's 2010 CVWMP and the water use factors developed by CVWD for the use of supplemental water. Moreover, CVWD's updated water use factors have already been applied to new development projects within CVWD's retail service area and have proven to be achievable depending on the character and unique design features of a given project. Accordingly, Table 2-3 below identifies the total projected water demands of the La Entrada Project using CVWD's updated water use and consumption factors.

Table 2-3
La Entrada Average Water Demands with CVWD Factors

Land Use	Units	Area (Acres)	Demand w/ City Factors (AFY)	CVWD Consumption Factor (acft/ac/yr)	Demand w/ CVWD Factors (AFY)
High-Density Residential	1,832	91.6	1,128.7	3.42	313.27
Medium-Density Residential	3,060	374.2	2,348.1	3.56	1,332.15
Low-Density Residential	2,055	448.7	1,576.9	3.56	1,597.37
Very Low-Density Residential	133	66.4	102.1	3.56	236.38
Mixed-Use	720	135	443.6	5.24	707.40
Schools	-	69.8	195.5	2.57	179.39
Parks/Recreation (Irrigated)	-	263.8	738.8	3.79	999.80
Parks/Recreation (Non-Irrigated)	-	80.9	N/A	N/A	N/A
Open Space (Non-Irrigated)	-	381.1	N/A	N/A	N/A
Channels	-	175.8	N/A	N/A	N/A
Right-of-Way	-	99.9	N/A	N/A	N/A
Interchange	-	12.3	N/A	N/A	N/A
Total:	**7,800**	**2,199.5**	**6,533.7**	**-**	**5,365.8**

2.4 Project-Specific Water Conservation and Groundwater Reduction Measures

As a general matter, new development projects within the City are required to implement the following measures to ensure the efficient use of water resources and to meet and maintain the goals of the 2010 CVWMP:

1. To the greatest extent practicable, native plant materials and other drought-tolerant plants will be used in all non-turf areas of Project landscaping. Large expanses of lawn and other water-intensive landscaped areas shall be kept to the minimum necessary and consistent with the functional and aesthetic needs of the Project, while providing soil stability to resist erosion;
2. Potential use of the Coachella Canal for construction water and Project landscaping may further reduce Project demand for potable water. This will be reviewed for feasibility and subject to agreements between the City and CVWD since the Project lies outside of the ID-1 boundary;
3. In the event recycled water becomes available to the Project, the potential use of tertiary treated water will be reviewed to determine feasibility of its use for on-site landscaped areas to reduce the use of groundwater for irrigation;
4. The installation and maintenance of efficient on-site irrigation systems will minimize runoff and evaporation, and maximize effective watering of plant roots. Drip irrigation and moisture detectors will be used to the greatest extent practicable to increase irrigation efficiency;
5. The use of low-flush toilets and water-conserving showerheads and faucets shall be required in conformance with Section 17921.3 of the Health and Safety Code, Title 20, California Code of Regulations Section 1601(b), and applicable sections of Title 24 of the State Code.

Consistent with these general requirements, the Project applicant has demonstrated its commitment to meeting and maintaining the water conservation goals of the 2010 CVWMP, as further provided below and in the La Entrada Specific Plan.

The La Entrada Specific Plan employs a multi-faceted approach to water efficiency. The proposed land use plan identifies a variety of areas that are intended to accommodate stormwater conveyance facilities, bio-swales, and water quality treatment facilities designed to improve water quality on-site and limit downstream water quality impairments from the proposed development. Coupled with this, the La Entrada Specific Plan proposes the efficient use of potable water through mandated building and site design requirements. In addition, the site layout would be able to accommodate an on-site sewer/reclaimed water treatment facility, if necessary, to create non-potable water supplies and utilize canal water for irrigation purposes. Sustainable Community Design Strategies for water efficiency within La Entrada include:

- Reduce potable water demand throughout the La Entrada Specific Plan by utilizing appropriate landscaping, non-potable reclaimed, well or canal water for irrigation purposes (when available), and high efficiency plumbing fixtures and appliances;

- Utilize high efficiency plumbing and fixtures that meet or exceed the CalGreen code (most current adopted version);

- Utilize efficient irrigation controls to reduce water demand on landscaped areas throughout the project;

- Reduce the amount of irrigated turf in parks to those uses dependent upon turf areas;

- Implement an integrated stormwater collection and conveyance system designed to treat and convey development-related runoff; provide 100 year flood protection to flood prone areas; increase groundwater recharge (where practical) through on-site retention basins, and improve water quality on-site and downstream through on-site water quality basins;

- Implement dual plumbing within the recreation, landscaped medians, common landscaped areas, mixed-use/commercial planning areas, and parks to allow for the use of reclaimed water when available; and

- Support the development of reclaimed water supplies in the City of Coachella and the La Entrada Specific Plan, which will achieve the goal of reducing the overall consumption of potable water from the municipal supply.

Landscaping within La Entrada Specific Plan will complement the surrounding desert environment as well as provide areas for outdoor enjoyment and activity. The plant palette proposed for the Specific Plan identifies appropriate plant types that have low water requirements, minimize turf, and provide shade, and which reduce the urban heat island effect. In conjunction with the proposed landscape design, the La Entrada Specific Plan proposes the use of Low Impact Development (LID) techniques to control stormwater flows on-site (see list below). LID is an ecologically friendly approach to site development and storm water management that aims to mitigate development impacts to land, water, and air. The approach emphasizes the integration of site design and planning techniques that conserve natural systems and hydrologic functions on a site. Sustainable Community Design Strategies for Landscape Design within La Entrada include:

- Increase access to fresh produce and through the promotion of community based food production within the project. This can be achieved through CC&Rs that do not prohibit local food production, establishment of neighborhood gardens, community supported agriculture, and/or promotion of a Farmer's Market within the project;

- Utilize native plant choices to the greatest extent possible throughout the development that complement the existing flora and fauna found on-site;

- Develop a plant palette that focuses on shading within the developed portions of the site and in those areas of pedestrian activity. An increase in shading within the development will promote greater walkability and reduce the urban heat island effect. Both of these will assist in the reduction of greenhouse gas emissions associated with the proposed development;

- Promote the development of tree-lined streets to encourage walking, biking, and transit use, and reduce urban heat island effects;
- Eliminate turf throughout the development to the greatest extent possible. Utilizing artificial turf and/or xeriscaping to reduce water demand and be responsive to existing climatic conditions within the project area;
- Reduce the heat island effect through the minimization of impervious surfaces and incorporation of landscaping within the development that provides adequate shading of developed areas within five years of occupancy;
- Preserve open space and minimize land disturbance within the Specific Plan, which reduces impacts to local terrestrial plants and animals and preserves the integrity of the ecological and biological systems on-site;
- Incorporate natural site elements (significant rock outcroppings, drainage corridors, bioswales) as design features; and protect natural systems and processes (drainage ways, vegetation, soils, sensitive areas);
- Reduce municipal infrastructure and utility maintenance costs (streets, curbs, gutters, sidewalks, storm sewer) by reexamining the use and sizing of traditional site infrastructure (lots, streets, curbs, gutters, sidewalks) and customizing infrastructure design to each planning area;
- Incorporate decentralized and micromanaged stormwater and/or water quality facilities close to the source within each planning area, protecting site and regional water quality by reducing sediment and nutrient loads to water bodies on-site and downstream;
- Construct bioswales within private development areas and street rights-of-way where grades permit;
- Mimic the predevelopment site hydrology by using site design techniques that store, infiltrate, evaporate, and retain runoff to reduce off-site runoff and facilitate groundwater recharge (where practical); and
- Ensure that receiving waters experience fewer negative impacts in the volume, frequency, and quality of runoff, by maintaining base flows and more closely approximating predevelopment runoff conditions.

The landscaping of the public spaces, including the community gateways, street medians and parkways, parks, community centers, plazas, paseos, trails, and open spaces is a major component of the overall community design envisioned for La Entrada. Complementary to the unifying architectural themes, these landscaped places will form the heart of the community. They provide an important aesthetic element, enhance community gathering places, encourage recreational opportunities, enable the use of alternative transportation such as walking, bicycling and neighborhood electric vehicles (NEV), and minimize and mitigate impacts to the environment.

The La Entrada Specific Plan landscape design guidelines expand upon and enhance design requirements and recommendations found in the City of Coachella General Plan, Parks and Recreation Master Plan, Landscape Development Guidelines and Specifications, Street Median Development Guidelines, CVAG Non-Motorized Transportation Plan, 2010 Urban Water Management Plan and Coachella Valley Water District Ordinance No. 1302.1 Landscape Irrigation System Design Criteria. Individual development projects will address regulations and guidelines contained in the documents listed above. Where inconsistencies occur, Specific Plan guidelines and regulations will govern. As set forth in the Specific Plan, the La Entrada landscaping is intended to incorporate natural and drought tolerant vegetation to create a “shady oasis” concept. The overall community landscaping comprises five distinct landscape zones to create an overall landscape framework. Landscape zones are as follows:

- Community Gateway and Entry Monumentation;
- Community Streetscapes;
- Parks and Recreation;
- Open Space;
- Buffers, Edge treatments, and Transitional areas.

As stated in the Specific Plan, the following guiding principles set the general direction for design of the landscaped places of the La Entrada community:

- Implement a landscape concept that is low water use, well adapted to the desert environment;
- Incorporate the latest design principles of environmental sensitivity, conservation and sustainability into the landscape planning and design to the greatest extent feasible;
- Promote environmental sustainability by incorporating eco-friendly design approaches that relate to site, landscape, and building design, including optimizing building orientation; reducing potable water use for landscape irrigation; implementing shade strategies; and promoting use of photovoltaic arrays on building roofs or parking lot shade structures;

- Maximize and encourage vibrant streetscapes with an emphasis on the pedestrian experience by providing shade, engaging amenities and efficient connectivity;

- Capitalize on the Parks and Recreation Master Plan potentials. Develop consistent with the goals and objectives of the 2006 Parks and Recreation Master Plan to help define this area of the City's image, character and recreational goals;

- Provide community gathering spaces - like a true downtown community core and extension of the heart of Coachella;

- Enhance public domains by providing a structured, pedestrian-friendly streets, bicycle lanes, sidewalks, parks, and public gathering spaces that facilitate walking and biking to local employment, retail, and entertainment uses;

- Create a destination for a safe public gathering place for daytime and nighttime activity;

- Provide opportunities to collect and treat urban runoff;

- Utilize turf grass only in active park areas and other important public gathering places;

- Streetscapes will utilize desert-adapted and native plant materials to minimize irrigation needs. Landscape concepts will utilize permeable materials such as decomposed granite and rocks/cobble to reduce irrigation demands;

- All planting areas will be irrigated with a high efficiency automatic irrigation system;

- Parks, parkways, HOA landscaped areas, and other common areas should develop and utilize reclaimed water to reduce demands on domestic water wherever possible as it becomes available;

- Irrigation systems should be zoned for exposure (south and west exposures together), topography, and varying water requirements of plant material.

The Project's plant palette incorporates native and desert-adapted trees, shrubs, and groundcovers to provide the envisioned landscape character. Plant palettes are designated to reflect the intended character of each landscape zone while expanding upon and enhancing design requirements and recommendations from the City of Coachella's approved plant list as noted in the City's Landscape Guidelines, the Coachella Valley Water District's Approved Plant List and the Street and Median Development Guidelines. The Project will specifically implement the following landscape standards:

- All plantings within the La Entrada community will be selected from the palette of plants listed in this document, or as modified in the subsequent private builder level Design Guidelines, with final landscaping plans subject to approval by the City of Coachella as part of design/site plan review;
- Landscaping within the La Entrada development will be designed in substantial conformance with this Specific Plan;
- The Master Developer will coordinate efforts with the City and the utility companies, which maintain easements through the property, in order to implement the landscape improvements proposed by the Plan;
- Non-toxic, non-invasive, drought tolerant vegetation will be utilized adjacent to all public open space areas except for limited turf areas within active parks;
- The Master Developer or individual builders will install all entry improvements concurrently with the street on which they front;
- Final landscape concept plans and construction plans for community entry treatments, streetscapes, park and open spaces and edge/buffer treatments shall be prepared by a licensed landscape architect and reviewed and approved by the City;
- Maximum slope in required landscape setbacks will be 2:1, with 3:1 preferred.

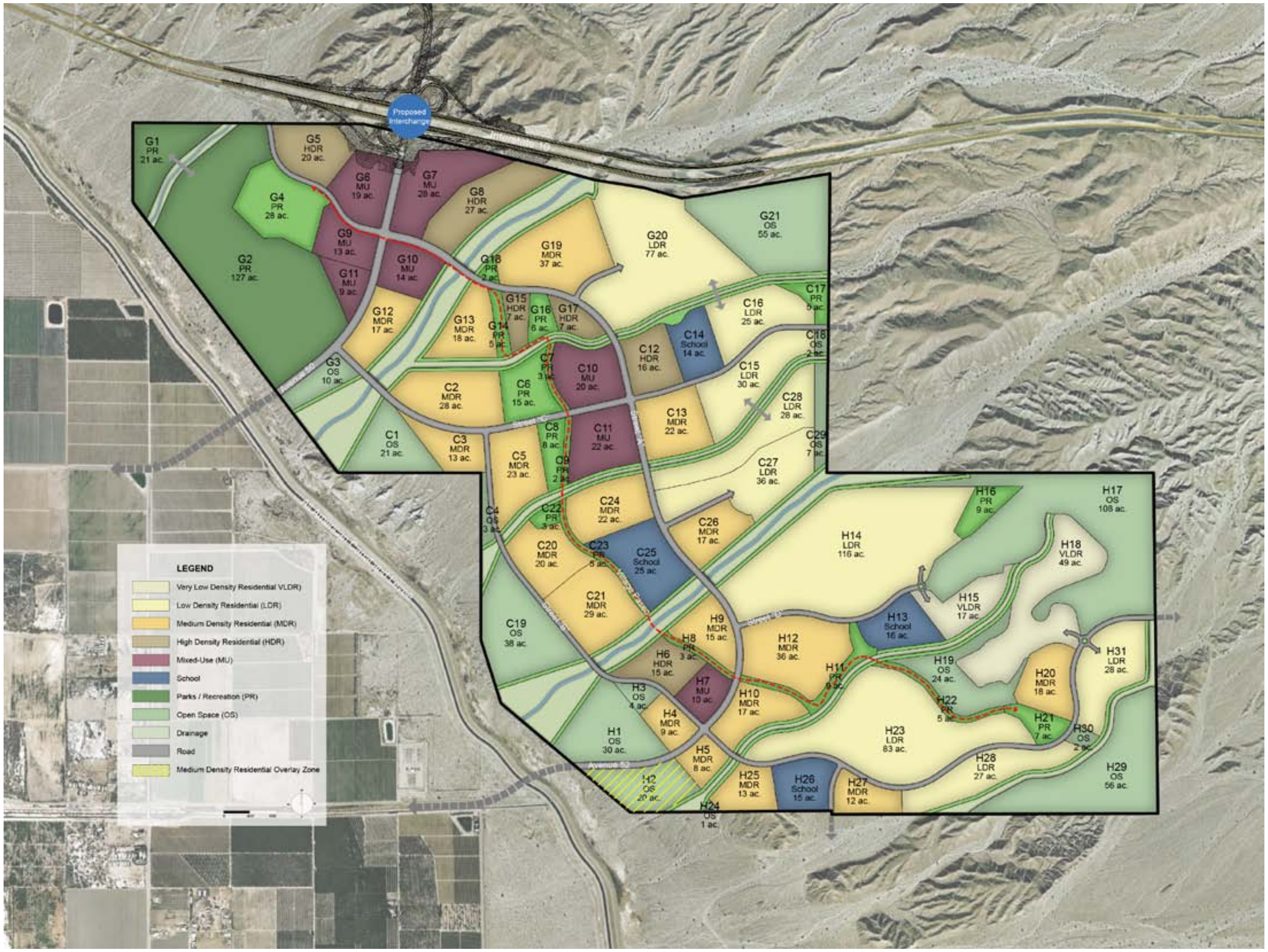

Figure 2-2 Project Land Use

SECTION 3
WATER DEMANDS

3.1 General

3.1.1 Service Area Description

The City, incorporated in 1946, encompasses approximately 32 square miles in Riverside County. The area is known as the Lower or East Coachella Valley. Existing land uses within the City consists primarily of single and multi-family homes. There is a commercial/light industrial zone along the freeway and 86-S Expressway corridors, agricultural zone east of Highway 86/111, and a heavier industrial zone in the southern part of the City. The population of the small, stable community has a young median age. Full build-out of the City's sphere of influence (SOI), for a total service area of approximately 53 square miles, is not anticipated until sometime after 2050. The City's water supply service area is shown in Figure 3-1, which includes the service area outside the city limits, but within the SOI. The April 2006 Local Area Formation Commission (LAFCO) meeting significantly increased the City's SOI. In addition to increasing the City's SOI, some areas currently served by the City will be served by the City of Indio in the future. The existing infrastructure in this area presents an opportunity to create inter connections between each city to facilitate exchange and sharing agreements.

3.1.2 Facilities

Water is currently supplied for the City of Coachella entirely by the Coachella Valley Groundwater Basin, Indio Subbasin; Basin Number 7-21.01 (also referred to as the Whitewater River Subbasin). The Basin is not adjudicated. The City presently uses approximately three to five percent of the total volume of water withdrawn from the groundwater basin each year. The City supplies 100 percent of its potable water from City owned and operated wells. The City presently operates eight (8) active groundwater wells, Well Nos. 7, 10, 11, 12, 16, 17, 18, and 19, with a total production capacity of approximately 12,500 gallons per minute (gpm) or 18 million gallons per day (MDG). In 2010, annual production was approximately 2,700 million gallons or 8,200 acre-feet. Water provided by these wells is of excellent quality and requires no treatment, other than chlorination, to maintain quality requirements of the California Department of Public Health.

The City is intersected by the Coachella Branch of the All-American Canal (Coachella Canal) and the Colorado River Aqueduct. The Coachella Canal is owned by the United States Bureau of Reclamation and is operated and maintained by the Coachella Valley Water District (CVWD). The Colorado River Aqueduct is owned, operated and maintained by the Metropolitan Water District of Southern California (MWD). The Coachella Canal bisects the City starting in the south and moving in a northwesterly direction. The Colorado River Aqueduct passes through the northeastern portion of the City's service area through a closed conduit to prevent losses during conveyance. These waters are used for irrigation and groundwater recharge, respectively.

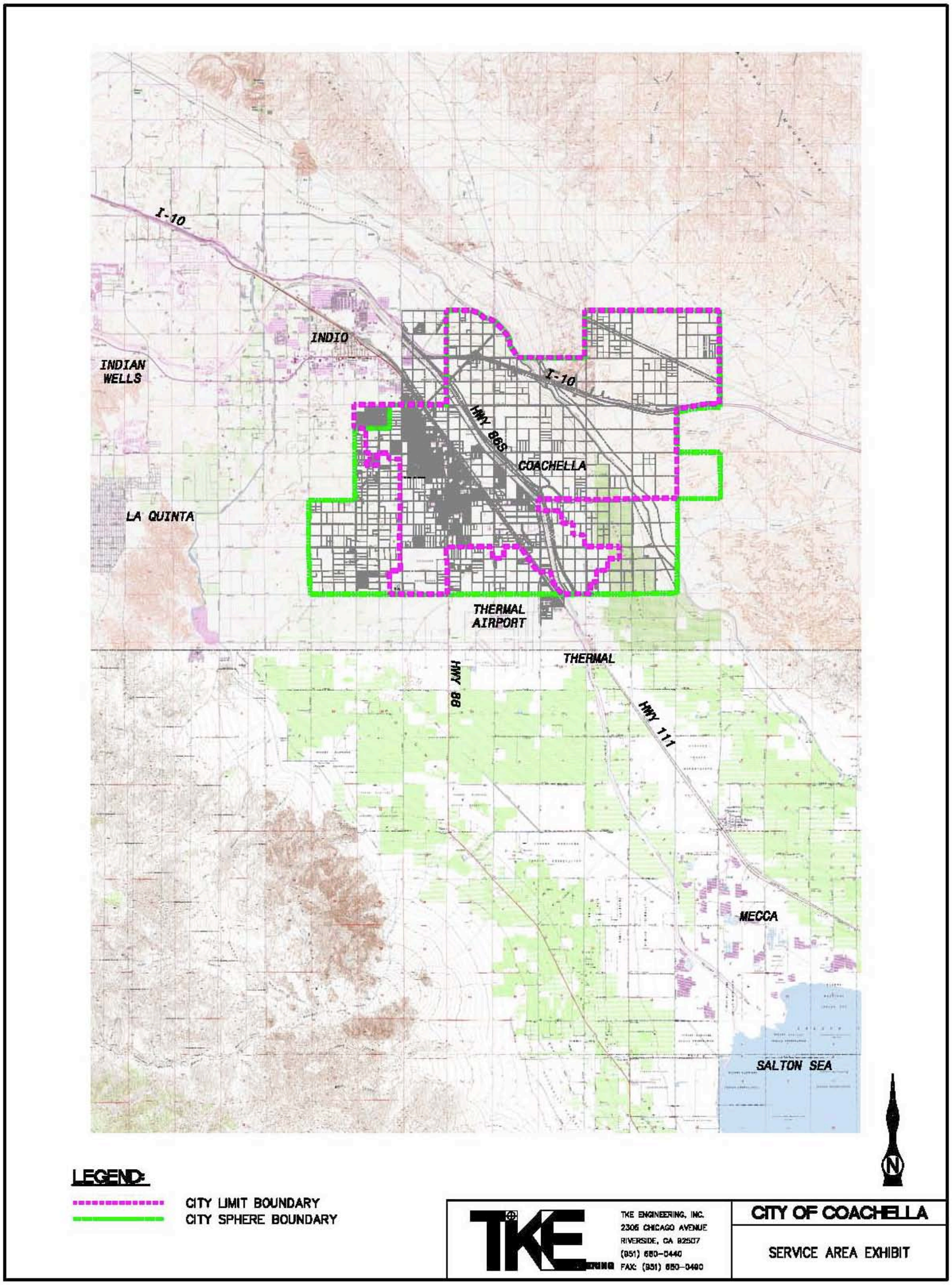

Figure 3-1 City of Coachella Water Service Area

The City operates a secondary-treatment wastewater facility with a 2.4 MGD capacity and currently processes approximately 1.7 MGD of wastewater. Wastewater effluent is conveyed to the Salton Sea via the storm water channel. The existing treatment plant can be upgraded to a tertiary treatment plant in the future which would permit recycled water to be used for non-potable purposes, further discussed in Section 4.7 below.

3.1.3 Climate

The City is located in the Coachella Valley. The climate is arid with the majority of precipitation occurring as rainfall in the winter months between November and March. The average rainfall for the Coachella area is approximately 4 inches per year. The only known measurable snowfall occurred on January 31, 1979.

Winter temperatures are generally between the low 40's and the mid 70's. Summer temperatures are generally between mid 70's and the low 100's. Table 3-1 shows the average monthly ETo, rainfall, and temperature for the City of Coachella area.

Table 3-1
City of Coachella Area Climate

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total or Average
Monthly Average ETo[1]		1.59	2.54	4.03	5.67	7.81	8.74	9.28	8.42	6.26	4.39	2.36	1.59	62.68
Average Temperature (Fahrenheit)[2]	Max	71	76	80	86	94	102	107	106	101	92	80	72	88.9
	Min	40	45	50	57	64	71	77	77	70	60	47	38	58.0
Average Rainfall (inches)[3]		0.60	0.50	0.40	0.10	0.10	0.00	0.30	0.50	0.40	0.30	0.40	0.40	4.00

[1] California Irrigation Management Information System, Department of Water Resources, Office of Water Use Efficiency, Monthly Average ETo Report for Station 200, Indio 2, Imperial/Coachella Valley – all other nearby stations are inactive or too new; [on-line] http://www.cimis.water.ca.gov/cimis/frontMonthlyEToReport.do

[2] [3] [on-line] http://countrystudies.us/united-states/weather/California/indio.htm (closest to Coachella and similar to CIMIS Station 200 Indio 2 report)

3.1.4 Service Area Population

The City of Coachella service area population is expected to increase steadily in the future, according to population and demographic projections provided by the California Department of Finance and Riverside County Transportation and Land Management Agency (RCTLMA). According to RCTLMA the City's population grew from 29,754 to 40,704 between 2005 and 2010 or by 36.8 percent. This equates to an average annual growth rate of approximately 7.4 percent. While the cumulative growth over the five year period was high, the yearly growth varied significantly. The population growth rate reached a high of 14.1 percent from 2005 to 2006 and dropped to 1.5 percent and less in 2008 to 2009. Indeed, most of the construction activity occurred between 2004 and 2007, and a considerable slowdown occurred in permitting activity after 2007. As indicated in Chapter 1, the City's 2010 UWMP illustrates slowed growth expectations due to this downturn in the economy and does not mirror the "substantial" projections provided by the State and County. However, development projects that have been on hold are slowly returning, growth is beginning to trend positively, and with these developments, growth trends could begin to reflect County data in future years. Table 3-2 shows the City's service area population since 2005 and estimates the population increase through the year 2035 in five-year increments based on State and County data.

Table 3-2
City of Coachella
Population Projections

	2005	2010	2015	2020	2025	2030	2035
Service Area Population	29,754	40,704	50,670	70,170	89,670	109,170	128,670

Sources: California Department of Finance, http://www.dof.ca.gov/; Riverside County Center for Demographic Research, http://www.rctlma.org/default.aspx

3.2 Water Demands

3.2.1 City Past and Current Water Use

As previously stated, the City of Coachella service area population growth was trending upward until 2007, when growth trends leveled off. As such, the City saw a much greater increase in the number of metered accounts leading up to 2007 and a relatively small increase between 2008 and 2010. However, as indicated above, population in the City will continue to increase over time. It should be noted that water deliveries and metered account growth rates do not directly reflect population growth since population growth is estimated from County data and the metered accounts are a direct representation of accounts added by the City over the same time period. The principal influencing factor is the various types of development that were built (i.e., single-family residential households generally have a lower number of persons per unit compared to multi-family residential development). Additionally, approximately 49.6 percent of households in the City had at least 5 people. Table 3-4 show the past and current water use for the City's water service area shown by water use sectors.

Table 3-3
Past and Current Water Deliveries

Water use sectors	2005	2010
	Volume	Volume
Single family	946	1,426
Multi-family	222	307
Commercial/Institutional	179	376
Industrial	137	43
Landscape Irrigation	139	312
Agriculture Irrigation	0	0
Other	692	227
Total	2,315	2,691

Units: million gallons per year

3.2.2 City Water Demand Projections

The projected (next 20 years) water use for the City of Coachella is generally expected to increase at a similar rate to that of the projected population increase within the City and its SOI; provided, however, that per capita water use reductions achieved pursuant to SBx7-7 (see Chapter 1 above) may be expected to affect the relationship between increased population and increases in total water use. The City Development Services Department has active entitlement applications for several proposed development projects, ranging in size from 10 residential units to mixed-use developments such as La Entrada with over 7,800 residential units. The total number of proposed residential units associated with these entitlement applications is approximately 20,000, including the La Entrada. These units are included in the City's SOI, which is not anticipated for full build out until after 2050. Thus, most of these development projects are either in the preliminary planning stages or may have been put on hold by applicants due to the economic down turn. Projected water use for 2015 through 2035 in five-year increments is provided in Table 3-4. These demand projections are based on projected population and per capita water use, as shown in Table 3-4. The population projections are based on Riverside County data as presented in the previous section. Per capita water use was calculated in the City's 2010 UWMP. As presented in the City's 2010 UWMP, the water use is currently 191 gallons per capita per day (gpcd), with a reduction to 186 gpcd by 2015 and 181 gpcd by 2020 and beyond.

Table 3-4
Future per Capita Water Use

Year	Total Population	Per Capita Water Use (gpcd)	Total per Capita Water Use (gpcd)	Annual Water Use (MG)	Percent Increase
2010	40,704	191[1]	7,774,464	2,838	-
2015	50,670	186	9,424,620	3,440	21%
2020	70,170	181	12,700,770	4,636	35%
2025	89,670	181	16,230,270	5,924	28%
2030	109,170	181	19,759,770	7,212	22%
2035	128,670	181	23,289,270	8,501	18%

[1] As presented in the City's 2010 UWMP, Table 3.2-3, the base daily per capita water use 5-year average is 191 gpcd. It should be noted that this is a planning number and varies slightly from actual metered sales presented in Table 3-3 (2,691 MG Actual Sales versus 2,838 MG Planning Estimate).

Table 3-5
Projected 2015, 2020, 2025, 2030, and 2035 Water Deliveries

Water use sectors	2015	2020	2025
	Volume	Volume	Volume
Single family	1,803	2,434	3,115
Multi-family	388	524	671
Commercial/Institutional	476	643	822
Industrial	55	74	95
Landscape Irrigation	394	532	681
Agriculture Irrigation	0	0	0
Other	287	388	496
Total:	**3,403**	**4,594**	**5,881**
Water use sectors	**2030**	**2035**	
	Volume	**Volume**	
Single family	3,800	4,484	
Multi-family	819	966	
Commercial/Institutional	1,003	1,184	
Industrial	116	137	
Landscape Irrigation	831	981	
Agriculture Irrigation	0	0	
Other	605	714	
Total:	**7,175**	**8,466**	

Units: million gallons per year

As indicated above, Riverside County has been hit particularly hard by the current economic downturn. The County has some of the highest rates of foreclosures and unemployment in the country. Due to this economic downturn, growth in the County has significantly decreased over the last two to three years. The Riverside County Planning growth forecasts were developed and adopted in late 2006 and early 2007, before the onset of the widespread recession. Therefore, the slowdown in the housing market, which was one of the primary components of the recession, was not accounted for in the forecasts, which resulted in a lower than projected growth rate for the Valley. The timing and extent of this reduced growth rate cannot be accurately predicted. Because the planning period for the 2010 CVWMP Update is through 2045, it is expected that the effect of the recession on growth in the Valley will attenuate over the long term. For the purpose of CVWD's 2010 CVWMP Update, it is assumed that development within the Valley will continue and that the Riverside County Planning growth forecasts are applicable throughout the planning period. That assumption results in a particularly conservative analysis for purposes of the 2010 CVWMP and this WSA because the actual growth and the actual increases in water demand associated with growth are likely to be much lower than the forecasts that have been used for long term water supply planning purposes.

Certain other aspects of the water demand projections above and water supply reliability discussion in Section 4 below are noteworthy for purposes of this WSA. First, the City's 2010 UWMP, CVWD's 2010 UWMP, and CVWD's 2010 CVWMP demonstrate that the total projected water supplies available to CVWD and the City are sufficient to meet the water demands of La Entrada and other demands throughout the City and CVWD service areas during normal, single-dry and multiple-dry periods throughout the year 2035 and beyond. More importantly, those conclusions are made in the context of water demands associated with *projected population growth* in the City and CVWD service areas for the next 20 years – the standard established under the UWMP Act. Yet the UWMP Act standard is much more inclusive than the standards set forth by SB 610 and CEQA. Indeed, the water supply sufficiency standard established under SB 610 and CEQA is whether the total projected water supplies available to the City and CVWD over the next 20-year period is sufficient to meet the projected demand associated with the Project in addition to existing and planned future uses. (Water Code §§ 10910(c)(3); 10911(c); Pub. Res. Code § 21151.9; 14 Cal. Code Regs. § 15155.) Future water demands associated with the Project and "planned future uses" within the City and CVWD are considerably less than future water demands associated with projected population growth within the City and CVWD, and neither SB 610 nor CEQA requires a WSA to determine water supply sufficiency in the context of projected population growth. Accordingly, this WSA provides an ultra-conservative approach to water supply sufficiency.

Several sources of authority are instructive in this regard. Under the UWMP Act, an UWMP must quantify historic, existing, and projected demand of various water users over 5-year increments for the ensuing 20-year period or as far as data is available. (Water Code § 10631(a), (e)(1).) Notably, the Act expressly requires such water demand forecasts associated with projected population increases to be based upon data produced by state, regional, or local service agency population projections. (Water Code § 10631(a).) The Act further instructs that demand should account for particular land use sectors, including but not limited to, single-family residential, multifamily, commercial, industrial, institutional and government, landscape, sales to other agencies, conjunctive use, groundwater recharge, seawater intrusion barriers, and agriculture. (Water Code § 10631(e).)

The standard for assessing demand under SB 610, however, is conspicuously different. Again, the general standard for evaluating demand in a WSA is expressed as "the projected water demand associated with the proposed project, in addition to the public water system's existing and planned future uses, including agricultural and manufacturing uses." (See Water Code §§ 10910(c); 10911(c).) The DWR Guidebook supports the idea that demand calculations for purposes of preparing a WSA are much more tailored and limited than the demand analyzed in an UWMP. The DWR Guidebook states: "Planned future uses – the lead agency, as the land-use agency, has information on planned development. Regular communication between the water supplier and lead agency will be essential to ensuring an accurate determination of sufficiency of water supply for future demand. Planned future uses may include: projects that are expected to be completed during the same time frame as the proposed project. These include all new demands ranging from all individual single-family homes to large-scale developments. Proposed developments that have a reserved (or entitlement to) future water supply and are considered to be moving towards construction. Proposed projects that are included in a general or specific plan need not be included if the agency determines that they are not likely to begin construction during the period under consideration. … [I]t would be a reasonable interpretation that planned future uses are those that would be undertaken within the same time frame as the project under consideration." (DWR Guidebook, p. 23.)

Thus, a WSA arguably should not be required to consider water demands associated with all development that might conceivably occur over the 20-year planning horizon, such as development or projected water demands associated with forecasted population increases in a general plan or UWMP. Rather, a WSA should only be required to contemplate development that is planned and reasonably likely to occur. This approach is consistent with project review conducted under CEQA. In general, CEQA requires some degree of forecasting of future events. For instance, CEQA Guidelines section 15144 provides: "While forecasting the unforeseeable is not possible, an agency must use its best efforts to find out and disclose all that it reasonably can." (Cal. Code Regs, tit. 14, § 15144.) In this regard, even a cumulative impacts analysis under CEQA is only required to encompass "past, present, and reasonably anticipated future projects." (Pub. Res. Code § 21083(b); Cal. Code Regs, tit. 14, § 15130(b)(1)(A).)

In *Laurel Heights Improvement Association of San Francisco v. The Regents of the University of California* (1988) 47 Cal.3d 376, the California Supreme Court endorsed this view, explaining that "an EIR must address the impacts of 'reasonably foreseeable' future activities related to the proposed project." (*Id.* at 398-399; see also *Vineyard Area Citizens for Responsible Growth v. City of Rancho Cordova* (2007) 40 Cal.4th 412, 428.) In *Laurel Heights*, the lead agency had detailed information about potential future uses for a property (details that had been published in a newsletter, for example), but did not address those future uses in its EIR because they had not yet been officially proposed. Though the Court did not require detailed analysis of every possible future use, it found that at least a general analysis of probable future uses was required. In explaining what may fall within the scope of such probable future uses, the Court held that an EIR does not require discussion of possible future action "that is merely contemplated or a gleam in a planner's eye." (*Laurel Heights*, *supra*, 47 Cal.3d at 398.) Pursuant to this CEQA standard, it is reasonable for a WSA's evaluation of projected water demand associated with the "planned future uses" in the water provider's service area to be tied to the more limited set of projects that are "reasonably foreseeable probable future projects."

Not only is this approach reasonable and consistent with CEQA, in most cases it would produce a lower total forecasted water demand figure which a WSA then compares to total projected supplies. In the case of La Entrada, for instance, "planned future uses" within the City and CVWD over the next 20-year period have decreased due to economic slowdown and related market factors. Thus, the water demand associated with those uses is much less than the forecasted demand associated with projected population increases as set forth in CVWD's 2010 planning documents and in regional and county forecasts. Nevertheless, this WSA provides the most conservative analysis of water supply sufficiency by comparing the City and CVWD's total projected water supplies to possible water demands associated with State and SCAG-based growth projections. The result of this conservative analysis is that the WSA has evaluated potential water supply impacts of the Project against a greater long-term water demand than is required by SB 610 and CEQA. Yet even according to this extra-conservative approach, the record evidence and analyses herein demonstrate that the total projected water supplies available to the City and CVWD over the next 20-year period (and beyond) during normal, single-dry and multiple-dry year periods are sufficient to serve the projected water demand associated with La Entrada in addition to existing and future demands, and that the potential impacts of supplying water to the Project are less than significant on both a project-level and cumulative basis.

3.3 Water Use Reduction Plan

The City and CVWD recognize that water is a limited resource and that water conservation and water use efficiency should be actively pursued throughout the Coachella Valley. Both the City and CVWD have implemented and will continue to expand and implement water conservation programs to achieve the goal of realizing a 20 percent reduction in per capita water use by the year 2020, and the interim goal of realizing a 10 percent per capita reduction by 2015, pursuant to SBx7-7.

The California Urban Water Conservation Council (CUWCC) Memorandum of Understanding (MOU) regarding Urban Water Conservation in California sets guidelines to achieve a baseline level of water conservation in given water service areas (CUWCC, 2004). Signers of the MOU agree to set goals to meet the standards outlined in the MOU. On November 2, 2000, the City of Coachella became a signatory to the MOU, and the City has remained committed to demand management throughout its service area. For example, the City's applies a tiered water rate schedule that is conducive to voluntary conservation. The City has also adopted a landscape irrigation policy as part of the City's "Landscape Guidelines" that address all landscaping for public parkways, median islands, and common area landscaping improvements for residential and commercial developments in the City. The City worked with the Coachella Valley Association of Governments and adopted the Coachella Valley "Model Landscape Ordinance" as a policy document. The guidelines used by the City encourage minimal turf areas, use of native plant materials reminiscent of the "desert wash" plant palette which are used in all of the newer residential common areas including retention basins, parkways and perimeter landscaped planters.

Additionally, the City has implemented a model of sustainability in landscaping its largest public parks with smart irrigation systems and permeable pavers. The newly constructed Rancho Las Flores Park, the expanded Bagdouma Park, and the re-designed De Oro Park all incorporate a blend of native and drought-tolerant plants, trees and ground covers into an attractive, low-maintenance, water-saving resource for the community. Further, the CWA offers three water conservation programs to its residents. These include the Turf Removal Rebate Program, the Indoor/Outdoor Water Fixture Kits, and the Toilet Rebate Program. The City also promotes water conservation and other resources in coordination with CVWD, Imperial Irrigation District (IID), and other energy utilities. The City distributes public information through bill inserts, brochures, and community events.[6] CVWD is not a signatory to the MOU; however, as presented in Section 1, CVWD participates in a number of demand management programs similar to those provided by the CUWCC.

[6] Coachella Valley Integrated Regional Water Management Plan, December 2010

SECTION 4
WATER SUPPLY ASSESSMENT

4.1 Existing Water Supplies

The Coachella Valley relies on a combination of local groundwater, Colorado River (CR) water, State Water Project (SWP) water, surface water, and recycled water to meet demand. As explained throughout this WSA, the City produces its water supplies from the Coachella Valley Groundwater Basin, specifically, the Lower Whitewater River Subbasin, which is continuously replenished at the local and regional level pursuant to a variety of water supply projects and programs. The Lower Whitewater River Subbasin is managed by CVWD. CVWD has statutory authority to replenish local groundwater supplies and collect assessments necessary to support a groundwater replenishment program as provided in the County Water District Law. As indicated in the referenced CVWD 2010 UWMP, CVWD 2010 CVWMP, and CVWD 2011 SPEIR, the Coachella Valley groundwater basin area serves as an expansive conjunctive use resource that is capable of ensuring a sufficient and sustainable water supply to serve existing uses and projected growth during normal, single-dry and multiple-dry years over an extended planning horizon, currently established as the year 2045. Not only does the basin contain vast reserves of local groundwater (approximately 25 million AF), it has substantial available storage space that has been utilized and will continue to be utilized to store millions of acre-feet of supplemental supplies that become available during normal and above-normal years. Those surplus supplies are recharged to the basin for later use during dry periods.

In 2002, CVWD prepared a Water Management Plan to provide a road map for meeting future water demand throughout its service area, including the City. It included recommendations for water conservation, additional imported supplies, source substitution, and groundwater recharge elements. CVWD successfully implemented an urban water conservation program, acquired additional SWP supplies, constructed the initial phase of the Mid-Valley Pipeline, and constructed the Thomas E. Levy Groundwater Replenishment Facility. CVWD updated the Plan in 2010. The new 2010 CVWMP recommends greater conservation (agricultural conservation, additional urban conservation, and golf course conservation), supply development (acquisition of additional imported water supplies, recycled water use, and desalinated drain water), groundwater recharge program enhancements, and source substitution programs. A number of new projects and programs are recommended and presented in Section 8 of the 2010 CVWMP.[7] (See Chapter 1 above for an overview discussion of the 2010 CVWMP and related 2011 SPEIR that has been adopted and certified pursuant to CEQA.)

[7] See also: CVWD 2010 CVWMP, Section 4, Existing Water Supplies.

4.2 Groundwater

Groundwater[8] is the principal source of municipal water supply in the Coachella Valley. The main groundwater source for the entire valley is the Coachella Valley Groundwater Basin, Indio Subbasin, Basin Number 7-21-01, also known as the Whitewater River Subbasin, as shown in Figure 4-1. The lower portion of the Whitewater River Subbasin is shared by CVWD, Indio Water Authority, Coachella Water Authority (City), and numerous private groundwater producers.

Water Code Section 10910(f) requires additional information when a groundwater basin is included as a source of water supply for a proposed project. The additional information includes a description of the basin, the rights of the public water system (PWS) to use the basin, the overdraft status of the basin, any past or planned overdraft mitigation efforts, historical use of the basin by the PWS, projected use of the basin by the project, and a sufficiency analysis of the basin that is to be utilized to supply the project. In addition to the information and analyses provided in other sections of this WSA, each of the statutory elements of Section 10910(f) are discussed in the following paragraphs.

4.2.1 Basin Description

The Whitewater River Subbasin underlies a major portion of the valley floor and encompasses approximately 400 square miles. Beginning approximately one mile west of the junction of State Highway 111 and Interstate 10, the Subbasin extends southeast approximately 70 miles to the Salton Sea. It is bordered on the southwest by the Santa Rosa and San Jacinto Mountains and is separated from other basins by the Garnet Hill and San Andreas faults. The 2010 CVWMP provides a more comprehensive description and discussion of the Subbasin, which is incorporated herein.[9]

4.2.2 Public Water System Use Rights

As noted by DWR Bulletin 118, the basin is not adjudicated. As such, there are no specifically established limitations on the rights of the City to withdraw water. Bulletin 118 notes that groundwater management in the basin is a local responsibility, and therefore decisions regarding basin conditions and controlled overdraft are the responsibility of local agencies. With specific regard to the Whitewater River Subbasin and surrounding areas, CVWD, one of the region's SWP contractors, developed the 2002 CVWMP and 2010 CVWMP Update for the long-term management of groundwater resources. As detailed in those Plans and in other sections of this WSA, CVWD has determined that the total projected water supplies available to the basin area during normal, single-dry and multiple-dry periods throughout the year 2045 are sufficient to meet the needs of existing uses and projected growth. (See, e.g., 2010 CVWMP, pp. 7-2 to 7-12; 2011 SPEIR, pp. 3-4 to 3-9.) Moreover, the potential environmental effects of implementing the projects and programs contained in the 2010 CVWMP have been analyzed in accordance with CEQA, and the determination has been made that

[8] As indicated throughout this WSA, the term groundwater refers to local groundwater and imported, recycled and other supplies that are continuously recharged to the basin and extracted from groundwater wells.
[9] See 2010 CVWMP, Section 4.1.1, Whitewater River Subbasin.

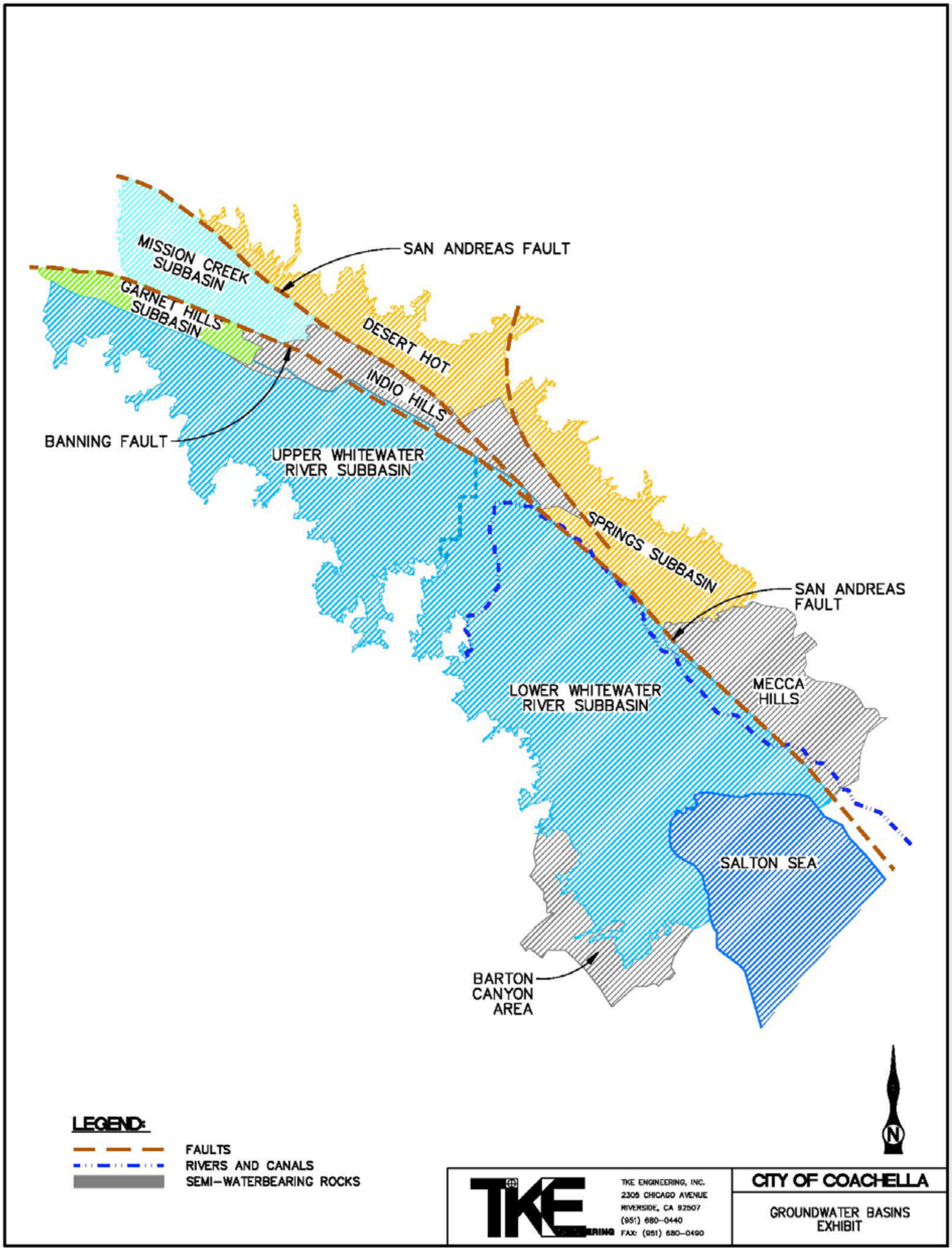

Figure 4-1 Groundwater Basins

implementation of the 2010 CVWMP will have a beneficial effect on groundwater resources. (See, e.g., 2010 CVWMP, pp. 7-20 to 7-32; 2011 SPEIR, pp. 3-23 to 3-33.) CVWD, with assistance from other water agencies including the City's Coachella Water Authority, have been implementing water supply projects, programs and related management actions of the CVWMPs since 2002. A notable requirement under the CVWMP is that the City (and other agency producers) must pay a replenishment assessment charge (RAC) for each acre-foot of groundwater produced. The current RAC is $24 per acre-foot of groundwater pumped. In 2010, the City produced approximately 8,340 acre-feet of groundwater and paid approximately $200,000 in RAC. In addition to the CVWMP process, in December 2010 the Coachella Valley Integrated Regional Water Management Plan (IRWMP) was developed to promote a regional approach for addressing water management issues and to enhance the region's eligibility for state funding opportunities for water resource projects. The IRWMP was created by the Coachella Valley Regional Water Management Group (CVRWMG), which is a partnership of CWA, CVWD, DWA, Indio Water Agency, and the Mission Springs Water District.

4.2.3 Status of Groundwater Basin

The 2010 CVWMP states that the demand for groundwater in the Basin has annually exceeded the natural recharge of the groundwater basin. This condition has caused groundwater levels to decrease in portions of the Lower Valley and has raised concerns about water quality degradation and land subsidence. If left unaddressed and unmanaged, such groundwater conditions could result in increased groundwater pumping costs, continued decline of groundwater levels, and water quality degradation in the Basin. Because of the difficult nature of quantifying overdraft, CVWD has based its assessment of the issue on the change in freshwater storage in the Basin. For 2012, the latest report available, the loss in storage was considerably less than previous years and was estimated at 9,116 AF.[10] Importantly, and as noted throughout this WSA and the water supply planning and CEQA documents that support its analysis, Basin conditions have been and will continue to be fully addressed and comprehensively managed. Consistent with the conclusions of CVWD's 2010 CVWMP Update and 2011 SPEIR, it is expected that continued implementation of CVWMP recommendations will improve overdraft conditions and have a beneficial effect on the groundwater basin.

4.2.4 Groundwater Management and Mitigation Efforts

As presented in Section 1 and Section 4.1 above, CVWD is successfully implementing an urban water conservation program, has acquired additional SWP supplies, and has constructed the Thomas E. Levy Groundwater Replenishment Facility, among a host of other water management programs and actions. The 2010 CVWMP Update recommends greater conservation (agricultural conservation, additional urban conservation, and golf course conservation), supply development (acquisition of additional imported water supplies, recycled water use, and desalinated drain water), groundwater recharge program enhancements, and source substitution programs as means of improving basin conditions while ensuring a sufficient and sustainable source of water supply for existing and projected uses throughout the region. In addition to the

[10] CVWD Engineers Report on Water Supply and Replenishment Assessment, Lower Whitewater River Subbasin Area of Benefit, 2012-2013.

information and analyses presented in this WSA, other descriptions of the projects and programs within the City and CVWD service areas are set forth in the City 2010 UWMP, CVWD 2010 UWMP, CVWD 2010 CVWMP and 2011 SPEIR, which discussions are incorporated herein by reference.[11]

4.2.5 Historical Use of the Basin

The City of Coachella currently operates eight groundwater wells. In 2012, the City produced approximately 8,000 AF of groundwater. The operating conditions and controls for the wells vary, with some wells operating year-round and some turned on only seasonally. The system is controlled by a Supervisory Control and Data Acquisition (SCADA) system to ensure maximum efficiency of groundwater resources. The City presently uses approximately five percent of the total volume of water withdrawn from the Lower Whitewater River Subbasin each year. Table 4-1 shows the City's annual groundwater production in the Subbasin over the past 13 years. Table 4-2 shows estimated total groundwater production in the Subbasin over the past 14 years.

Table 4-1
City of Coachella Historic Well Production

Year	Well Production	
	(MG)	(AFY)
2000	1,786.4	5,483
2001	1,882.4	5,777
2002	1,901.3	5,835
2003	2,111.8	6,481
2004	2,168.7	6,656
2005	2,314.8	7,104
2006	2,895.2	8,886
2007	2,827.8	8,679
2008	2,728.1	8,373
2009	2,715.5	8,334
2010	2,691.8	8,261
2011	2,530.0	7,765
2012	2,604.4	7,993

Source: City of Coachella Public Water Statistic Sheets

[11] See Chapter 1 above regarding management efforts to ensure water supply sufficiency and improved groundwater conditions.

Table 4-2
Estimated Groundwater Production
Lower Whitewater River Subbasin

Year	Acre-feet
1999[1]	168,300
2002[2]	166,700
2003	199,800
2004	172,300
2005	172,000
2006	172,000
2007	172,000
2008	172,000
2009	160,000
2010	150,000
2011	145,000[3]

[1] From the CVWMP, Table 3-2 Summary of Historical Water Supplies in 1936 and 1999.
[2] 2002 through 2008 base on Table 2, Engineer's Report on Water Supply and Replenishment Assessment, Lower Whitewater River Subbasin Area of Benefit 2012-2013
[3] Assessable groundwater production estimated from reported and projected unreported groundwater production.

As indicated herein, substantial regional efforts are ongoing, led by CVWD, to recharge the Whitewater River Subbasin with imported water and other supplies. Those efforts are made possible in large part because CVWD is a SWP contractor. Notably, however, the Coachella Valley does not have a direct physical connection to the SWP system. Therefore, CVWD has entered an agreement with the Metropolitan Water District of Southern California (MWD), whereby MWD delivers Colorado River supplies to CVWD in exchange for like amounts of CVWD's SWP supplies. The Colorado River deliveries are made through MWD's Colorado River Aqueduct, which crosses the Coachella Valley near Whitewater. Among other things, the exchange agreement allows for advanced delivery and storage of Colorado River water in the Coachella Basin, thereby providing flexible and efficient water management opportunities. The large storage capacity of the Basin and the large volume of water in storage allow CVWD and other local water providers, such as the City, to pump needed supplies from the Basin during dry years, where large amounts of water can be recharged in normal and above normal years.

4.2.6 Projected Groundwater Use

As presented in Section 2 above, total projected water demand for the La Entrada Project is estimated at approximately 5,366 acre-feet per year (AFY), using CVWD demand factors. For additional information regarding estimated water use for the Project, please refer to Section 3 above. A detailed description and analysis of the amount and location of groundwater and recharged groundwater that is projected to be produced by the City from the Lower Whitewater Subbasin of the Coachella Groundwater Basin are provided in Sections 1, 3.2, 4.1 and 4.2 above. For purposes of this analysis, the facilities to be used by the City are described in Section 3.1.2.

4.2.7 Sufficiency of the Groundwater Basin

As detailed and analyzed throughout this WSA and in the City's 2010 UWMP, CVWD's 2010 CVWMP Update and CVWD's 2011 SPEIR, substantial evidence demonstrates that the groundwater and recharged groundwater supplies of the Coachella Valley Groundwater Basin are and will continue to be sufficient during normal, single-dry and multiple dry years over the 20-year projection and beyond to meet the projected demand associated with the La Entrada Project, in addition to other existing and planned future uses within the City and CVWD service areas.

4.2.8 Other Factors Related to the Groundwater Basin

On or about May 14, 2013, the Agua Caliente Band of Cahuilla Indians filed a federal court lawsuit against CVWD and DWA, requesting the court to "judicially recognize, declare, quantify and decree" the Tribe's right to sufficient water underlying the Coachella Valley as necessary to fulfill the purposes of the Tribe. The lawsuit contends that the development of groundwater by CVWD and DWA has adversely affected the quantity and quality of groundwater supplies underlying the Coachella Valley and the Agua Caliente Reservation, and thus has injured and infringes upon the rights of the Tribe and its members. Among other things, the lawsuit seeks the following: an injunction to prevent CVWD and DWA from withdrawing groundwater from the Upper Whitewater and Garnet Hill subbasins of the Coachella Valley Groundwater Basin underlying the Agua Caliente Reservation; an injunction to prevent CVWD and DWA from overdrafting the Upper Whitewater and Garnet Hill subbasins; an injunction to prevent CVWD and DWA from recharging the Upper Whitewater and Garnet Hill subbasins with imported water of lesser quality than pre-existing groundwater without first treating the imported water; and an injunction preventing CVWD and DWA from infringing on the Tribe's "ownership interest" in the storage space underlying the Reservation that is used to store the Tribe's water rights.

The potential for the Agua Caliente lawsuit to affect the water supplies available to the City of Coachella to serve the La Entrada Project cannot be determined at this time and are too speculative to evaluate in relation to the Project and for purposes of this WSA. However, several factors suggest that the lawsuit will not affect the availability, reliability or overall sufficiency of water supplies available to the City to serve the Project. For example, the rights that the Tribe alleges to hold have not been quantified, defined, substantiated or proven from an engineering or legal standpoint, and thus the potential impacts to CVWD and DWA operations are very speculative at this preliminary stage of the lawsuit. Second, as noted above, the City is not a party to the lawsuit and no injunctions are sought against the City's water production or any other water related activities conducted by the City. Third, the lawsuit concerns groundwater production and storage activities in the Upper Whitewater and Garnet Hill subbasins, whereas the City and the La Entrada Project are located in the Lower Whitewater subbasin, which is far south of the Agua Caliente Reservation and separate from the Upper Whitewater and Garnet Hill subbasins. (See Figure 4-1 above.) Fourth, assuming only for the sake of argument that the lawsuit was successful, it does not seek to prohibit the recharge of imported and supplemental water in the Upper Whitewater and Garnet subbasins (which, again, the Project does not utilize). Rather, the lawsuit demands that imported water of "inferior quality" be treated before it is recharged to the Upper Whitewater or

Garnet Hill subbasins. For these and other reasons, it does not appear likely that the Agua Caliente lawsuit has the potential to affect the availability, reliability or overall sufficiency of water supplies available to the City of Coachella to serve the Project as set forth in this WSA.

4.3 State Water Project (SWP)

The SWP delivers water supplies from the Sacramento Delta to areas throughout the State, including Southern California. The system includes 660 miles of aqueduct and conveyance facilities extending from Lake Oroville in the north to Lake Perris in the south.

4.3.1 SWP Contracts

The California Department of Water Resources (DWR) holds direct contracts to deliver SWP supplies to 29 contracting agencies that hold particular allotments to the annual yield of the SWP. These contracts run until 2035, with terms for renewal, and form the basis for the construction, operation and maintenance of the SWP. There are several different SWP Contract Water types including Table A. Table A water is delivered in accordance with contractual allotments and is given first priority for delivery.

CVWD and DWA are both State Water Contractors. CVWD's original right to SWP supply (Table A Allotment) was 23,100 acre-feet per year (ac-ft/yr) and DWA's original SWP Table A allotment was 38,100 ac-ft/yr, for a combined Table A allotment of 61,200 ac-ft/yr. In 2004, CVWD purchased an additional 9,900 ac-ft/yr of SWP water from the Tulare Lake Basin Water Storage District, which brought CVWD's SWP Table A Allotment to 33,000 ac-ft/yr. In 2007, CVWD and DWA made a second purchase of SWP water from the Tulare Lake Basin Water Storage District. CVWD purchased 5,250 ac-ft/yr and DWA purchased 1,750 ac-ft/yr. Also in 2007, CVWD and DWA completed the transfer of 12,000 ac-ft/yr and 4,000 ac-ft/yr, respectively, from the Berrenda Mesa Water District. These acquisitions brought CVWD's annual SWP Table A Allotment to 50,250 ac-ft/yr, and DWA's annual SWP Table A Allotment to 43,850 ac-ft/yr. In addition to these amounts, CVWD and DWA have entered an agreement with MWD whereby MWD has permanently transferred 88,100 ac-ft/yr and 11,900 ac-ft/yr of SWP Table A Allotments to CVWD and DWA, respectively. Generally, the agreement enables MWD to call back certain amounts during dry and critical dry years, where in other years CVWD and DWA recharge the SWP supplies within the Coachella Valley Groundwater Basin. In sum, and subject to the discussion in Section 4.3.1, up to 138,350 ac-ft/yr of SWP Table A Allotment is available to CVWD, and up to 55,750 ac-ft/yr is available to DWA. Table 4-3 summarizes the CVWD and DWA total allocations of Table A SWP water.

In addition to the SWP allotments discussed above, CVWD and DWA secured additional rights to SWP supplies pursuant to a 2003 exchange agreement with Metropolitan. Historically, Metropolitan has not made full use of its SWP Table A Amounts in normal and wet years. Under the 2003 exchange agreement, CVWD and DWA acquired 100,000 AFY of Metropolitan's SWP Table A water as a permanent transfer, commencing in 2005. The terms of the agreement provide that Metropolitan has the option to call back the transferred water under certain conditions. This option must be exercised no later than April 30 of each year. Metropolitan's callback options are to be exercised in two 50,000 AF blocks. To estimate conservatively the average supply from this transfer, two scenarios are considered – without and with call-back. Without call-back, CVWD and DWA can receive SWP exchange water based on the estimated DWR reliability (see discussion below). With call-back, it is assumed that Metropolitan would exercise its option to callback the 100,000 AFY in four wet years out of every 10 years and the amount of water called back would be deducted from average SWP exchange deliveries. The actual frequency of callback would depend on the availability of Metropolitan's water supplies to meet its demands, the price of the callback water, and the ability of Metropolitan to store or use the callback water. Since 2005, Metropolitan has exercised its call-back option only once in 2005.

Table 4-3
State Water Project Water Sources (AFY)

	Original SWP Table A	Tulare Lake Basin Transfer #1	Tulare Lake Basin Transfer #2	MWD Transfer	Berrenda Mesa Transfer	Total
CVWD	23,100	9,900	5,250	88,100	12,000	138,350
DWA	38,100		1,750	11,900	4,000	55,750
Total:	**61,200**	**9,900**	**7,000**	**100,000**	**16,000**	**194,100**

Source: 2010 CVWMP Update, Table 4-3
[1]CVWD purchase of Table A water from the Tulare Lake Basin Water Storage District in 2004.
[2]CVWD and DWA purchase of Table A SWP water from Tulare Lake Basin in 2007.
[3]CVWD and DWA acquired Metropolitan's SWP Table A water as a permanent transfer Under the 2003 Exchange Agreement.
[4]CVWD and DWA transfer of Table A water from the Berrenda Mesa Water District in 2007.

CVWD and DWA, as SWP contractors, have the ability to purchase additional SWP supplies on an interruptible basis as the opportunity presents. Contractors may choose to offer their allocated Table A water in excess of their needs, designated Turnback Pool water, to other contractors through two pools (A and B) in February and March of a given year. This water can be purchased for 50 percent (Pool A) or 25 percent (Pool B) of the Delta Water Charge plus the Variable OMP&R Transportation and Off-Aqueduct Power Charges. The first significant purchase by CVWD and DWA occurred from 1996 through 1999 when large amounts of Turnback Pool water were available. Available Turnback Pool water is allocated between interested parties based on their Table A amounts. During that period, CVWD and DWA purchased 276,000 acre-feet of water for recharge at Whitewater.[12]

SWP contractors may also receive water under Article 21 of their contracts. Article 21 water is water that SWP contractors may receive on a short-term basis in addition to their Table A water, if they request it. Article 21 water is used by many SWP contractors to help meet demands when allocations are less than 100 percent. (See DWR 2011 Final SWP Delivery Reliability Report, p. 20.) Notably, Article 21 water is typically available only in wet yeas and when aqueduct capacity is available. Article 21 water is apportioned to those contractors requesting it in the same proportion as their Table A water. According to DWR, Article 21 water is available to a SWP contractor only if the

[12] Mission Creek-Garnet Hill Subbasins Water Management Plan, Final Report, January 2013.

following conditions are met: "Excess water" is flowing through the Delta; the contractor is able to use the surplus water, such as by offsetting the use of groundwater that would otherwise occur, or can store it in its own system; and delivering the water will not interfere with Table A allocations, other SWP deliveries, or SWP operations. (DWR 2011 Report, pp. 20-21.) The cost of Article 21 water is the Variable OMP&R Transportation and Off-Aqueduct Power Charges and any incremental DWR power cost. CVWD and DWA purchased 35,600 acre-feet of Article 21 water in 2000 and 800 acre-feet in 2002 and 2003.[13] According to DWR, the estimated long-term average availability of Article 21 water is 76,000 acre-feet per year under current conditions and 50,000 acre-feet per year under future conditions, with variations according to average, dry-period and wet-period conditions. (DWR 2011 Report, pp. 52, 56.)

Another potentially available, intermittent source of SWP water to the Coachella Valley is the Yuba River Accord Dry Year Water Purchase Program. In March 2008, CVWD and DWA entered into separate agreements with DWR for the purchase and conveyance of supplemental SWP water under the Yuba River Accord Dry Year Water Purchase Program, which provides dry year supply through a water purchase agreement between DWR and Yuba County Water Agency (YCWA). The agreement was part of the Lower Yuba River Accord, which settled long stranding operational and environmental issues over instream flow requirements for the lower Yuba River. Yuba Accord water transfers include both surface water and groundwater substitution transfers for an estimated total of up to 140,000 AFY. The available water is allocated among participating SWP contractors based on their Table A Amounts. It is estimated that CVWD and DWA may be able to purchase up to 4 percent of Table A or 5,600 AFY, and 1.3 percent or 1,820 AFY, respectively, for a total of 7,420 AFY. The amount of water available for purchase in a given year varies and will be based on DWR's determination of the Water Year Classification. These agreements provide for the exchange of these supplies with Metropolitan for CRA water in accordance with existing exchange agreements. CVWD and DWA obtained 1,836 AF in 2008 and 3,482 AF in 2009 from this program. (2011 SPEIR, p. 3-7.)

4.3.2 Historic Initial and Final Allocations and Historic Deliveries

Table 4-4 summarizes the historic initial and final allocations of SWP Table A water starting in 1991 and extending to 2011. Table 4-4 also shows imported water deliveries to the Lower Whitewater Subbasin.

[13] Mission Creek-Garnet Hill Subbasins Water Management Plan, Final Report, January 2013.

Table 4-4
Department of Water Resources
Table A Water Allocations, 1991-2011

Year	Initial Allocation[1]	Final Allocation[1]	Deliveries[2]
1991	85%	30%	N/A
1992	20%	45%	N/A
1993	10%	100%	N/A
1994	50%	50%	N/A
1995	40%	100%	N/A
1996	40%	100%	N/A
1997	70%	100%	415
1998	40%	100%	1,364
1999	55%	100%	2,802
2000	50%	90%	1,813
2001	40%	39%	3,572
2002	20%	70%	2,360
2003	20%	90%	1,671
2004	35%	65%	3,450
2005	40%	90%	4,743
2006	55%	100%	2,648
2007	60%	60%	5,775
2008	25%	35%	7,473
2009	15%	40%	21,735
2010	5%	50%	37,401
2011	25%	80%	32,417
AVERAGE:	**38%**	**73%**	**8,643**
		TOTAL:	**129,639**

[1]Source: California Department of Water Resources, Water Contract Branch within the State Water Project Analysis Office, Notices to State Water Contractors, 1991 – 2011.
[2]Source: CVWD Engineers Report on Water Supply and Replenishment Assessment, Lower Whitewater River Subbasin Area of Benefit, 2012-2013, Table 4

4.3.3 MWD Exchange Agreements

Since currently there is no conveyance facility to deliver SWP water to the Coachella Valley, CVWD and DWA cannot directly receive their SWP supplies. Instead, pursuant to certain exchange agreements, the CVWD and DWA SWP water is delivered to Metropolitan, which in turn delivers an equal amount of CRA water to CVWD and DWA to be recharged at the Levy, Whitewater and Mission Creek recharge facilities. CVWD and DWA are required to pay for their respective SWP costs and MWD is required to pay for its CRA costs. The original exchange agreements were entered in 1967. In 1983, the agreements were extended to 2035 (CVWD-Metropolitan, 1983; DWA-Metropolitan, 1983).

CVWD has operated a pilot recharge facility at Dike 4 near Avenue 62 since 1997. Construction of the full scale Levy facility was completed in mid-2009. Thereafter, substantially more recharge has occurred in the Lower Whitewater Subbasin. The Levy facility has an estimated capacity to recharge 40,000 AFY. In addition to the Levy facility, CVWD is planning construction of the Martinez Canyon recharge facility that is expected to recharge between 20,000 and 40,000 AFY on an average basis. The 2010 CVWMP considers alternative recharge scenarios to effectively recharge imported water at Whitewater, Levy, and Martinez to provide the greatest benefit for the groundwater basin.

4.3.4 SWP Reliability

DWR issues the State Water Project Delivery Reliability Report every two years, with the most recent final version issued in June 2012 (the DWR 2011 Report). In its last several updates, DWR has projected reductions in average SWP water deliveries in comparison to 2005. The 2011 Report identifies several factors that have the potential to affect the availability and reliability of SWP supplies. Although the 2011 Report presents an extremely conservative projection of SWP delivery reliability, it remains the best available information concerning the SWP. Following is information and a brief summary of several factors identified in the 2011 Report as having the potential to affect the availability and reliability of SWP supplies. An additional analysis of factors having the potential to affect the availability and reliability of SWP deliveries is attached as Appendix D.

4.3.4.1 FWS and NMFS Biological Opinions

In December 2008 and June 2009, respectively, the United States Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) issued biological opinions (BiOps) setting forth each agency's conclusions regarding the effects that the proposed long-term coordinated operations of the SWP and Central Valley Project (CVP) would have on threatened and endangered fish species in the Delta.[14] Both BiOps conclude that the operation of the SWP and CVP as proposed by DWR and the Bureau of Reclamation would jeopardize the continued existence of the protected species. Because FWS and NMFS reached "jeopardy" conclusions, each was required by the federal Endangered Species Act (ESA) to develop a Reasonable and Prudent Alternative (RPA) to the proposed project, and to include that RPA in its respective BiOp. According to their terms, the RPAs developed and adopted by FWS and NMFS impose various new restrictions and requirements on SWP and CVP operations.

As applied to the SWP, the RPAs included in the BiOps have the potential to result in substantially reduced water exports from the Delta. Preliminary estimates prepared by DWR have indicated that, in comparison to the level of SWP exports from the Delta that

[14] The December 15, 2008 FWS BiOp evaluated impacts to the delta smelt. The June 4, 2009 NMFS BiOp evaluated impacts to winter-run and spring-run Chinook salmon, steelhead, green sturgeon, and resident killer whales.

previously were authorized under State Board Decision 1641 (D-1641),[15] the FWS BiOp could reduce SWP deliveries by 18 to 29 percent during average and dry conditions, respectively, and the NMFS BiOp could reduce SWP deliveries by an additional 10 percent (for an aggregate reduction of 28 to 39 percent). Those potential reductions, however, cannot be predicted with certainty because the RPA restrictions are dependent upon highly variable factors such as hydrologic conditions affecting Delta water supplies, flow conditions in the Delta, migratory and reproductive patterns of the protected species, and numerous other non-project factors that impact the health and abundance of fish species and their habitats. As further discussed below, the RPA restrictions contained in the BiOps have been expressly accounted for in DWR's 2011 Report and future projections of SWP deliveries. Moreover, several legal challenges have been filed against the FWS and NMFS BiOps, and should a court conclude the RPA restrictions are invalid, SWP exports could return to higher levels.

4.3.4.2 FWS BiOp Litigation

In early 2009, the State Water Contractors, the San Luis Delta-Mendota Water Authority, and several individual water agencies holding contracts for SWP and CVP supplies filed legal challenges against the FWS BiOp regarding delta smelt. (*The Consolidated Delta Smelt Cases*, E.D. Cal. 1:09-CV-00407-OWW-GSA.) In November 2009, the Federal District Court of the Eastern District of California granted summary judgment on the claim made by several plaintiffs that the federal defendants violated the National Environmental Policy Act (NEPA) by failing to perform NEPA analysis prior to provisionally adopting and implementing the FWS BiOp and RPA. Further, in May 2010, the court issued Findings of Fact and Conclusions of Law on a motion for preliminary injunction, which confirmed the court's prior NEPA ruling and also determined that plaintiffs were likely to prevail on their claims that FWS violated the federal ESA and the Administrative Procedure Act (APA) in adopting the RPA for delta smelt. Thereafter, the parties filed motions for summary judgment to obtain a final ruling in the cases, and those motions were argued in early July 2010. In March 2011, the court issued a final decision that invalidated the FWS BiOp and RPA in several respects and ordered FWS to prepare a new BiOp. FWS and others appealed that decision to the Ninth Circuit Court of Appeals. The appeal was argued in September 2012 and a written decision has not been issued. In December 2012, FWS, DWR and others filed a joint motion with the court requesting an additional three years for FWS to prepare a new BiOp concerning delta smelt, which otherwise would be due by December 2013. The court tentatively denied the motion and requested additional information to justify the extension of time. Meanwhile, FWS, DWR and the Bureau of Reclamation (BOR) continue to use the RPA measures as a guideline for restricting SWP and CVP operations to protect delta smelt.

[15] D-1641 implements the objectives of the 1995 Bay-Delta Plan and imposes flow and water quality objectives to assure protection of beneficial uses in the Delta. The requirements of D-1641 address, among other things, standards for fish and wildlife protection, municipal and industrial water quality, agricultural water quality, and salinity. D-1641 imposed a new operating regime for the Delta, including measures such as X2, an export/inflow ratio, and the Vernalis Adaptive Management Program (VAMP). The standards under D-1641 are accomplished through requirements and conditions imposed on the water right permits for the SWP, the CVP and others. (*See*, California Water Plan Update 2009, Regional Reports Volume 3, Sacramento-San Joaquin River Delta at DB-6.)

4.3.4.3 NMFS BiOp Litigation

After issuance of the NMFS BiOp in June 2009, the State Water Contractors and other water agencies filed legal challenges against the BiOp. (*The Consolidated Salmon Cases*, E.D. Cal. 1:09-CV-1053-OWW-DLB.) In May 2010, the Federal District Court for the Eastern District of California ruled that the federal defendants violated NEPA by failing to analyze the impact of the BiOp and RPA on humans and the human environment. The court also ruled that plaintiffs were likely to prevail on their claims that NMFS violated the federal ESA and the APA in adopting the RPA. As with the delta smelt litigation, the parties also filed motions for summary judgment to obtain a final ruling in the cases. In September 2011, the court issued a final decision that invalidated the NMFS BiOp and RPA and ordered NMFS to prepare a new BiOp. NMFS and others appealed that decision to the Ninth Circuit Court of Appeals. Briefing of the appeal is expected to continue through April 2013, at which time a hearing will be set. In December 2012, NMFS, DWR and others filed a joint motion with the court requesting an additional three years for FWS to prepare a new BiOp concerning delta smelt, which otherwise would be due in or around 2016. The court tentatively denied the motion and requested additional information to justify the extension of time. Meanwhile, NMFS, DWR and the Bureau of Reclamation (BOR) continue to use the RPA measures as a guideline for restricting SWP and CVP operations to protect listed anadromous species.

4.3.4.4 Consistency Determination Litigation

Because the delta smelt and salmon species that are the subject of the FWS and NMFS BiOps are also protected under the California Endangered Species Act (CESA), the SWP and CVP are required to obtain take authorization for project operations from the California Department of Fish and Wildlife (DFW, formerly Department of Fish and Game). In July 2009 and September 2009, respectively, DFG issued “consistency determinations” which found that SWP and CVP operations do not violate CESA to the extent that such operations are in compliance with the RPAs set forth in the FWS and NMFS BiOps. Because the consistency determinations are issued under state law, and thus could remain in effect even if the federal BiOps are overturned, the State Water Contractors and the Kern County Water Agency filed legal challenges against the consistency determinations. The cases are currently stayed pending the final outcome of *The Consolidated Delta Smelt Cases* and *The Consolidated Salmon Cases*, which as indicated above are both pending on appeal before the Ninth Circuit.[16]

4.3.4.5 Longfin Smelt Protections

Regulatory actions related to longfin smelt also have the potential to affect the availability and reliability of SWP supplies. In February 2008, longfin smelt were listed as a “candidate” species under CESA, and DFW imposed certain interim restrictions on SWP operations for the protection of longfin smelt and its critical habitat. In February 2009, shortly before longfin smelt were officially listed as a “threatened” species under CESA, DFW issued Incidental Take Permit No. 2081-2009-001-03 (the Permit) to DWR, which imposes various terms and conditions on the ongoing and long-term operations of

[16] *See*, *e.g.*, *State Water Contractors v. Cal. Dept. of Fish and Game*, Sac. Sup. Ct. Case No. 34-2010-80000552; *State Water Contractors v. Cal. Dept. of Fish and Game*, Sac. Sup. Ct. Case No. 34-2010-80000560.

SWP facilities in the Delta. The operating restrictions under the Permit are based in large part on the restrictions imposed on the SWP by the 2008 FWS BiOp for delta smelt (see above). The resulting water supply reductions under the Permit depend on several variable factors, such as Delta hydrology, migratory and reproductive patters of longfin smelt, and other factors affecting species abundance in the Delta. Notably, DWR has not indicated whether any particular reductions in SWP exports are likely to result from the Permit. In March 2009, a legal challenge was filed against the Permit.[17] Although that litigation is currently stayed pursuant to a stipulation of the parties, the challenge puts DFW's ability to enforce the Permit into question.

4.3.4.6 Development of Delta Plan and Delta Flow Criteria Pursuant to New State Laws

In November 2009, the California Legislature enacted SBx7-1 as part of a comprehensive package related to water supply reliability, ecosystem health, and the Delta.[18] Among other things, SBx7 1 creates the Delta Stewardship Council (Council) and directs the Council to develop a management plan for the Delta by January 1, 2012 (the Delta Plan). In addition, the State Board was directed to develop flow criteria for the Delta to protect public trust resources, including fish, wildlife, recreation and scenic enjoyment, and DFW was required to identify quantifiable biological objectives and flow criteria for species of concern in the Delta.

In August 2010, the State Board adopted Resolution No. 2010-0039 approving its report entitled "Development of Flow Criteria for the Sacramento-San Joaquin Delta Ecosystem" (Flow Criteria). The State Board report concludes that substantially higher flows are needed through the Delta than in have occurred in previous decades in order to benefit zooplankton and various fish species.[19] Separately, in September 2010, DFW issued a draft report entitled "Quantifiable Biological Objectives and Flow Criteria for Aquatic and Terrestrial Species of Concern Dependent on the Delta" (DFW Report). The DFW Report is based on similar biological objectives and recommends Delta flows similar to those set forth in the State Board's Flow Criteria.[20] Notably, both the State Board and DFW recognize that their recommended flow criteria for the Delta do not balance the public interest or the need to provide an adequate and reliable water supply, and thus the recommendations may not be consistent with the public trust doctrine.[21] Also of importance, both the State Board and DFW acknowledge that their recommended flow criteria do not have any regulatory or adjudicatory effect, although they may be used to inform the Council as it prepares the Delta Plan, and may be considered as the Bay Delta Conservation Plan (BDCP) process moves forward.[22]

[17] *See State Water Contractors v. California Dept. of Fish and Game, et al.*, Sac. Sup. Ct. Case No. 34-2009-80000203.
[18] SBX7-1 became effective February 3, 2010 and adds Division 35 to the California Water Code (commencing with Section 85300). Division 35 is referred to as the Sacramento-San Joaquin Delta Reform Act of 2009.
[19] Flow Criteria at 5-8.
[20] DFW Report at 13.
[21] Flow Criteria at 4; DFW Report at 16.
[22] Flow Criteria at 3, 10; DFG Report at ES-4.

4.3.4.7 DWR Final 2011 SWP Delivery Reliability Report

DWR continues to evaluate the issues affecting SWP exports from the Delta and how those issues may affect the long-term availability and reliability of SWP deliveries to water agencies that hold SWP contracts. As indicated above, in June 2012, DWR released its Final 2011 SWP Delivery Reliability Report. According to the 2011 Report, the average delivery of contractual SWP Table A supply is projected to be 61 percent under current conditions and 60 percent under future conditions over the 20-year projection.[23] Within that long-term average, SWP Table A deliveries can range from 9 percent (single dry year) to 70 percent (single wet year) of contractual amounts under current conditions, and from 11 percent (single dry year) to 98 percent (single wet year) under future conditions.[24] Under current conditions, contractual amounts are projected to range from 35 to 38 percent during multiple-dry year periods, and from 69 to 72 percent during multiple wet periods.[25] Under future conditions, contractual amounts are projected to range from 30 to 35 percent during multiple-dry year periods, and from 72 to 95 percent during multiple wet periods.[26]

To ensure a conservative analysis, the DWR 2011 Report expressly assumes and accounts for the institutional, environmental, regulatory, and legal factors affecting SWP supplies, including but not limited to: water quality constraints, fishery protections, other D-1641 requirements, and the operational limitations imposed by the FWS and NMFS BiOps that are discussed above. The 2011 Report also considers the potential effects of Delta levee failures and other seismic or flood events.[27] Notably, the 2011 Report assumes that all of these restrictions and limitations will remain in place over the next 20-year period and that no actions to improve the Delta will occur, even though numerous legal challenges, various Delta restoration processes, and new legal requirements for Delta improvements are currently underway (i.e., Bay Delta Conservation Plan, Delta Vision, Delta Plan, etc.). Finally, DWR's long-term SWP delivery reliability analyses incorporate assumptions intended to account for potential supply shortfalls related to global climate change.[28] These and other factors result in DWR presenting an extremely conservative projection of SWP delivery reliability in its 2011 Report.

DWR's most recently published SWP Delivery Reliability Report (2012) demonstrates that the projected long-term average delivery amounts of contractual SWP Table A supplies are essentially the same as those projected in the final 2009 Report (e.g., 60%). As noted, the projections developed by DWR are predicated on extremely conservative assumptions, which make the projections useful from a long-range urban water supply planning perspective.[29] Indeed, recent legal rulings and other factors described above, among others, support higher estimates of average annual SWP deliveries than

[23] DWR 2011 Report at 50, 55-56, Tables 6-3, 6-4, 7-2 and 7-3.
[24] DWR 2011 Report at 50, 55-56, Tables 6-3, 6-4, 7-2 and 7-3.
[25] DWR 2011 Report at 50, 55-56, Tables 6-3, 6-4, 7-2 and 7-3.
[26] DWR 2011 Report at 50, 55-56, Tables 6-3, 6-4, 7-2 and 7-3.
[27] See, e.g., DWR 2011 Report at 33-36.
[28] See, e.g., DWR 2011 Report at 28-32, Technical Addendum.
[29] See, e.g., *Sonoma County Water Coalition v. Sonoma County Water Agency* (2010) 189 Cal.App.4th 33; *Watsonville Pilots Association v. City of Watsonville* (2010) 183 Cal.App.4th 1059; *Vineyard Area Citizens for Responsible Growth v. City of Rancho Cordova* (2007) 40 Cal.4th 412.

projected in the 2011 Report. While this may lead DWR to increase its projections in its next scheduled Report, the 2011 Report remains the best available information concerning the long-term delivery reliability of SWP supplies.

As shown on Table 4-5 below, even though the DWR 2011 Report demonstrates an average 60 percent delivery reliability for SWP Table A supplies over the next 20-year projection, the 2010 CVWMP is even more conservative in its assumptions. Indeed, notwithstanding the 2011 Report, the 2010 CVWMP assumes future SWP Table A deliveries to the Coachella Valley to be only 50 percent of Table A to account for potential water reductions that could occur in the absence of programs to balance Delta environmental concerns and water supply needs, the DWR 2011 Report was not available during the CVWMP preparation.[30] In light of the SWP reliability discussion presented above, in particular the BDCP implementation program, the CVWMP 50 percent reliability assumption is extremely conservative.

4.4 Colorado River Water

Colorado River supplies are important to the Coachella Valley for two primary reasons. First, and as further discussed below, a substantial portion of California's share of Colorado River water is allocated directly to CVWD. Second, much of the replenishment supplies used in the Valley come from MWD's allocation of Colorado River water, via the exchange agreement for SWP supplies as discussed above.

Colorado River water has been a major source of supply for the Coachella Valley since 1949 with the completion of the Coachella Canal. (2010 CVWMP, pp. 4-11 to 4-12.) The Colorado River is managed and operated in accordance with the *Law of the River,* the collection of interstate compacts, federal and state legislation, various agreements and contracts, an international treaty, a U.S. Supreme Court decree, and federal administrative actions that govern the rights to use of Colorado River water within the seven Colorado River Basin states. The *Colorado River Compact*, signed in 1922, apportioned the waters of the Colorado River Basin between the Upper Colorado River Basin (Colorado, Wyoming, Utah, and New Mexico) and the Lower Basin (Nevada, Arizona, and California). The Colorado River Compact allocates 15 million AFY of Colorado River water: 7.5 million AFY to the Upper Basin and 7.5 million AFY to the Lower Basin, plus up to 1 million AFY of surplus supplies. The Lower Basin's water was further apportioned among the three Lower Basin states by the *Boulder Canyon Project Act* in 1928 and the 1964 U.S. Supreme Court decree in *Arizona v. California*. Arizona's basic annual apportionment is 2.8 million AFY, California's is 4.4 million AFY, and Nevada's is 0.3 million AFY. California has been diverting up to 5.3 million AFY in recent years, using the unused portions of the Arizona and Nevada entitlements. Mexico is entitled to 1.5 million AFY of the Colorado River under the *1944 United States-Mexico Treaty for Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande*. However, this treaty did not specify a required quality for water entering Mexico. In1973, the United States and Mexico signed Minute No. 242 of the International Boundary and Water Commission requiring certain water quality standards for water entering Mexico. (2010 CVWMP, pp. 4-11 to 4-12.)

[30] 2010 CVWMP Update, Section 4.3.3, SWP Delivery Availability; see also 2011 SPEIR, pages 3-6 to 3-7.)

California's apportionment of Colorado River water is allocated by the 1931 *Seven Party Agreement* among Palo Verde Irrigation District (PVID), Imperial Irrigation District (IID), CVWD and Metropolitan. The three remaining parties, the City and the County of San Diego and the City of Los Angeles, are now part of Metropolitan. The allocations defined in the *Seven Party Agreement* are shown in Table 4-5 below. In its 1979 supplemental decree in the *Arizona v. California* case, the United States Supreme Court also assigned "present perfected rights" to the use of river water to a number of individuals, water districts, towns and Indian tribes along the river. These rights, which total approximately 2,875,000 AFY, are charged against California's 4.4 million AFY allocation and must be satisfied first in times of shortage. Under the 1970*Criteria for Coordinated Long-Range Operation of the Colorado River Reservoirs* (Operating Criteria), the Secretary of the Interior determines how much water is to be allocated for use in Arizona, California and Nevada and whether a surplus, normal or shortage condition exists. The Secretary may allocate additional water if surplus conditions exist on the River (see additional discussion below). (2010 CVWMP, p. 4-12.)

Table 4-5
Priorities and Water Delivery Contracts
California Seven Party Agreement of 1931

<table>
<tr><th>Priority</th><th>Description</th><th>Acre-ft/year</th></tr>
<tr><td>1</td><td>Palo Verde Irrigation District gross area of 104,500 acres of Coachella Valley lands</td><td rowspan="4">3,850,000</td></tr>
<tr><td>2</td><td>Yuma Project (Reservation Division) not exceeding a gross area of 25,000 acres within California</td></tr>
<tr><td>3(a)</td><td>IID, CVWD and lands in Imperial and Coachella Valley's to be served by the All American Canal</td></tr>
<tr><td>3(b)</td><td>Palo Verde Irrigation District – 16,000 acres of mesa lands</td></tr>
<tr><td>4</td><td>Metropolitan Water District of Southern California for use on coastal plain</td><td>550,000</td></tr>
<tr><td></td><td>Subtotal – California Basic Apportionment</td><td>4,400,000</td></tr>
<tr><td>5(a)</td><td>Metropolitan Water District of Southern California for use on coastal plain</td><td>550,000</td></tr>
<tr><td>5(b)</td><td>Metropolitan Water District of Southern California for use on coastal plain</td><td>112,000</td></tr>
<tr><td>6(a)</td><td>IID and lands in the Imperial and Coachella Valley's to be served by the All American Canal</td><td rowspan="2">300,000</td></tr>
<tr><td>6(b)</td><td>Palo Verde Irrigation District – 16,000 acres of mesa lands</td></tr>
<tr><td></td><td>Total</td><td>5,362,000</td></tr>
</table>

Sources: United States Bureau of Reclamation, http://www.usbr.gov; Coachella Valley Water Management Plan Update, December 2010, p. 4-14, Table 4-1.

California's Colorado River supply is protected by the 1968 Colorado River Basin Project Act, which provides that in years of insufficient supply on the main stream of the Colorado River, supplies to the Central Arizona Project shall be reduced to zero before California will be reduced below 4.4 million AF in any year. This assures full supplies to the Coachella Valley except in periods of extreme drought. As further described below, delivery analyses performed for the Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lakes Powell and Mead indicated that that California would only experience shortages if the total shortage in the Lower Basin exceeds 1.7 million AFY. (2010 CVWMP, p. 4-13.)

The Coachella Canal (Canal) is a branch of the All-American Canal that brings Colorado River water into the Imperial and Coachella Valleys. Historically, CVWD received approximately 330,000 AFY of Priority 3A Colorado River water delivered via the Coachella Canal. The Canal originates at Drop 1 on the All-American Canal and extends approximately 122 miles, terminating in CVWD's Lake Cahuilla. The service area for Colorado River water delivery under CVWD's contract with Reclamation is defined as Improvement District No. 1 (ID-1) which encompasses most of the East Valley and a portion of the West Valley north of Interstate 10. Under the 1931 California Seven Party Agreement, CVWD has water rights to Colorado River water as part of the first 3.85 million AFY allocated to California. CVWD is in the third priority position along with IID. (2010 CVWMP, pp. 4-13 to 4-14.)

4.4.1 Quantification Settlement Agreement

Although the rights and relative priorities to Colorado River supplies as discussed above remain established under the *Law of the River*, an additional framework applies in California. In 2003, CVWD, IID and Metropolitan successfully completed negotiation of the Quantification Settlement Agreement (QSA). The QSA quantifies the Colorado River water allocations of California's agricultural water contractors for the next 75 years and provides for the transfer of water between agencies.

Specific programs under the QSA include lining portions of the All-American and Coachella Canals, which conserve approximately 96,000 acre-feet annually. As a result, about 80,000 acre-feet of conserved water is delivered to the San Diego County Water Authority ("SDCWA") by exchange with Metropolitan. Metropolitan also takes delivery of 16,000 acre-feet annually that will be made available for the benefit of the La Jolla, Pala, Pauma, Rincon and San Pasqual Bands of Mission Indians, the San Luis Rey River Indian Water Authority, the City of Escondido and the Vista Irrigation District, upon completion of a water rights settlement, expected in 2013. An amendment to the 1988 Conservation Agreement between Metropolitan and IID and an associated 1989 Approval Agreement among Metropolitan, IID, CVWD and PVID, extended the term of the 1988 Conservation Agreement and limited the single year amount of water used by CVWD to 20,000 acre-feet. Also included under the QSA is the Delivery and Exchange Agreement between Metropolitan and CVWD that provides for Metropolitan to deliver annually up to 35,000 acre-feet of Metropolitan's State Water Project contractual water to CVWD by exchange with Metropolitan's available Colorado River supplies. In calendar year 2011, under a supplemental agreement with CVWD, Metropolitan delivered 105,000 acre-feet which consisted of the full 35,000 acre-feet for 2011 plus advance delivery of the full contractual amounts for 2012 and 2013. (MWDSC 2013 Preliminary Official Statement, Water Revenue Refunding Bonds, Appendix A, p. A-16.)

Under the QSA, CVWD has a base allotment of 330,000 AFY. In accordance with the QSA, CVWD has entered into water transfer agreements with Metropolitan and IID that increase CVWD supplies by an additional 129,000 AFY as shown in Table 4-6 below. (2010 CVWMP, p. 4-14.)

Table 4-6
CVWD Deliveries under the QSA

Component	2010 Amount (AFY)	2045 Amount (AFY)
Base Allotment	330,000	330,000
1988 MWD/IID Approval Agreement	20,000	20,000
Coachella Canal Lining (to SDCWA)	-26,000	-26,000
To Miscellaneous/Indian PPRs	-3,000	-3,000
IID/CVWD First Transfer	12,000	50,000
IID/CVWD Second Transfer	0	53,000
MWD/SWP Transfer	35,000	35,000
Total Diversion at Imperial Dam	**368,000**	**459,000**
Less Conveyance Losses[1]	-31,000	-31,000
Total Deliveries to CVWD	**337,000**	**428,000**

[1] Assumed losses after completion of canal lining projects.

Source: Coachella Valley Water Management Plan Update, December 2010, p. 4-14, Table 4-2

As of 2010, CVWD receives 368,000 AFY of Colorado River water deliveries under the QSA (See Table 4-6 above). This includes the base entitlement of 330,000 AFY, Metropolitan/IID Approval of20,000 AFY, 12,000 AFY of IID/CVWD First transfer, and 35,000 AFY of Metropolitan/SWP transfer. It also includes the 26,000 AFY transferred to San Diego County Water Authority (SDCWA) as part of the Coachella Canal lining project and the 3,000 AFY transfer to Indian Present Perfected Rights (PPRs). CVWD's allocation will increase to 459,000 ac-ft/yr of Colorado River water by 2026 and remain at that level for the 75 year term of the QSA. After deducting conveyance and distribution losses, approximately 428,000 AFY will be available for CVWD use. (2010 CVWMP, p. 4-14.) As further discussed below, legal challenges were filed against the QSA in 2003. While several of the issues have been resolved, the litigation continues and will likely take several more years to complete.

4.4.2 Factors Affecting Colorado River Supplies

Several important factors have the potential to affect the long-term availability and reliability of Colorado River supplies in the Coachella Valley. Among those factors are drought conditions in the Colorado River Basin; water requirements for endangered species and habitat protection; climate change; and lawsuits challenging the validity of the QSA. A detailed discussion of these factors is presented below.

4.4.2.1 Drought Conditions and Interim Guidelines

Drought conditions in the Colorado River Basin are well documented. The period from 2000 through 2007 was the driest eight-year period in the 100-year historical record of the Colorado River. This drought in the Colorado River Basin reduced Colorado River system storage, while demands for Colorado River water supplies continued to increase. From October 1, 1999 through September 30, 2007, storage in Colorado River reservoirs decreased from 55.8 million AF (approximately 94 percent of capacity) to 32.1 million AF (approximately54 percent of capacity), and was as low as 29.7 million AF (approximately 52 percent of capacity) in 2004. In November 2010, Lake Powell and Lake Mead were at 62 percent and 38 percent of their storage capacities, respectively (Reclamation, 2010b). Although slightly above normal snowpack conditions existed in the Colorado River basin in 2008, the years 2009 and 2010 saw a return of below normal runoff conditions. Consequently, the potential for continued drought conditions exists. (2010 CVWMP, p. 4-26.)

In January 2001, the Secretary of the Interior adopted guidelines (the "Interim Surplus Guidelines") for use through 2016 in determining if there is surplus Colorado River water available for use in California, Arizona and Nevada. The Interim Surplus Guidelines were amended in 2007, with the new Guidelines extending through 2026. The Interim Surplus Guidelines contain a series of benchmarks for reductions in agricultural use of Colorado River water within California by set dates. (2010 CVWMP, p. 4-26.

The purposes of the Guidelines are to: (1) improve Reclamation's management of the Colorado River by considering trade-offs between the frequency and magnitude of reductions of water deliveries, and considering the effects on water storage in Lake Powell and Lake Mead, where Reclamation will also consider the effects on water supply, power production, recreation, and other environmental resources; (2) provide mainstream United States users of Colorado River water, particularly those in the Lower Division states, a greater degree of predictability with respect to the amount of annual water deliveries in future years, particularly under drought and low reservoir conditions; and (3) provide additional mechanisms for the storage and delivery of water supplies in Lake Mead to increase the flexibility of meeting water use needs from Lake Mead, particularly under drought and low reservoir conditions. (2010 CVWMP, p. 4-26.)

As a result of the interim guidelines, recipients of Colorado River water, including CVWD, will receive deliveries with a higher degree of reliability. Information presented in the Bureau of Reclamation's 2007 Final Environmental Impact Statement ("EIS") for the Interim Guidelines indicates that California would only experience shortages if the total shortage in the Lower Basin exceeds 1.7 million AF. Due to California's Colorado River priority system, all delivery shortages would be borne by Metropolitan, which has a lower priority than CVWD (Reclamation, 2007). Consequently, no reduction in CVWD's Colorado River supplies is projected at this time. (2010 CVWMP, p. 4-26.)

4.4.2.2 Protected Species and Other Environmental Issues

Federal and state environmental laws protecting fish species and other wildlife species have the potential to affect Colorado River operations. A number of species that are on either "endangered" or "threatened" lists under the ESAs are present in the area of the Lower Colorado River, including among others, the bonytail chub, razorback sucker, southwestern willow flycatcher and Yuma clapper rail. To address this issue, a broad-based state/federal/tribal/private regional partnership that includes water, hydroelectric power and wildlife management agencies in Arizona, California and Nevada have developed a multi-species conservation program for the main stem of the Lower

Colorado River (the Lower Colorado River Multi-Species Conservation Program or "MSCP"). The MSCP allows Metropolitan to obtain federal and state permits for any incidental take of protected species resulting from current and future water and power operations of its Colorado River facilities and to minimize any uncertainty from additional listings of endangered species. The MSCP also covers operations of federal dams and power plants on the river that deliver water and hydroelectric power for use by Metropolitan and other agencies. The MSCP covers 27species and habitat in the Lower Colorado River from Lake Mead to the Mexican border for a term of 50 years. Over the 50 year term of the program, the total cost to Metropolitan will be about $88.5 million (in 2003 dollars), and annual costs will range between $0.8 million and $4.7 million (in 2003 dollars). (MWDSC 2013 Preliminary Official Statement, Water Revenue Refunding Bonds, Appendix A, pp. A-20 to A-21.)

The non-profit conservation organization Grand Canyon Trust filed litigation in December 2007 against the Bureau of Reclamation in the United States District Court for the District of Arizona, alleging that the Bureau of Reclamation's planning for, and operation of, the Glen Canyon Dam in the Upper Basin of the Colorado River system (which impounds Lake Powell) does not comply with requirements of NEPA and the Federal ESA. Metropolitan, IID, the seven basin states, and several water and energy agencies intervened in this case. On March 29, 2011, the trial court issued a final judgment upholding the Bureau of Reclamations' prior decisions for Glen Canyon Dam operations. The Grand Canyon Trust appealed. On August 13, 2012, the United States Court of Appeals for the Ninth Circuit affirmed the decision of the Arizona district court. (MWDSC 2013 Preliminary Official Statement, Water Revenue Refunding Bonds, Appendix A, p. A-21.)

4.4.2.3 Potential Climate Change Impacts

Climate change has the potential to affect imported water supplies. Potential effects of global warming could also increase water demand within the Coachella Valley. Precise estimates of potential future impacts of climate change on runoff throughout the Colorado River basin are not currently available.[31] These impacts may include decrease in annual flow and increased variability, including more frequent and more severe droughts. Furthermore, even without precise knowledge of the effects, increasing temperatures alone would likely increase losses due to evaporation and sublimation, resulting in reduced runoff. (2010 CVWMP, p. 5-15.)

According to DWR, increased air temperature will result in earlier snow melt runoff and a greater proportion of runoff due to rainfall. Because reservoir storage in the Colorado River basin is so large in comparison to annual basin runoff (roughly four times average runoff), a change in the timing of annual runoff would not be expected to significantly affect basin yield.[32] Potential changes in the amount of precipitation received by the Colorado River basin could affect basin yield. Warmer temperatures could also be expected to increase water demands and increase evaporation from reservoirs and canals. While changes in any particular location will likely be small, the aggregate

[31] Colorado River Interim Guidelines for East Basin Shortages and Coordinated Operations for Lakes Powell and Mead, U.S. Bureau of Reclamation, 2007.
[32] Progress on Incorporating Climate Change into Management of California's Water Resources, Technical Memorandum Report, California Department of Water Resources, October 2006.

change for the basin could be significant because so much land is involved. No reliable quantitative estimates of potential changes in precipitation (or increased demand) are available, according to the referenced 2007 BOR guidelines.

Potential climate changes impacts were evaluated in the Environmental Impact Study (EIS) on the referenced BOR guidelines. The guidelines extend through 2026, providing the opportunity to gain valuable operating experience through the management of Lake Powell and Lake Mead, particularly for low flow reservoir conditions, and to improve the bases for making additional future operational decisions during the interim period and thereafter.

The shortage sharing guidelines are crafted to include operational elements that would respond if potential impacts of climate change and increased hydrologic variability occur. The guidelines include coordinated operational elements that allow for adjustment of Lake Powell releases to respond to low average storage conditions in Lake Powell or Lake Mead. In addition, the guidelines enhance conservation opportunities in lower basin and retention of water in Lake Mead. (2010 CVWMP, p. 5-15.)

While impacts from climate change cannot be quantified at this time, the interim guidelines should provide additional protection against impacts of shortage sharing at least through 2026, and likely for extended periods. Coachella Valley water supplies are uniquely protected from potential impacts of climate change and corresponding shortages by (1) California's first priority for Colorado River water supplies in the lower Colorado River basin, and (2) Coachella's high priority for Colorado River supplies among California users of Colorado River water. (2010 CVWMP, p. 5-15.)

4.4.2.4 QSA Litigation

On November 5, 2003, IID filed a validation action in Imperial County Superior Court, seeking a judicial determination that thirteen agreements associated with the IID/SDCWA water transfer and the QSA are valid, legal and binding. Other lawsuits also were filed contemporaneously challenging the execution, approval and implementation of the QSA on various grounds. All of the QSA cases were coordinated in Sacramento Superior Court. Between early 2004 and late 2009, a number of pretrial challenges and dispositive motions were filed by the parties and ruled on by the court, which reduced the number of active cases and narrowed the issues for trial, the first phase of which began in November 2009 and concluded in December 2009. One of the key issues in this first phase was the constitutionality of the QSA Joint Powers Agreement, pursuant to which IID, CVWD and SDCWA agreed to commit $163 million toward certain mitigation and restoration costs associated with implementation of the QSA and related agreements, and the State agreed to be responsible for any costs exceeding this amount. A final judgment was issued on February 11, 2010, in which the trial court held that the State's commitment was unconditional in nature and, as such, violated the appropriation requirement and debt limitation under the California Constitution. The trial court also invalidated eleven other agreements, including the QSA, because they were inextricably interrelated with the QSA Joint Powers Agreement. Lastly, the trial court ruled that all other claims raised by the parties, including CEQA claims related to the QSA Programmatic EIR and the IID Transfer Project EIR, were moot. (2010 CVWMP, p. 4-26; MWDSC 2013 Preliminary Official Statement, Water Revenue Refunding Bonds, Appendix A, p. A-18.)

In March 2010, Metropolitan, IID, CVWD, SDCWA, the State and others filed notices of appeal challenging various aspects of the trial court's ruling. On December 7, 2011, the Court of Appeal issued its ruling reversing, in part, the trial court's ruling. In particular, the Court held that while the State's commitment to fund mitigation costs in excess of $163 million was unconditional, actual payment of such costs was subject to a valid appropriation by the Legislature, as required under the California Constitution. Moreover, the State's commitment did not create a present debt in excess of the State Constitution's $300,000 debt limit. Thus, the QSA Joint Powers Agreement was held to be constitutional. The Court of Appeal also rejected other challenges to this agreement, including that it was beyond the State's authority, there was no "meeting of the minds," and there was a conflict of interest. In light of its ruling, the court of appeal remanded the matter back to the trial court for further proceedings on the claims that had been dismissed as moot, including the CEQA claims.

On June 4, 2013, the trial court issued its ruling on remand, validating the QSA and eleven related agreements while denying the remaining legal challenges that were brought against the QSA. Among other important rulings, the court upheld the CEQA review that was prepared for the QSA. Among its decisions on specific environmental issues, the court determined that the potential air quality impacts to the Salton Sea were adequately analyzed under CEQA. The court also found that the use of a baseline consisting of existing and predicted future conditions of the Salton Sea was appropriate to measure the impacts of the long-term water transfers. It denied project opponents' arguments that more alternatives should have been considered and found that the water agencies' conclusion that use and transfer of water to the San Diego area would not induce growth was supported by record evidence. The court also addressed the nature of changes made to the agreements after the environmental documentation was completed and the procedural decision of water districts to designate themselves as "co-lead agencies" under CEQA, finding that these decisions did not violate CEQA. As a result, the court concluded that the record supported the lead agencies' conclusions relating to CEQA and upheld the validity of the QSA and eleven related agreements.

In January 2010, a separate complaint was filed by the County of Imperial and the Imperial County Air Pollution Control District alleging that execution and implementation of three QSA-related agreements violate NEPA and the federal Clean Air Act. The complaint named the Department of the Interior, Secretary of the Interior, Bureau of Reclamation and Commissioner of Reclamation as defendants, and Metropolitan, CVWD, IID and SDCWA as real parties in interest. With respect to NEPA, the complaint alleged that the environmental impact statement prepared by the Bureau of Reclamation failed to adequately analyze potential impacts on the Salton Sea and on land use, growth and socioeconomics; improperly segmented various project components; failed to address cumulative impacts; and failed to address mitigation of potential impacts. With respect to the Clean Air Act, the complaint alleged that the Bureau of Reclamation failed to conduct a conformity analysis as required under the Act and Imperial County Air Pollution Control District's own rules. In April 2012, the court ruled against the plaintiffs and in favor of the defendants on all claims. The court held that the plaintiffs lacked standing to pursue NEPA and Clean Air Act claims and that the NEPA claims lacked merit. In May 2012, the plaintiffs filed a notice of appeal and the non-federal defendants filed a notice of cross-appeal. Briefing on all appeals is expected to be completed by the middle of 2013. The impact, if any, that this separate litigation might have on CVWD's access to Colorado River supplies under the QSA cannot be determined with certainty at this time. (2010 CVWMP, p. 4-26; see also MWDSC 2013 Preliminary Official Statement, Water Revenue Refunding Bonds, Appendix A, p. A-18 to A-19.)

4.4.2.5 Colorado River Basin Study

In December 2012, the Bureau of Reclamation (BOR) issued its Colorado River Basin Water Supply and Demand Study (2012 Study). According to BOR, the 2012 Study was prepared against the backdrop of challenges and complexities of ensuring a sustainable water supply and meeting future demand in the Colorado River system. Notably, the 2012 Study recognizes that because of the Colorado River system's ability to store approximately 60 million acre-feet of water (or nearly four years of average natural flow of the River), all requested deliveries have been met in the Lower Basin, despite recently experiencing the worst 11-year drought in the last century. (2012 Study, Executive Summary, p. ES-1.) The 2012 Study concludes that, without additional future water management actions among the Upper and Lower Basin states, a wide range of future imbalances is plausible, primarily due to uncertainties inherent in future water supply. (Id, p. ES-6.) Comparing the median long-term water supply projections against the median long-term water demand projections, and factoring in the myriad factors having the potential to affect the availability and reliability of River supplies and demands (such as climate change, species and other environmental issues, social trends, economic and legal forces, and technical capabilities), the 2012 Study shows that a long-term projected imbalance of 3.2 million acre-feet or more could occur by the year 2060. (Id.) To address such potential long-term imbalances, the 2012 Study identifies and discusses a broad range of potential options to resolve the differences between water supply and demand. During the study period, over 150 options were received and organized into four groups: (1) those that increase Basin water supplies; (2) those that reduce Basin water demands; (3) those that focus on modifying operations; and (4) those that focus primarily on Basin governance. (Id., p. ES-7.) Moreover, recognizing that no single option is likely sufficient to resolve potential water supply and demand imbalances, the 2012 Study developed groups and portfolios of options to reflect different adaptive strategies. (Id., p. ES-11.) Importantly, the 2012 Study recognizes that *complete* elimination of Basin vulnerability is not likely obtainable, yet concludes that implementation of various adaptive management options results in a significant reduction in vulnerability (e.g., the percentage of future scenarios resulting in Lake Mead elevations being less than 1,000 feet msl is reduced from 19 percent to only 3 percent). (Id., p. ES-14.). Indeed the 2012 Study states that implementation of management portfolios are projected to be successful in significantly improving the resiliency of Basin resources to vulnerable hydrologic conditions. (Id.) Similar to the extraordinary conservation and management efforts being undertaking throughout the Coachella Valley, the 2012 Study concludes that supply augmentation, water reuse and conservation will be critical tools in managing potential supply and demand imbalances. (Id.)

4.5 Transfer and Exchange Opportunities

Water transfers involve the temporary or permanent sale or lease of a water right or contractual water supply between willing parties. Water can be made available for transfer from other parties through a variety of mechanisms.

4.5.1 City

The City is exploring opportunities to exchange non-potable groundwater for water from the Coachella Canal. Certain groundwater in the Lower Coachella Valley has higher levels of dissolved solids and fluoride, and thus is not suitable for potable purposes. However, that supply may be suitable for irrigation and other non-potable uses. In turn, Canal water that is currently used only for irrigation purposes could be treated or left untreated and used for potable or non-potable urban uses. (City 2010 UWMP, pp. 4-12 to 4-13.)

4.5.2 CVWD

CVWD, DWA and the City of Indio are considering the acquisition of additional imported water supplies to augment existing supplies. Under the 2010 CVWMP, CVWD plans to acquire up to 50,000 AFY of additional water supplies through either long-term leases or entitlement purchases from willing parties. Potential sources might include the Delta Wetlands Project which would store surplus water at two Delta islands for later delivery, Sacramento Valley irrigation water transfers, or purchase(s) of additional Table A water from other SWP contractors. Notably, developments within CVWD's retail service area are required to pay a supplemental water supply charge. These amounts can be used to acquire additional water supplies to serve the needs of specific development projects. Supplemental supplies can be transferred to the Coachella Valley and delivered via the SWP, Metropolitan's Colorado River Aqueduct or the Coachella Canal. Further analysis of transfer and exchange opportunities is provided in the 2010 CVWMP and CVWD 2010 UWMP. (2010 CVWMP, pp. 8-4 to 8-6; CVWD 2010 UWMP, pp. 4-19 to 4-21.)

4.6 Desalinated Water Opportunities

As described in the Coachella Valley IRWMP, desalination processes are being developed for reuse of agricultural drainage flows in the Coachella Valley. The Valley has a large network of drains and open channels that transport irrigation drainage flows and stormwater. In East Valley areas of agriculture, a high groundwater table and concentration of salts in irrigated soils makes this system a requirement. Desalinated agricultural drain flows can be applied to any number of irrigation and domestic purposes, and thus can serve as an important component of the Valley's water supply portfolio.

4.6.1 City

The City of Coachella does not anticipate the future use of desalinated water within its service area, as the backbone facilities and infrastructure needed for desalination are not economically feasible. However, the City believes that desalinated water makes sense at the regional level. With a regional approach, desalination of local agricultural drain water could become a viable and economical alternative to potable water and Coachella Canal water. (City 2010 UWMP, p. 4-14.)

4.6.2 CVWD

CVWD plans to use treated agricultural drainage and other brackish water for irrigation purposes. A brackish water treatment pilot study and feasibility study was completed in 2008. A variety of treatment technologies, brine management approaches and source water supply combinations were compared and assessed over a range of treatment capacities. The treatment alternatives compared reverse osmosis (RO) with dew evaporation, and RO was the chosen technology. Source water supply options consist of the collection of agricultural drainage water at select outfall locations and the installation of a well field to extract groundwater in the upper part of the aquifer influencing the agricultural runoff water. The amount of drain water that would be treated and recycled depends on supply availability (the amount of drain flow occurring), the overall supply mix (the amount of additional water needed), and the cost of treatment and brine disposal. CVWD’s CVWMP considers up to 10,000 AFY of desalinated drain water by the year 2035 for urban use. Further analysis is provided in the 2010 CVWMP and CVWD 2010 UWMP.

In addition to drain water, the CVWMP also analyzes desalinated ocean water. Coastal communities in southern California are conducting feasibility studies and developing plans to desalinate ocean water as a water supply source. However, desalinating ocean water has relatively high costs due to the energy required to operate reverse osmosis facilities and potential environmental impacts associated with seawater intakes supplying the plant and disposal of brine. Since the Coachella Valley is located a significant distance from the ocean, desalinated ocean water would need to be exchanged with an imported water source (SWP or Colorado River water) for delivery to the Valley. The amount of water that could be developed through ocean water desalination and exchange is likely to be limited by economics of the physical capacity to deliver desalinated ocean water into the coastal water delivery systems and water quality. Further analysis is provided in the 2010 CVWMP and CVWD 2010 UWMP. (2010 CVWMP, pp. 8-5 to 8-13; CVWD 2010 UWMP, pp. 4-21 to 4-23.)

4.7 Recycled Water Opportunities

Recycled water is a significant resource that can be used to help expand the local and regional water supply portfolio. Wastewater that has been highly treated and disinfected can be reused for landscape irrigation, certain agricultural applications, and a variety of other purposes. Recycled water has historically been used for irrigation of golf courses and urban landscaping in the Coachella Valley. City and CVWD recycled water opportunities are described below.

4.7.1 City

Currently, the City does not have infrastructure in place to recycle water. However, the City is in the process of updating its sewer master plan, which will include a feasibility study on implementing a recycled water program. If the treatment system upgrade feasibility study produces a favorable result, and tertiary treatment is added to the facility, potential uses of recycled water could be implemented, including non-potable water systems for larger developments, such as La Entrada. In addition, the City has begun negotiations with Valley Sanitation District to acquire wastewater effluent from its treatment plant located north and uphill of the City. The investigation includes determining treatment plant improvements required to meet applicable recycled water quality standards. (City 2010 UWMP, pp. 4-16 to 4-19.)

4.7.2 CVWD

Urban growth is expected to increase the amount of wastewater generated, and thus will make additional recycled water available for reuse, primarily in the East Valley. As discussed in the 2010 CVWMP, with water conservation measures, recycled water supplies in the East Valley are projected to total about 67,000 AFY by 2045.

In addition, growth is expected to occur in areas that are not currently served by wastewater treatment facilities. It is expected that the wastewater agency serving these areas will extend their wastewater collection systems as development occurs. For the areas within the cities of Coachella and Indio and their respective spheres of influence that are northeast of the San Andreas fault, it is expected that one or more satellite treatment facilities will be constructed to treat wastewater generated in these areas. That recycled water can be reused for outdoor use within those developments to reduce the need for additional local potable and imported water supplies. Based on estimates of water demands and wastewater flows, recycled water could meet as much as 12,000 AFY of non-potable demand in this area by 2045. Further analysis is provided in the 2010 CVWMP and CVWD 2010 UWMP. (2010 CVWMP, pp. 8-5 to 8-9; CVWD 2010 UWMP, pp. 4-23 to 4-31.)

4.8 Future Water Projects

The City and CVWD continue efforts to meet water demand through development of future water projects. Each are discussed in the following paragraphs.

4.8.1 City

The City understands the need to develop additional sources of supply to meet demands associated with projected growth. The City will continue to evaluate the use of Canal water as a source substitution for drinking water supplies obtained from groundwater. Upon completion of necessary agreements, treatment facilities, and infrastructure, the City estimates that it could derive approximately 15 percent of its drinking water from the Canal. As part of its water master plan process, the City will continue to design water system improvements to enhance conservation, identify additional water supplies and potential source substitutions, and enhance local groundwater recharge. In addition, City financing plans will be developed to implement the capital improvement program. (City 2010 UWMP, p. 4-19.)

4.8.2 CVWD

CVWD will continue to implement recommendations provided in the 2010 CVWMP. As outlined in Chapter 1 above, and as described throughout this WSA, CVWD water supply projects and programs include greater conservation (agricultural conservation, additional urban conservation, and golf course conservation), supply development (acquisition of additional imported water supplies, recycled water use, and desalinated drain water), groundwater recharge program enhancements, and source substitution programs. In addition to the information provided in this WSA, Section 8 of the 2010 CVWMP Update provides a detailed discussion of the many new projects and programs that are recommended for implementation. (2010 CVWMP, pp. 8-13 to 8-14; CVWD 2010 UWMP, pp. 4-31 to 4-34.)

4.9 Analysis of Water Supply and Demand

As noted herein, the supply and demand analyses for the La Entrada Project are based in large part on the City's 2010 UWMP, CVWD's 2010 UWMP and CVWD's 2010 CVWMP Update and 2011 SPEIR. The UWMPs were prepared in accordance with the Urban Water Management Planning Act, as most recently amended by SBx7-7. Among other analyses, the UWMPs and the CVWMP Update and 2011 SPEIR identify total projected water demands, and demonstrate that total projected water supplies will be sufficient to meet those demands through 2035 and beyond. Also discussed above, through the 2009 and 2013 MOUs the City and CVWD have identified ways to ensure that sufficient water supplies will be available to serve growth throughout the City's service area, including its sphere of influence. Indeed, the 2013 MOU specifically applies to the La Entrada Project.

Although substantial growth has been forecasted for the Coachella Valley, the rate of growth has slowed in recent years due to widespread economic downturn. As the economy recovers and as development returns, other changes may occur in the region. For example, the area may continue to experience a transition from agricultural to urban land uses. As agricultural land converts to urban uses, the characteristics of water demands and infrastructure will also change. The 2010 CVWMP Update specifically accounts for these changes and the different ways that water will be used. The analyses show that as urban development occurs, Canal water that is currently used for irrigation could be used for groundwater replenishment to serve urban uses, could be treated for direct indoor use, or left untreated for urban non-potable use.

As outlined in the Chapters above, water conservation is a major component of future water management in the Valley. As presented above, both the City and CVWD are committed to reducing their per capita urban water demand in accordance with SBx7-7. Agricultural conservation will also be a focus within CVWD. The 2010 CVWMP Update increases the water conservation requirement during the next 35 years. A 14-percent reduction in agricultural water use is targeted by the year 2020. CVWD's 2009 landscape ordinance will govern the irrigation demands of new golf courses within CVWD's service area, and reduce demands of existing golf courses by 10 percent.

Other than Canal water, recycled water and desalinated agricultural drain water, all water delivered to end users is obtained from the groundwater basin, which is continuously recharged with supplemental imported supplies as discussed above. Also noted above, the groundwater basin has a capacity of approximately 28.8 million acre-feet and currently contains about 25 million acre-feet and acts as a very large conjunctive use reservoir. As provided throughout this WSA, and in the 2010 CVWMP and 2011 SPEIR, the managed basin is capable of ensuring a sufficient and sustainable water supply to meet existing water demands and the demands associated with projected growth throughout the region (specifically including the City and the proposed La Entrada Project) during normal, single-dry and multiple-dry periods throughout the

20-year projection and beyond. Moreover, it has been determined in accordance with CEQA that implementation of the 2010 CVWMP will have a beneficial effect on groundwater resources. CVWD has many programs to maximize the water resources available to it including recharge of its Colorado River and SWP supplies, recycled water, desalinated agricultural drain water, conversion of groundwater uses to Canal water and various conservation measures, such as tiered water rates, a landscaping ordinance, outreach and education. The 2010 CVWMP Update and CVWD replenishment assessment programs, in which the City fully participates, establish a comprehensive and managed effort to eliminate the overuse of local groundwater supplies.

The analysis herein evaluates whether the total projected water supplies available to the City, by virtue of its membership and participation in the regional efforts of the CVWD 2010 CVWMP, are sufficient to meet the water demands of the La Entrada Project in addition to other existing and planned future uses within the City's service area. The supply and demand assessment includes three scenarios over the 20-year projection as required by SB 610: normal water years, single-dry years, and multiple-dry years. As presented in Section 3, the City's water demands are projected to grow from 8,709 AFY in 2010 to 26,089 AFY in 2035. As shown in Section 2, the estimated Project demands are 5,366 AFY, representing approximately 31 percent of the City's projected growth. Tables 4-7, 4-8 and 4-9 outline the water supply and demand scenarios for normal, single-dry and multiple-dry years respectively.

Table 4-7
Normal Water Years 2010-2035 (AFY)

	2010	2015	2020	2025	2030	2035
Supply Totals	8,260	10,558	14,228	18,181	22,135	26,089
Demand Totals	8,260	10,558	14,228	18,181	22,135	26,089
Difference	0	0	0	0	0	0
Difference as % of Supply	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Difference as % of Demand	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Table 4-8
Single-Dry Water Years 2010-2035 (AFY)

	2010	2015	2020	2025	2030	2035
Supply Totals	8,260	10,558	14,228	18,181	22,135	26,089
Demand Totals	8,260	10,558	14,228	18,181	22,135	26,089
Difference	0	0	0	0	0	0
Difference as % of Supply	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Difference as % of Demand	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Table 4-9
Multiple-Dry Water Years 2010-2035 (AFY)

		2010	2015	2020	2025	2030	2035
Multiple-Dry Year First Year Supply[1]	**Supply totals**	8,260	10,558	14,228	18,181	22,135	26,089
	Demand totals	8,260	10,558	14,228	18,181	22,135	26,089
	Difference	0	0	0	0	0	0
	Difference as % of Supply	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Difference as % of Demand	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Multiple-Dry Year Second Year Supply[2]	**Supply totals**	7,847	10,030	13,517	17,272	21,028	24,785
	Demand totals	7,847	10,030	13,517	17,272	21,028	24,785
	Difference	0	0	0	0	0	0
	Difference as % of Supply	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Difference as % of Demand	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Multiple-Dry Year Third Year Supply[3]	**Supply totals**	7,021	8,974	12,094	15,454	18,815	22,176
	Demand totals	7,021	8,974	12,094	15,454	18,815	22,176
	Difference	0	0	0	0	0	0
	Difference as % of Supply	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Difference as % of Demand	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

[1] No demand reductions are expected during a single dry year. Typically, there are no demand reduction measures during single dry years. It isn't until back to back dry years are recognized that demand reduction measures are implemented.

[2] Based on an assumed 5% reduction in demand based on Stage I Water Alert.

[3] Based on an assumed 15% reduction in demand based on Stage II Water Alert.

4.10 Conclusions

The water supply for the proposed La Entrada Project will be the Lower Whitewater River Subbasin in the Coachella Valley with supplies that are recharged to the Basin on an ongoing basis. Groundwater storage will be used in dry years to support potential differences between demands and supply. The groundwater basin has a capacity of approximately 28.8 million acre-feet and currently contains about 25 million acre-feet, simulating the benefits of a very large conjunctive use reservoir. It is capable of meeting the water demands of the Coachella Valley for extended periods during normal, single-dry and multiple-dry year conditions, and the determination has been made in accordance with CEQA that the City's utilization of groundwater supplies in a manner that is consistent with the implementation of the CVWD 2010 CVWMP will not have significant environmental impacts on the groundwater basin, and instead will have a beneficial effect on groundwater resources. (See CVWD 2011 SPEIR.)

As discussed in the 2010 CVWMP Update, the 2011 SPEIR, CVWD's 2010 UWMP, City's 2010 UWMP, and this WSA, the City and CVWD have many programs to maximize the water resources available to the City and CVWD, including but not limited to recharge of the basin using Colorado River and SWP supplies, direct use and recharge of recycled water, desalinated agricultural drain water, conversion of groundwater uses to Canal water and comprehensive water conservation practices such as tiered water rates, landscaping ordinances, outreach and education. The CVWD groundwater replenishment programs establish a comprehensive and managed effort to reduce and eliminate overuse of local groundwater resources. These programs allow CVWD to maintain the groundwater basin as its primary water supply and to recharge the groundwater basin as its other supplies are available and needed to meet existing and projected demands within its overall service area, including the City and the City's sphere of influence.

Based on the information, analysis, and conclusions documented in this WSA, substantial evidence exists to support a determination that the total projected water supplies available to the City during normal, single dry, and multiple dry water years during a 20-year projection are sufficient to meet the projected water demand associated with the proposed La Entrada Project, in addition to the City's existing and planned future uses, including agricultural and manufacturing uses. This conclusion is based on, among other things, the volume of water available in the regional aquifer, the City's current and planned local water management programs and projects, and CVWD's current and planned local and regional management programs and water supply projects to supplement and sustain regional groundwater supplies. The analyses and conclusions set forth in this WSA are further supported by the City's 2009 MOU and 2013 MOU with CVWD regarding water supply for new developments (specifically including La Entrada), and the contractual availability of State Water Project and Colorado River supplies to the Coachella Valley. Additionally, the City and CVWD have committed sufficient resources to further implement the primary elements of the City's 2010 UWMP, the CVWD 2010 UWMP and the CVWD 2010 CVWMP, including source substitution, water conservation, and purchases of additional water supplies. Furthermore, as set forth in this WSA and the La Entrada Specific Plan, the Project will incorporate various water conservation elements adopted by the City and/or CVWD in accordance with SBx7-7. These include conservation elements for indoor and outdoor uses throughout the Project. These efforts may further reduce the ultimate water demands of the Project.

As provided by Water Code section 10914, nothing in this WSA is intended to create a right or entitlement to water service or any specific level of water service, and nothing herein is intended to impose, expand or limit any duty concerning the City's obligation to provide certain levels of service to existing or future potential customers. (Water Code § 10914(a)-(b).) The City retains the right, in its sole discretion, to evaluate from time to time whether the projected demands associated with the Project continue to fall within the City's forecasted demand or planned future uses.

APPENDIX A

Water Supply Planning Documents

(See Attached CD-Rom)

La Entrada Water Supply Assessment

Appendix A
Water Supply Planning Documents

Part 1
Final Delivery Reliability Report 2011, June 2012

The State Water Project

Final Delivery Reliability Report 2011

June 2012

State of California
Natural Resources Agency
Department of Water Resources

State of California
Edmund G. Brown Jr., Governor

California Natural Resources Agency
John Laird, Secretary for Natural Resources

Department of Water Resources
Mark W. Cowin, Director

Susan Sims
Chief Deputy Director

Kasey Schimke
Asst. Director, Legislative Affairs

Sandy Cooney
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Director's Message

The *State Water Project Delivery Reliability Report 2011* (2011 Report) is the latest update to a biannual report that describes the existing and future conditions for State Water Project (SWP) water supply that are expected if no significant improvements are made to convey water past the Sacramento–San Joaquin Delta (Delta) or to store the more variable runoff that is expected with climate change.

This report is presented in a different format than previous versions. The four previous reports were written for a dual audience—both the general public and those interested in a greater level of technical detail, such as the SWP contractors. By contrast, this report is written primarily with the public in mind. As a result, it not only provides updated information about the SWP's water delivery reliability, but is also designed to educate Californians about the SWP and its operations. This report presents a concise description of the historical events leading to the construction of the SWP and describes the SWP's facilities and operations. It then defines and explains the concept of water delivery reliability and the types of SWP water available to contractors, and describes various factors that affect the reliability of water deliveries. Because of the public interest in water project pumping from the Delta and the dependence of SWP water supply on Delta pumping, a new chapter has been added that focuses specifically on SWP pumping (exports) at the Harvey O. Banks Pumping Plant in the Delta.

The 2011 Report shows that the SWP continues to be subject to reductions in deliveries similar to those contained in the *State Water Project Delivery Reliability Report 2009* (2009 Report), caused by the operational restrictions of biological opinions (BOs) issued in December 2008 and June 2009 by the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) to govern SWP and Central Valley Project operations. Federal court decisions have remanded the BOs to USFWS and NMFS for further review and analysis. We expect that the current BOs will be replaced sometime in the future. The operational rules defined in the 2008 and 2009 BOs, however, continue to be legally required and are the rules used for the analyses supporting the 2011 Report.

The following "Summary" includes key findings of the analyses in the 2011 Report. A technical addendum is also available which provides detail on the assumptions of the analyses and the results for the 2011 Report. The results of the studies, as presented in this report and the technical addendum, are designed to assist water planners and managers in updating their water management and infrastructure development plans. These results emphasize the need for local agencies to develop a resilient and robust water supply, and a distribution and management system to maximize the efficient use of our variable supply. They also illustrate the urgent need to improve the method of conveying water past the Delta in a more sustainable manner that meets the dual goals of increasing water delivery reliability and improving conditions for endangered and threatened fish species.

Mark Cowin
Director
California Department of Water Resources
June 2012

Summary





This report is intended to inform the public about key factors important to the operation of the SWP and the reliability of its water deliveries.

California faces a future of increased population growth coupled with the potential for water shortages and pressures on the Delta. For many SWP water contractors, water provided by the SWP is a major component of all the water supplies available to them. SWP contractors include cities, counties, urban water agencies, and agricultural irrigation districts. These local utilities and other public and private entities provide the water that Californians use at home and work every day and that helps to nourish the state's bountiful crops. Thus, the availability of water to the SWP becomes a planning issue that ultimately affects the amount of water that local residents and communities can use.

The availability of these water supplies may be highly variable. A wet water year may be followed by a dry or even critical year. Knowing the probability that they will receive a certain amount of SWP water in a given year—whether it be a wet water year, a critical year, or somewhere in between—gives contractors a better sense of the degree to which they may need to implement increased conservation measures or plan for new facilities.

The Delta is the key to the SWP's ability to deliver water to its agricultural and urban contractors. All but three of the 29 SWP contractors receive water deliveries from the Delta (pumped by either the Harvey O. Banks or Barker Slough Pumping Plant).

Yet the Delta faces numerous challenges to its long-term sustainability. Among these are continued subsidence of Delta islands, many of which are already below sea level, and the related threat of a catastrophic levee failure as water pressure increases on fragile levees. Climate change poses the threat of increased variability in floods and droughts, and sea level rise complicates efforts to manage salinity levels and preserve water quality in the Delta so that the water remains suitable for urban and agricultural uses.

Protection of endangered and threatened fish species, such as the delta smelt, is also an important factor of concern for the

Delta. Ongoing regulatory restrictions, such as those imposed by federal biological opinions on the effects of SWP and CVP operations on these species, also contribute to the challenge of determining the SWP's water delivery reliability.

The analyses in this report factor in all of the regulations governing SWP operations in the Delta and upstream, and assumptions about water uses in the upstream watersheds.

Modeling was conducted that considered the amounts of water that SWP contractors use and the amounts of water they choose to hold for use in a subsequent year.

Many of the same specific challenges to SWP operations described in the *State Water Project Delivery Reliability Report 2009* (2009 Report) remain in 2011. Most notably, the effects on SWP pumping caused by issuance of the 2008 and 2009 federal biological opinions, which were reflected in the 2009 Report, continue to affect SWP delivery reliability today. The analyses in this report factor in climate change and the effects of sea level rise on water quality, but do not incorporate the probability of catastrophic levee failure. The resulting differences between the 2009 and 2011 Reports can be attributed primarily to updates in the modeling assumptions and inputs.

As noted in the discussion of SWP exports in Chapter 5 of this report, Delta exports (that is, SWP water of various types pumped by and transferred to contractors from the Banks Pumping Plant) have decreased since 2005, although the bulk of the change occurred by 2009 as the federal BOs went into effect, restricting operations. These effects are also reflected in the SWP delivery estimates provided in Chapters 6 and 7 of this report. Chapters 6 and 7 characterize the SWP's water delivery reliability under existing conditions and future conditions, respectively. The following are a few of the key points from Chapters 5, 6, and 7:

- Estimates of average annual SWP exports under conditions that exist for 2011 are 2,607 thousand acre-feet (taf), 350 taf or 12% less than the estimate under 2005 conditions.
- The estimated average annual SWP exports decrease from 2,607 taf/year to 2,521 taf/year (86 taf/year or about 3%) between the existing- and future-conditions scenarios.
- The estimates in this report for Table A water supply deliveries are not significantly different from those in the 2009 Report. The average annual delivery estimated for existing conditions (2,524 taf/year) is 2% greater, and the estimated amount for future conditions (2,466 taf/year) is 1% less than the corresponding estimates in the 2009 Report.
- The likelihood of SWP Article 21 deliveries (supplemental deliveries to Table A water) being equal to or less than 20 taf/year has increased relative to that estimated in the 2009 Report. However, both this report and the 2009 Report show a high likelihood that Article 21 water deliveries will be equal to or less than 20 taf/year, ranging between 71% and 78% for both existing and future conditions.

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Chapter 1

Water Delivery Reliability: A Concern for Californians

California's water supplies are crucial to maintaining a high quality of life for the state's residents. The State Water Project (SWP), operated by the California Department of Water Resources (DWR), is an integral part of the effort to ensure that business and industry, urban and suburban residents, and farmers throughout much of California have sufficient water at all times. This *State Water Project Delivery Reliability Report 2011* describes the expected existing and future SWP water deliveries.

The term "water delivery reliability," as used in this report, is defined as the annual amount of SWP water that can be expected to be delivered with a certain frequency. To put this another way: What is the likelihood, or probability, that a certain amount of water will be delivered by the SWP in a year?

Reasons to Assess SWP Water Delivery Reliability

Let's look at two important factors that underscore the importance of assessing the SWP's water delivery reliability: the effects of population growth on California's water supply, and State legislation intended to help maintain a reliable water supply.

Population Growth, Land Use, and Water Supply

Water and development have had a close yet complex relationship since California's early days. Indeed, the SWP was established in the wake of a second economic "gold rush" that began after the end of World War II. Increased statewide population and commerce made it clear to water managers that local water supplies (including groundwater) would not be sufficient to meet their communities' future needs.

Population growth and resulting development in California since World War II have been substantial, fueling the need for increased water supply.

California's population has grown rapidly in recent years, with resulting changes in land use. This growth is expected to continue. From 1990 to 2005, California's population increased from about 30 million

to about 36.5 million. Based on this trend, California's population has been projected to be more than 47.5 million by 2020. The "current trends" scenario depicted in the *California Water Plan 2009* for year-2050 conditions assumed a population of nearly 60 million—double the 1990 population.

The amount of water available in California—or in different parts of the state—can vary greatly from year to year. Some areas may receive 2 inches of rain a year, while others are deluged with 100 inches or more. As land uses have changed, population centers have grown up in many locations where there is not a sufficient local water supply. Thus, Californians have always been faced with the problem of how best to conserve, control, and move water from areas of abundant water to areas of water need and use.

To help assure that their water supply is sufficient to meet their demands, water districts develop "water management portfolios" that reflect diversity in water sources and locations. Components of a sustainable water portfolio include conservation, improved efficiency in use, rainwater and runoff capture, use of groundwater aquifers for storage and treatment, improved water treatment, desalination, and a water recycling program.

Legislation on Ensuring a Reliable Water Supply

The laws described below impose specific requirements on both urban and agricultural water suppliers. These laws increase the importance to water suppliers of estimates of SWP water delivery reliability.

California Urban Water Management Planning Act

The California Urban Water Management Planning Act was enacted in 1983. As amended, this law (California Water Code, Sections 10610–10656) requires urban water suppliers to adopt water management plans every 5 years and submit those plans to DWR. Adoption of the most recent (2010) round of urban water management plans was required by July 1, 2011; the plans were due to DWR by August 1, 2011.

In their water management plans, urban water suppliers must assess whether their current and planned water supplies will be enough to meet the water demands expected during the next 20 years. The plans also consider various drought scenarios and the proper ways to respond in case of an unexpected water shortage.

DWR is required to review local water management plans and report on the status of these plans. DWR published a guidebook to preparing urban water management plans in March 2011. Guidance documents are available at http://www.water.ca.gov/urbanwatermanagement.

Water Conservation Act

The Water Conservation Act of 2009 (Senate Bill X7.7, Steinberg), enacted in November 2009, includes distinct requirements related to both urban and agricultural water use.

This law requires that the State of California reduce urban per capita water use statewide by 10% by the end of 2015 and 20% by the end of 2020. DWR is required to report on progress toward meeting these urban per capita water use goals.

In addition, agricultural water suppliers must adopt agricultural water management plans by the end of 2012, then update the plans by the end of 2015 and every 5 years thereafter.

Through its Agricultural Water Management Planning & Implementation Program (http://www.water.ca.gov/wateruseefficiency/agricultural/agmgmt.cfm), DWR helps water districts develop agricultural water management plans and implement cost-effective, efficient water management practices. DWR is currently preparing a guidebook for developing agricultural water management plans.

Background of This Report

This *State Water Project Delivery Reliability Report 2011* is the fifth in a series of reports on the SWP's water delivery reliability. DWR is legally required to prepare and distribute this report every 2 years to all SWP contractors (recipients of SWP water), city and county planning departments, and regional and metropolitan planning departments in the SWP's service area. Reports were previously produced for 2002, 2005, 2007, and 2009.

The requirement for a biennial water delivery reliability report was established in a settlement agreement among the Planning and Conservation League, DWR, SWP contractors, and others that was approved by the 3rd Circuit Court of Appeals in May 2003. The settlement agreement was reached in the aftermath of the "Monterey Amendments" case, which resolved a dispute about the environmental analysis of amendments to the long-term water supply contracts for the SWP that were entered into by DWR and most of the SWP contractors in the 1990s. The terms of the SWP contracts were amended after water shortages during the 1987–1992 drought drastically reduced SWP water deliveries to SWP contractors in the San Joaquin Valley and Southern California.

Attachment B to the settlement agreement specifies that each SWP delivery reliability report must include all of the following information:

- the overall water delivery capacity of the SWP facilities at the time of the report;
- the allocation of that SWP water to each SWP contractor;
- a discussion of the range of hydrologic conditions, which must include the historic extended dry cycle and long-term average; and
- the total amount of SWP water delivered to all contractors and the amount of SWP water delivered to each contractor during each of the 10 years immediately preceding the report.

DWR's water delivery reliability reports are used by various entities for water planning purposes. The reports must be presented in a format understandable by the public. The information presented in the reports is intended to help local agencies, cities, and counties that use SWP water to develop adequate, affordable water supplies for their communities.

Contents and Use of This Report

The following topics are addressed in this *State Water Project Delivery Reliability Report 2011*:

- The Summary at the front of this report briefly summarizes the updated findings on water delivery reliability detailed in previous chapters.
- Chapter 1, "Water Delivery Reliability: A Concern for Californians," summarizes important issues (including selected State legislation) that underlie the need to assess the SWP's water delivery reliability, provides background on DWR's water delivery reliability reports, and defines key terms.
- Chapter 2, "A Closer Look at the State Water Project," describes the SWP's purpose, background, and facilities. This chapter also introduces factors that interact in the Sacramento–San Joaquin Delta (Delta) to affect SWP operations: precipitation and snowmelt patterns, variable river inflows, operations of the federal Central Valley Project (CVP), Delta water quality concerns, regulatory requirements, and the Delta's physical conditions.
- Chapter 3, "SWP Contractors and Water Contracts," lists the SWP water contractors and shows where they are located, and describes the different types of SWP water allocations.
- Chapter 4, "Factors that Affect Water Delivery Reliability," explains generally how water delivery reliability is calculated. The chapter then describes a variety of factors that make forecasting water delivery

reliability inherently challenging. Among these complicating factors are climate change, environmental and policy planning efforts pertaining to the Delta, and the potential for levee breaches in the Delta.

- Chapter 5, "SWP Delta Exports," discusses how the delivery estimates for the SWP have been reduced as a result of more restrictive operational rules. This chapter also presents the results of DWR's modeling of SWP exports from the Harvey O. Banks Pumping Plant for existing conditions (2011) and future conditions (2031).
- Chapter 6, "Existing SWP Water Delivery Reliability (2011)," estimates the SWP's delivery reliability for existing conditions (2011) and compares these estimates with the existing-condition results presented in the *State Water Project Delivery Reliability Report 2009*.
- Chapter 7, "Future SWP Water Delivery Reliability (2031)," estimates the SWP's delivery reliability for conditions 20 years in the future (2031), reflecting potential hydrologic changes that could result from climate change. This chapter also compares these estimates with the future-condition results presented in the *State Water Project Delivery Reliability Report 2009*.
- Appendix A, "Historical SWP Delivery Tables for 2001–2010," presents the historical deliveries for SWP contractors over the last 10 years.

In addition, a technical addendum has been prepared for this report and includes more specific details of the technical analyses and results. Urban and agricultural water suppliers can use the information in this report and the technical addendum when they prepare or amend their water management plans. These details will help them decide whether they need new facilities or programs to meet future water demands. The technical addendum is available upon request and is posted online, along with this report, at http://baydeltaoffice.water.ca.gov.

Urban water suppliers can also use this information when, as required by the California Environmental Quality Act, they analyze whether enough water is available for proposed subdivisions or development projects.

Chapter 2

A Closer Look at the State Water Project





Northern California typically receives abundant rainfall and runoff from mountain snowpack. However, a larger percentage of California's population lives in Southern California and most irrigated farmland lies in Central California. These regions are mostly arid, and local water suppliers cannot fully meet the needs of many of their communities. These areas rely on additional imported water, especially to meet shortages during dry years and the demands of increasing populations. The SWP was constructed to help meet these needs.

Purpose and Background of the SWP

The SWP is the largest state-built, multipurpose, user-financed water project in the United States. More than two-thirds of California's residents—25 million people—receive at least part of their water from the SWP. Project water also supplies thousands of industries and irrigates about 750,000 acres of California farmland. Of the SWP's contracted water supply, 70% goes to urban users and 30% goes to agricultural users.

The primary purpose of the SWP is to provide a water supply—that is, to divert and store water during wet periods in Northern and Central California and distribute it to areas of need in Northern California, the San Francisco Bay area, the San Joaquin Valley, the Central Coast, and Southern California. Other SWP purposes include flood control, power generation, recreation, fish and wildlife enhancement, and water quality improvement in the Delta.

These purposes have been discussed at length for many decades. The concept of a statewide water development project was first raised in 1919 when Lt. Robert B. Marshall of the U.S. Geological Survey proposed transporting water from the Sacramento River system to the San Joaquin Valley, then moving it over the Tehachapi Mountains into Southern California.

In the 1930s, State Engineer Edward Hyatt proposed the "State Water Plan," which identified the facilities needed and economic means to transfer water from north to south. The California Legislature authorized the project in the Central Valley Act of 1933, and a $170 million bond act was approved by California voters in December 1933. However, the Great Depression precluded the State from obtaining the necessary funding. The U.S. government funded the construction of major components of the plan, which became the federal CVP. (See "The Central Valley Project and Its Relationship to the SWP" later in this chapter.)

As California's population grew after World War II, investigations of statewide water resources resumed. In 1945, DWR's predecessor, the Division of Water Resources of the Department of Public Works, conducted a variety of studies that culminated in the Feather River Project, presented to the State Legislature in 1951 by State Engineer A. D. Edmonston. A revised project proposal was presented in 1955. The Legislature appropriated funds for detailed studies of the Feather River Project, which evolved to become the SWP.

In 1959, the Legislature passed the California Water Resources Development Bond Act. This law, also known as the Burns-Porter Act, authorized $1.75 billion in bonds to build the SWP's initial facilities, contingent on voter approval. After California voters approved the Burns-Porter Act in November 1960, construction of the SWP by DWR began in the early 1960s, with water deliveries following.

SWP Facilities

Today, the SWP includes 33 storage facilities, 21 reservoirs and lakes, 20 pumping plants, four pumping-generating plants, five hydroelectric power plants, and about 700 miles of canals and pipelines. Figure 2-1 shows the primary SWP facilities.

Facilities North of the Delta

The SWP's watershed encompasses the mountains and waterways around the Feather River in Plumas County. Rain and melting snow run off mountainsides and into waterways that flow into Lake Oroville, where the SWP officially begins. With a capacity of about 3.5 million acre-feet, Lake Oroville is the SWP's largest storage facility. The water management facilities of Lake Oroville are designed to maximize energy production and include six power generating units and six pumping/generating units. Three hydroelectric power plants operate at Oroville.

Oroville Dam.

When water is needed, Oroville Dam releases water into the Feather River, which converges with the Sacramento River north of the city of Sacramento. Releases from Shasta and Folsom Reservoirs, facilities of the federal CVP, also flow into the Sacramento River. The Sacramento River flows into the Delta, where it mixes with water from the San Francisco Bay and is influenced by the tides. From the Delta, some of this water is pumped by the Barker Slough Pumping Plant into the North Bay Aqueduct for municipal use by Napa and Solano Counties.

Figure 2-1. Primary State Water Project Facilities

Facilities in the Delta and Central California

The SWP's primary pumping plant, the Harvey O. Banks Pumping Plant, is located in the south Delta in Alameda County. The pumps at the Banks Pumping Plant lift Delta water stored in the Clifton Court Forebay into the California Aqueduct, which at 444 miles long is the longest water conveyance system in California. At Bethany Reservoir, some SWP water is diverted from the California Aqueduct into the South Bay Aqueduct, which serves urban and agricultural uses in Alameda and Santa Clara Counties.

Harvey O. Banks Pumping Plant.

Water in the California Aqueduct flows into the San Luis Joint-Use Complex located in Merced County, which is jointly owned by the SWP and the CVP. Among the facilities at the complex is San Luis Reservoir, which is the world's largest offstream reservoir, with storage space for more than 2 million acre-feet of water. (An "offstream reservoir" is a water body that does not impede and store natural flows directly within a stream course, but instead is located "offstream"; stored water is diverted elsewhere and conveyed to the offstream reservoir by a pipeline or aqueduct.) Generally, water is pumped into San Luis Reservoir from late fall through early spring and is stored temporarily before being released back to the California Aqueduct to meet the higher summertime water demands of SWP (and CVP) contractors.

Facilities in the San Joaquin Valley and Southern California

After leaving the San Luis Joint-Use Complex, water travels through the central San Joaquin Valley via a jointly owned federal/State portion of the California Aqueduct. Along the way, deliveries are made to San Joaquin Valley contractors of both the SWP and the CVP. Near Kettleman City in Kings County, the SWP's Coastal Branch Aqueduct branches off to serve SWP contractors in San Luis Obispo and Santa Barbara Counties. The California Aqueduct continues southeast until, at the base of the Tehachapi Mountains, it reaches the A. D. Edmonston Pumping Plant, the SWP's largest pumping station.

A. D. Edmonston Pumping Plant.

The Edmonston Pumping Plant, located in Kern County, is an engineering marvel. It is the highest single-lift pumping plant in the world. The 14 pumps at this facility, each weighing more than 400 tons and powered by 80,000-horsepower motors, raise water from the California Aqueduct 1,926 feet—more than one and one-half times the height of New York's Empire State Building—to enter 10 miles of tunnels and siphons that cross the Tehachapi Mountains.

After crossing the mountains, the water splits into two branches, the West Branch and East Branch, and is delivered to SWP contractors in Southern California. The southernmost SWP facility, located at the end of the East Branch, is Lake Perris in Riverside County.

The Delta and Factors Affecting SWP Operations and Deliveries

The Delta forms the eastern portion of the San Francisco estuary. It is composed of 738,000 acres of land interlaced with hundreds of miles of waterways that receive runoff from about 40% of the state's land area. The Delta is one of the few estuaries in the world that is used as a major source of drinking water supply. The Delta is important not only to SWP operations, but to California's economy. About $400 billion of California's $1.5 trillion economy is supported by water from the Delta, as noted by DWR and the California Department of Fish and Game (DFG) in the 2008 report, *Risks and Options to Reduce Risks to Fishery and Water Supply Uses of the Sacramento/San Joaquin Delta*.

Numerous competing demands converge in the Delta—especially the need to provide water for both agricultural and urban uses and the desire to protect habitat for endangered species.

In the SWP conveyance system, the Delta is the critical link between the water supplies in the Sacramento Valley and the water demands of, and deliveries to, the rest of the Central Valley and Southern California. Physically, the Delta is the focal point for water distribution in California because most of the SWP contractors are located at points south of the Delta.

However, the Delta has long been an area of numerous competing demands; for example, the Delta provides water for millions of Californians, but also serves as important habitat for hundreds of animal, plant, and fish species, some of which are listed under the federal Endangered Species Act (ESA) and/or California Endangered Species Act (CESA) as threatened or endangered. It also supports a local population of more than 500,000 and millions of visitors who use the Delta's recreational areas, navigable waterways, and marinas. Further, not only do SWP and CVP contractors use Delta water for agriculture, but local farmers within the Delta itself use its water to irrigate their crops planted on the numerous Delta islands.

The SWP's ability to pump water from the Delta is not affected only by the physical size and capacity of the pumps at the Banks Pumping Plant. As described below, the Delta is affected by numerous factors that interact to affect SWP operations and water deliveries:

- Delta inflows (i.e., the combined total of water flowing into the Delta from the Sacramento River, San Joaquin River, and other rivers and waterways),
- beneficial uses and water rights,
- Delta water quality standards,
- regulatory requirements,
- concurrent CVP operations and pumping, and
- physical factors.

Delta Inflows

Delta inflow varies considerably from year to year. Levels of development upstream of the Delta along the rivers and their watersheds—in the areas from which the water originates—affect Delta inflows. For example, in an above-normal year, nearly 85% of the total Delta inflow comes from the Sacramento River, more than 10% comes from the San Joaquin River, and the rest comes from three eastside streams (the Mokelumne, Cosumnes, and Calaveras Rivers) (Figure 2-2).

The type of water year is also an important factor affecting the volume of Delta inflows. When hydrology is analyzed, water years are designated by DWR as "wet," "above normal," "below normal," "dry," or "critical" based on the amount of rain and snow that fell during the preceding period of October 1–September 30. DWR hydrologists and meteorologists measure snowpack in the northern Sierra Nevada on or about the first of January, February, March, April, and May, in the watersheds where most of the state's water supply originates, to forecast snowmelt runoff—and thus available water supply—for the coming spring and summer.

All other factors (such as upstream development) being equal, much less water will flow into the Delta during a dry or critical water year—that is, during a drought—than during a wet or above normal water year. Fluctuations in inflows are a substantial overall concern for the Delta, and a specific concern for the SWP; such fluctuations affect Delta water quality and fish habitat, which in turn trigger regulatory requirements that constrain SWP Delta pumping. For example:

- As discussed below under "Delta Water Quality Standards," lower inflows can cause Delta water to become increasingly saline and trigger additional upstream reservoir releases and/or reduced Delta pumping to meet regulatory requirements.
- Conditions for fish in the Delta are less suitable in drier years, as seen during California's 1987–1992 drought, which can also trigger regulatory requirements that reduce SWP pumping.

Delta inflows will also vary by time of year because the amount of precipitation varies by season. About 80% of annual precipitation occurs between November and March, and very little rain typically falls from June through September. A seasonal mismatch of water supply and demand typically exists; runoff is greatest in winter and spring, but water demands peak in summer. Upstream reservoirs dampen this variability by reducing flood flows and storing water to be released later in the year to meet water demands and flow and water quality requirements.

Delta Water Quality Standards

Water quality standards for the Delta also affect SWP operations. The Porter-Cologne Water Quality Control Act (Division 7 of the California Water Code) defines "beneficial uses" of waters of the State (both surface water and groundwater) that must be protected against quality degradation. These beneficial uses include domestic, municipal, agricultural, and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves. The criteria based on those uses, called "water quality objectives," are found in the water quality control plans adopted by the State Water Resources Control Board and the nine regional water quality control boards. The SWP and CVP must meet specific criteria for salinity during certain times of the year at various locations in the Delta, as described further under "Factors that Can Influence the SWP's Water Delivery Reliability" in Chapter 4.

Salinity levels can be affected by the water year type: Inflows into the Delta decline in dry and

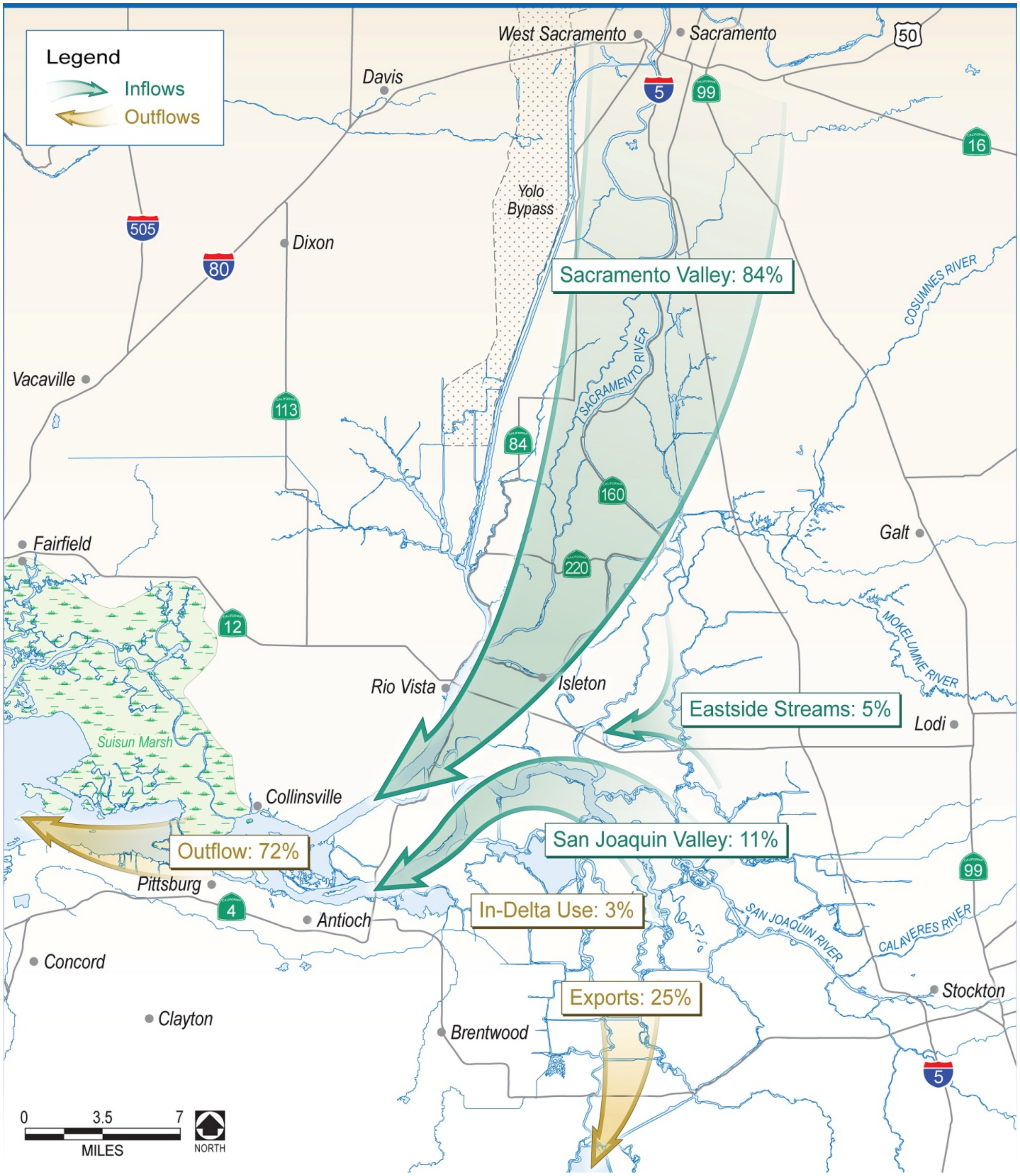


Figure 2-2. Water Year 2000 (Above-Normal) Delta Water Balance (Percent of Total)

critical water years, but daily tidal inflow of salty water into the Delta from the Pacific Ocean remains generally the same, thus increasing Delta salinity. Excessive salinity may adversely affect crop yields and require more water for salt leaching, may require additional municipal and industrial treatment, may increase salinity levels in agricultural soils and groundwater, and is the primary water quality constraint to recycling wastewater. Salty water is both undrinkable and unusable for irrigation (and thus unsuitable for SWP and CVP contractors and farmers in the Delta), and is harmful to fish inhabiting the Delta, including endangered and threatened species. Climate change is also causing sea level rise, which is projected to substantially increase Delta salinities. Generally, Delta water quality is best during winter and spring and poorer through the summer irrigation season and early fall.

SWP operations are closely regulated by the water quality standards contained in State Water Resources Control Board Water Right Decision 1641 (D-1641). D-1641 was issued in December 1999 (with a revised version issued in March 2000) to implement the 1995 *Water Quality Control Plan for the San Francisco Bay/Sacramento–San Joaquin Delta* (1995 WQCP). The 1995 WQCP established beneficial uses of Delta water, associated water quality objectives for the reasonable protection of beneficial uses, and an implementation program to achieve the water quality objectives.

D-1641 assigned primary responsibility for meeting many of the water quality objectives established in the 1995 WQCP to the SWP (thus, to DWR) and the CVP (thus, to Reclamation). To meet these objectives, D-1641 limits or curtails SWP and CVP pumping operations in certain parts of the year. For example, D-1641 imposed limits on the ratio of SWP and CVP exports to total inflow into the Delta. This "export-inflow ratio" varies by time of year.

Regulatory Requirements

The Delta provides important habitat for fish species listed as threatened or endangered under either the federal ESA or the CESA, or both. Several resource agencies have taken actions under their authorities to protect these species. Regulatory requirements based on recent biological opinions (BOs) issued by the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) for CVP and SWP operations are a particularly important factor affecting SWP operations. DFG also regulates the protection of species under the CESA, and has issued consistency determinations in the past when it has found federal BOs to be consistent with CESA for State-listed species.

Delta smelt.

A BO is a determination by USFWS or NMFS on whether a proposed federal action is likely to jeopardize the continued existence of a threatened or endangered species or result in the destruction or adverse modification of designated critical habitat. If jeopardy is determined, certain actions are required to protect species of concern. Usually BOs apply specifically to federal actions, but DWR coordinates with Reclamation in the agencies' operation of the SWP and federal CVP. Since the passage of the federal ESA in 1973, various BOs have been issued by USFWS and NMFS for the effects on federally listed endangered species of these coordinated operations.

NMFS administers the ESA for marine fish species, including anadromous salmonids (those that spend a part of their life cycle in the sea and return to freshwater streams to spawn), such as

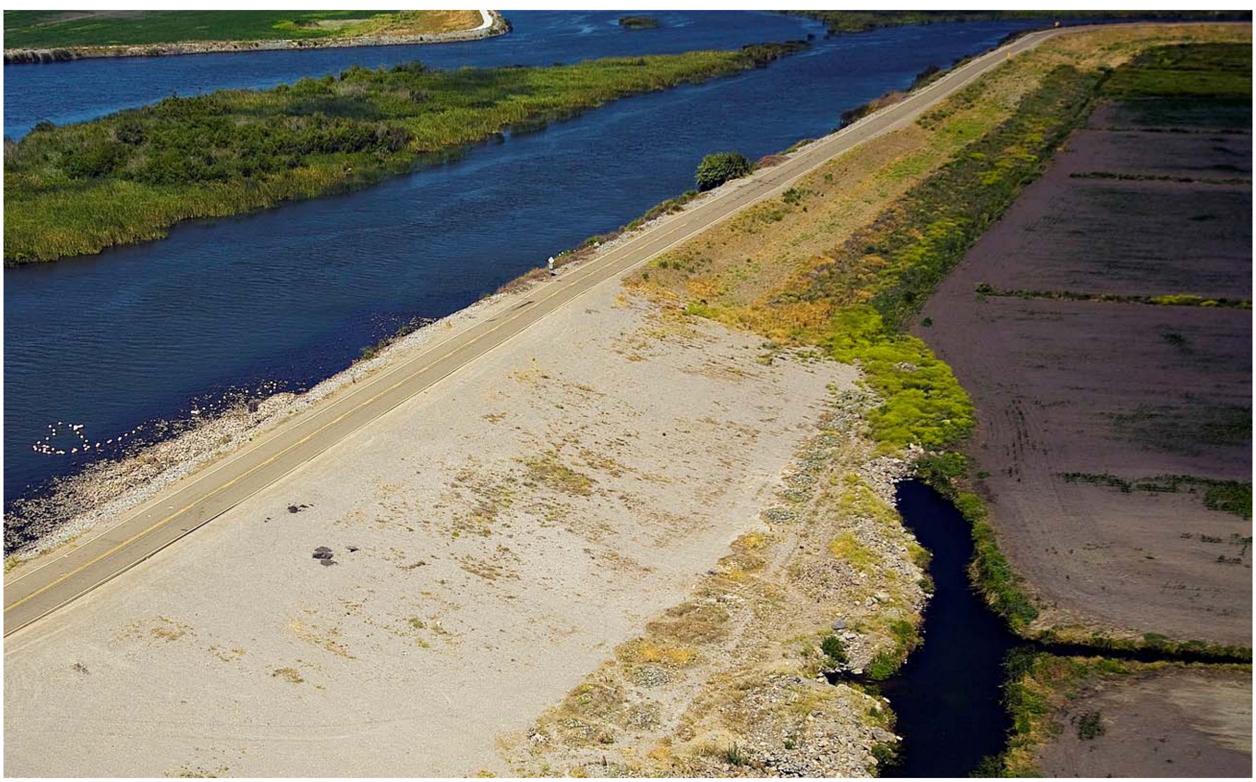
Central Valley steelhead, winter-run and spring-run Chinook salmon, and green sturgeon. USFWS administers the ESA for nonanadromous and nonmarine fish species, such as delta smelt and longfin smelt. Both anadromous and nonanadromous fish species are found in the Delta and are federally listed under the ESA.

If USFWS or NMFS finds that a proposed action is likely to jeopardize a listed species or adversely modify its critical habitat, the agency is required to identify "reasonable and prudent alternatives" (defined in Title 50, Section 402.02 of the Code of Federal Regulations) that it has determined would enable the project to go forward in compliance with the ESA.

Especially important to the SWP are the BOs issued by USFWS and NMFS in 2008 and 2009, respectively, for the coordinated operations of the CVP and SWP. Both of these BOs, which DFG found consistent with the CESA for State-listed species, have directly and substantially affected SWP operations and pumping levels in recent years: They incorporate terms that directly or indirectly limit the amount of CVP and SWP Delta pumping under certain conditions. Relative to prior years, SWP water deliveries estimated in the *State Water Project Delivery Reliability Report 2009*—the last edition of this report—were, in general, reduced by the operational restrictions of these BOs.

Concurrent Central Valley Project Operations and Pumping

CVP operations also affect the Delta as Reclamation diverts water for agricultural and urban uses. To make the most efficient use of the common water supply available to the CVP and SWP, Reclamation and DWR must work as closely as possible to coordinate their respective reservoir releases and Delta pumping operations. The CVP and SWP operate in conjunction according to the Coordinated Operation Agreement signed in 1986 by the two agencies.



Subsidence (sinking) of islands in the Delta places even more pressure on already fragile Delta levees.

The two projects share some of their facilities in the San Joaquin Valley—most notably the San Luis Unit, for which the major storage reservoir is San Luis Reservoir, and more than 100 miles of the California Aqueduct. In addition, the CVP and SWP are allowed to use each other's export pumping facilities in the south Delta—to pump water for each other—when operation of one set of pumps is affected by facility maintenance, capacity limitations, or fish protection requirements. Use of this "joint point of diversion" is subject to an operations plan that protects fish and wildlife and other legal users of water.

Physical Factors

The stability and reliability of SWP water deliveries can be threatened by physical factors affecting facilities or water quality anywhere in the SWP system. The Delta is particularly vulnerable. Delta islands have been subsiding and in some places the land has sunk to 20 feet below sea level. This places extra pressure on the Delta's levees because it means they must hold back water constantly rather than only during peak-flow periods.

Climate change is causing sea level to rise, increasing pressure on Delta levees even further. Delta levees are also vulnerable because they were built 150 years ago and could be affected if an earthquake were to strike anywhere near the Delta.

THE CENTRAL VALLEY PROJECT AND ITS RELATIONSHIP TO THE SWP

The federal Central Valley Project, operated by the U.S. Bureau of Reclamation, was originally conceived as a State of California project to protect the Central Valley from water shortages and floods. During the Great Depression, however, the State was unable to sell bonds to finance project construction, and beginning in the late 1930s, the U.S. government constructed the CVP as a public works project.

The CVP operates 18 dams and reservoirs, 11 powerplants, and 500 miles of canals and other facilities between the Cascade Range near Redding and the Tehachapi Mountains near Bakersfield. It serves agricultural, municipal, and industrial needs in the Central Valley and urban centers in parts of the San Francisco Bay Area, and is the primary water source for many Central Valley wildlife refuges. In an average year the CVP delivers about 7 million acre-feet of water for agriculture, urban, and wildlife use, irrigating about one-third (3 million acres) of California's agricultural lands and supplying water for nearly 1 million households (Reclamation 2009).

The CVP and SWP share some of their facilities, especially the San Luis Unit, and their respective operations staffs work closely together. The Coordinated Operations Agreement between the CVP and SWP, signed in 1986, outlines the shared responsibilities of each project to meet Delta water quality and flow objectives and provides for equitable sharing of surplus water that enters the Delta.

Chapter 3

SWP Contractors and Water Contracts

During the 1960s, as the SWP was created, long-term contracts were signed by DWR and 29 urban and agricultural water suppliers in various locations within California. The contracts are essentially uniform and will expire in 2035. These urban and agricultural water suppliers are referred to in this report as the "SWP contractors" or "contractors." This chapter introduces the SWP contractors, explains the basics of SWP water contracts, and describes the various types of project water, especially "Table A" water. The discussion also outlines some of the factors that influence delivery of Table A water.

About the SWP Contractors

The SWP contractors are located along the Feather River north of the Delta, in the north and south San Francisco Bay Area, along the Central Coast, in the San Joaquin Valley, and in Southern California. They include cities, counties, urban water agencies, and agricultural irrigation districts. Most contractors use the project water they receive for municipal purposes; several use the water for agriculture. The SWP contractors mostly use project water to supplement local supplies, including groundwater, or other imported water. The 29 SWP contractors are listed below and their locations are shown in Figure 3-1.

Feather River Area Contractors

- Butte County
- Yuba City
- Plumas County Flood Control and Water Conservation District

North Bay Area Contractors

- Napa County Flood Control and Water Conservation District
- Solano County Water Agency

South Bay Area Contractors

- Alameda County Flood Control and Water Conservation District, Zone 7
- Alameda County Water District
- Santa Clara Valley Water District

San Joaquin Valley Area Contractors

- Dudley Ridge Water District
- Empire West Side Irrigation District
- Kern County Water Agency
- Kings County
- Oak Flat Water District
- Tulare Lake Basin Water Storage District

Figure 3-1. State Water Project Contractors

Central Coastal Area Contractors

- San Luis Obispo County Flood Control and Water Conservation District
- Santa Barbara County Flood Control and Water Conservation District

Southern California Area Contractors

- Antelope Valley–East Kern Water Agency
- Castaic Lake Water Agency
- Coachella Valley Water District
- Crestline–Lake Arrowhead Water Agency
- Desert Water Agency
- Littlerock Creek Irrigation District
- Metropolitan Water District of Southern California
- Mojave Water Agency
- Palmdale Water District
- San Bernardino Valley Municipal Water District
- San Gabriel Valley Municipal Water District
- San Gorgonio Pass Water Agency
- Ventura County Watershed Protection District

How Water Contracts Work

Under the terms of their long-term water supply contracts with DWR, the 29 SWP contractors receive specified amounts of water from the SWP each year, called "annual allocations."

The SWP's long-term water supply contracts define the terms and conditions governing water delivery and repayment of project costs. In return for the allocated water, the SWP contractors repay principal and interest on both the bonds that initially funded construction of the SWP and the bonds that paid for additional facilities. The contractors also pay all costs, including labor and power, to maintain and operate project facilities. They also pay transportation charges based on the distance between the Delta and each contractor's water delivery point.

The contractors also contribute mitigation costs for any environmental impacts of SWP operations on fish and wildlife.

"Table A" Water

Table A is an exhibit to the SWP's water supply contracts. This section explains Table A water and outlines the primary factors that influence the amount of such water actually delivered to SWP contractors.

What Is Table A Water?

The water supply–related costs of the SWP are paid for by SWP contractors. All water contracts signed in the 1960s included an estimate of the date that SWP water would first be delivered and a schedule of the amount of water the contractor could expect to be delivered annually. That amount of water, known as the contractor's annual Table A amount, was designed to increase gradually until the designated maximum for that SWP contractor was reached.

The total combined maximum Table A amount for all SWP contractors was initially 4,230 thousand acre-feet per year (taf/year), assuming full development of the SWP. At that time, this amount was referred to as the "maximum project yield." As a result of amendments to the water supply contracts in the 1990s, the current combined maximum Table A amount is 4,172 taf/year. Of this amount, 4,133 taf/year is the maximum Table A water available for delivery from the Delta. It is recognized that deliveries will be less than the established maximum Table A amount in some years and more than this amount in other years.

The maximum Table A amount is the basis for apportioning water supply and costs to the SWP contractors. Once the total amount of water to be delivered is determined for the year, all available water is allocated in proportion to each contractor's annual maximum SWP Table A amount. To reiterate, however, in some years the SWP cannot deliver the maximum amount of 4,172 taf, but in other years, project supply exceeds that amount. Additionally, in some years contractors receive other classifications of water from the SWP, such as Article 21 water and turnback pool water. (See “Other Types of SWP Water” later in this chapter.)

The established maximum Table A amounts for the 29 SWP contractors vary widely (Table 3-1). The median is 42 taf; thus, the maximum allocations of Table A water for half of the SWP contractors exceed this amount, and for the other half they are less. As shown in Table 3-1, the largest Table A amount is held by the Metropolitan Water District of Southern California at 1,911,500 acre-feet; the smallest is held by the Littlerock Creek Irrigation District at 2,300 acre-feet.

The Table A amounts determine the maximum water a contractor may request each year from DWR. Table A amounts may also be used as a factor to allocate other available water supplies to each contractor. “Table A” or “Table A water” represents a portion or all of the annual Table A requested by the SWP water contractors and approved for delivery by DWR, based on hydrologic conditions, current reservoir storage, and combined requests from the SWP water contractors. DWR is not always able to deliver the quantity of water requested by contractors. In these cases, and under certain conditions, a lesser amount is allocated and delivered according to the long-term water supply contracts by prorating the amount in proportion to each SWP water contractor’s maximum Table A amount.

As discussed below, the water year type and the contractors’ demand levels are among the factors involved in determining the amount of Table A water that will be delivered by DWR to each contractor. At various times of the year, DWR issues projections of anticipated Table A allocations based on then-current conditions, and updates those projections as warranted. The deliveries of Table A water to each of the SWP contractors in the last 10 years are shown in Appendix A.

Factors Influencing Percentages of Table A Water Delivery Amounts

The percentage of its maximum Table A amount that an SWP contractor will receive in any given year will vary depending on a variety of factors. The discussion below presents basic questions underlying these factors, which are described in greater detail later in this report.

Winter snowpack is an important factor determining annual Table A water deliveries.

Physical Availability of Water from Precipitation and Runoff

The amount and timing of precipitation and ensuing runoff to streams are important in determining how much water will be physically available to the SWP to pump and export from the Delta. The type of precipitation matters as well, along with anticipated patterns of use and consumption of the source water by entities other than the SWP.

The answers to the following questions influence the amount of water delivered to contractors each year:

- How much rain and snow fell within the last year?
- Which parts of California received the precipitation, and how much runoff resulted?

Table 3-1. Maximum Annual SWP Table A Water Delivery Amounts for SWP Contractors	
Contractor	Maximum Table A Delivery Amounts (acre-feet)
Feather River Area Contractors	
Butte County	27,500
Yuba City	9,600
Plumas County Flood Control and Water Conservation District	2,700
Subtotal	**39,800**
North Bay Area Contractors	
Napa County Flood Control and Water Conservation District	29,025
Solano County Water Agency	47,506
Subtotal	**76,531**
South Bay Area Contractors	
Alameda County Flood Control and Water Conservation District, Zone 7	80,619
Alameda County Water District	42,000
Santa Clara Valley Water District	100,000
Subtotal	**222,619**
San Joaquin Valley Area Contractors	
Dudley Ridge Water District	50,343
Empire West Side Irrigation District	2,000
Kern County Water Agency	982,730
Kings County	9,305
Oak Flat Water District	5,700
Tulare Lake Basin Water Storage District	88,922
Subtotal	**1,139,000**
Central Coastal Area Contractors	
San Luis Obispo County Flood Control and Water Conservation District	25,000
Santa Barbara County Flood Control and Water Conservation District	45,486
Subtotal	**70,486**
Southern California Area Contractors	
Antelope Valley–East Kern Water Agency	141,400
Castaic Lake Water Agency	95,200
Coachella Valley Water District	138,350
Crestline–Lake Arrowhead Water Agency	5,800
Desert Water Agency	55,750
Littlerock Creek Irrigation District	2,300
Metropolitan Water District of Southern California	1,911,500
Mojave Water Agency	82,800
Palmdale Water District	21,300
San Bernardino Valley Municipal Water District	102,600
San Gabriel Valley Municipal Water District	28,800
San Gorgonio Pass Water Agency	17,300
Ventura County Watershed Protection District	20,000
Subtotal	**2,623,100**
TOTAL TABLE A AMOUNTS	**4,171,536**

- Did rain come as a short intense storm or a long wet spell?
- Did more of the precipitation occur as snow in colder storms, or were storms warmer, resulting in more rain that produced higher peak runoff?
- Was snowmelt fast or gradual, and when did the bulk of the runoff occur?

For example, if substantial snowfall occurs late in the wet season, Sierra Nevada rivers can be full of melting snow later than usual in the year, as occurred in 2011. This allows the SWP's Delta pumping to continue at or near capacity for an extended duration, increasing the percentage of Table A water delivered. Conversely, if rain falls on snow early in the year, the resulting early snowmelt results in less water available for Delta pumping later in the year. Other factors affecting SWP delivery reliability are discussed in Chapter 4.

Local Facilities and Demands

A contractor's local diversion, storage, and conveyance facilities are important considerations in receiving water and in storing the water it receives. A contractor's water demands can also be affected by local weather patterns and water conservation measures. In some years, some contractors may rely more on water from sources such as groundwater or the Colorado River, while in other years they may rely more on the SWP.

The pattern of water demand on a water system can greatly affect the system's reliability. For example, if the demand occurs for only 3 months in summer, a water system with sufficient annual supply but insufficient water storage may not be able to reliably meet its customers' demands. If, however, the demand is distributed over the year, the system can more easily meet the demand because the need for water storage is reduced or storage could be increased.

Other Types of SWP Water

Regardless of water year type, Table A water is given first priority for delivery over other types of SWP water. Contractors have several options for what to do with the water that is allocated to them: use it, store it for later use, or transfer it to another contractor. Each long-term water contract describes several types of SWP water that are available to SWP contractors to supplement Table A water: "Article 21" water, carryover water, and turnback pool water. These other types of project water are discussed below and the related deliveries that occurred in each of the last 10 years are shown in Appendix A.

Article 21 Water

Article 21 water (so named because it is described in Article 21 of the water contracts) is water that SWP contractors may receive on a short-term basis in addition to their Table A water, if they request it. Because most SWP contactors often cannot meet their full demands with Table A water, Article 21 water should not be viewed as "surplus" or "extra" water. In fact, Article 21 water is used by many SWP contractors to help meet demands when allocations are less than 100%. Article 21 water is available to an SWP contractor only if the following conditions are met:

- "Excess water" is flowing through the Delta—that is, when releases from SWP and CVP reservoirs and unregulated flows into the Delta exceed Sacramento Valley water diversions, Delta exports, and flows needed to meet Delta water quality and flow requirements. If this scenario occurs, it is usually during December through May.
- The contractor is able to use the surplus water, such as by offsetting the use of groundwater that would otherwise occur, or can store it in its own system. (That is, the water will not be stored in an SWP facility, such as San Luis Reservoir.)

- Delivering this water would not interfere with Table A allocations, other SWP deliveries, or SWP operations.

SWP contractors requesting Article 21 water receive this water in the same proportion as their Table A water. Article 21 water becomes available only during wet months of the year, generally December through March. Unless the SWP contractor has facilities to routinely store or manage the Article 21 water it receives, such water is not likely to contribute significantly to local water supply reliability.

Carryover Water

"Carryover water" is SWP water that is allocated to an SWP contractor and approved for delivery to that contractor in a given year, but not used by the end of the year. (Note that SWP water deliveries are managed by calendar year, January 1–December 31, while hydrology is measured by water year, October 1–September 30.) This water is exported from the Banks Pumping Plant, but instead of being delivered to the contractor, it is stored in the SWP's share of San Luis Reservoir, when space is available, for the contractor to use in the following year.

Carryover water is like a water savings account that allows water managers flexibility in tough times—such as if the next year is a drought year and the contractor's allocation of SWP water is small. Carryover water was designed to encourage the most effective and beneficial use of water and to avoid obligating the contractors to use or lose the water by December 31 of each year.

With advance notice, SWP contractors can carry over water when they submit their initial request for Table A water, or within the last 3 months of the delivery year. They might do this for various reasons, such as local wet conditions or exchange and transfer arrangements. Storage for carryover water no longer becomes available to the contractors if it interferes with storage of SWP water for project needs.

Carryover water is stored in San Luis Reservoir.

Turnback Pool Water

SWP contractors may offer the portion of their allocated Table A water within the current year that exceeds their needs in a "turnback pool," where another contractor may purchase this water. DWR sets the price for water offered in turnback pools, which are established in February and March. Contractors that sell their extra Table A water in a turnback pool receive payments from contractors that buy water through the turnback pool.

Historical SWP Deliveries (2001–2010)

Please see Appendix A for tables listing annual historical deliveries from the Delta by various water classifications for each SWP contractor for 2001–2010. Similar delivery tables for years 1999–2008 are included in the 2009 Report.

Figure 3-2 shows that deliveries of SWP Table A water from the Delta for 2001–2010 range from an annual minimum of 1,049 taf to a maximum of 2,963 taf, with an average of 2,087 taf. Historical deliveries of SWP Table A water from the Delta over this 10-year period are less than the maximum of 4,133 taf/year.

Total historical SWP deliveries from the Delta, including Table A, Article 21, turnback pool, and carryover water, range from 1,236 to 3,727 taf/year, with an average of 2,524 taf/year for the period of 2001–2010 (Figure 3-3).

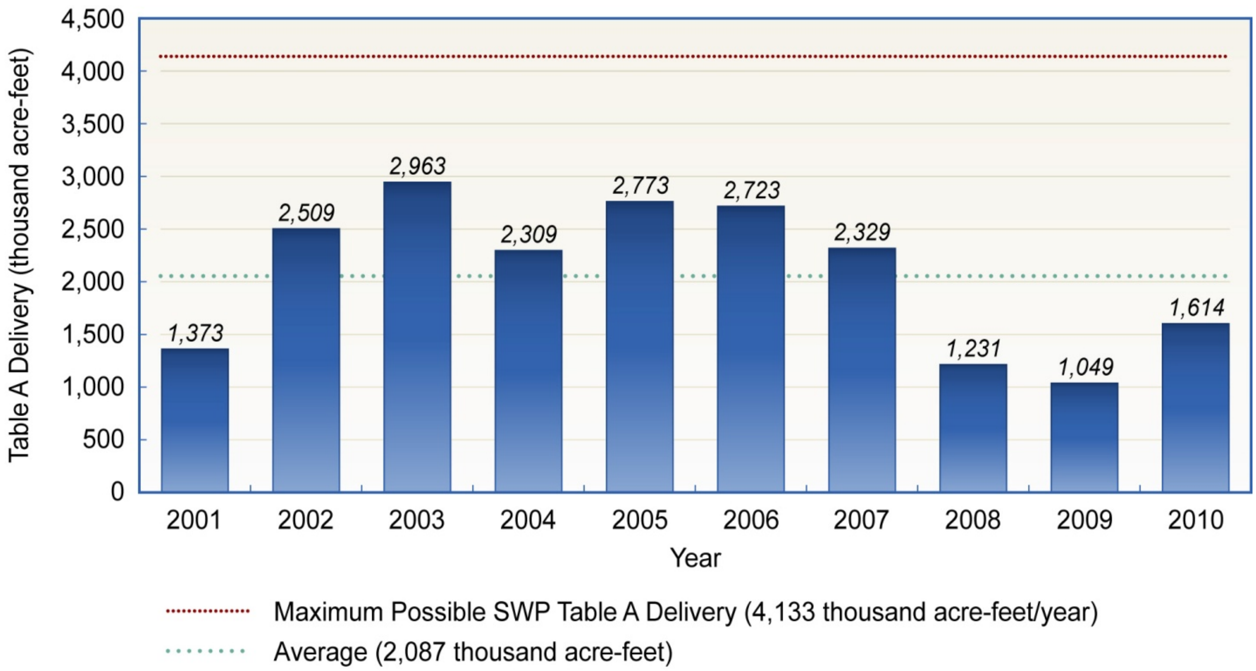
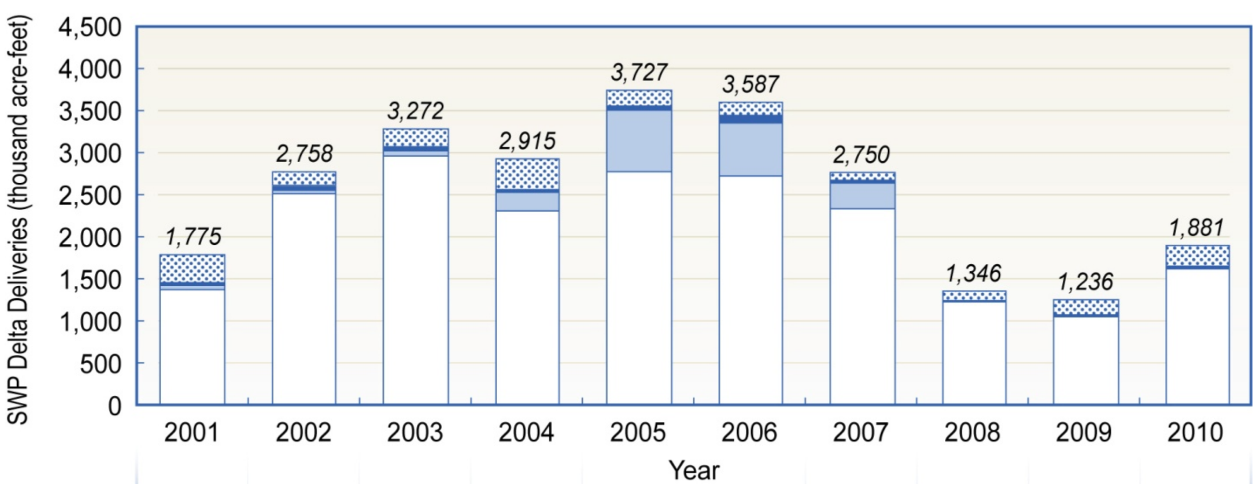


Figure 3-2. Historical Deliveries of SWP Table A Water from the Delta, 2001–2010



	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Carryover	335	161	220	370	185	160	94	110	180	248
Turnback	18	45	30	17	38	73	16	3	2	11
Article 21	48	43	60	218	731	631	310	3	6	8
Table A	1,373	2,509	2,963	2,309	2,773	2,723	2,329	1,230	1,049	1,614

Note: Due to rounding, the total delivery may not equal the sum of individual delivery type line items.

Figure 3-3. Total Historical SWP Deliveries from the Delta, 2001–2010 (by Delivery Type)

Chapter 4

Factors that Affect Water Delivery Reliability

This chapter explains the concept of SWP water delivery reliability and how it is calculated by DWR. Some of the factors that influence the percentages of SWP Table A deliveries were introduced in Chapter 3, “SWP Contractors and Water Contracts.” This chapter builds on that discussion, describing the most important factors that combine to affect SWP water delivery reliability. Among these natural and human-created factors are the availability of source water, regulatory restrictions on SWP operations, and the effects of climate change.

Uncertainty also exists because of the potential for an emergency such as an earthquake striking in or near the Delta, which, if substantial enough, could interrupt SWP exports from the Delta. This chapter describes various statewide efforts by DWR and other agencies to reduce risks to the Delta and enhance emergency response capabilities.

What Water Delivery Reliability Means to SWP Contractors

Water delivery reliability is the annual amount of SWP water that can be expected to be delivered to SWP contractors with a certain frequency. But what does that actually mean in practice?

In essence, it is a matter of probability—specifically, the likelihood that a contractor will receive a certain amount of water from the SWP in a particular year. From the contractor’s perspective, water delivery reliability indicates an acceptable or desirable level of dependability of water deliveries to the people receiving the water. This information is vitally important to SWP contractors for their long-term water planning and operations. Will farmers have the amount of water they will need to plant permanent crops? Will urban and suburban water districts have sufficient water to serve planned development, or will they need to call for greater conservation measures by residents and businesses? These are examples of critical questions to which SWP contractors must have answers to serve their customers.

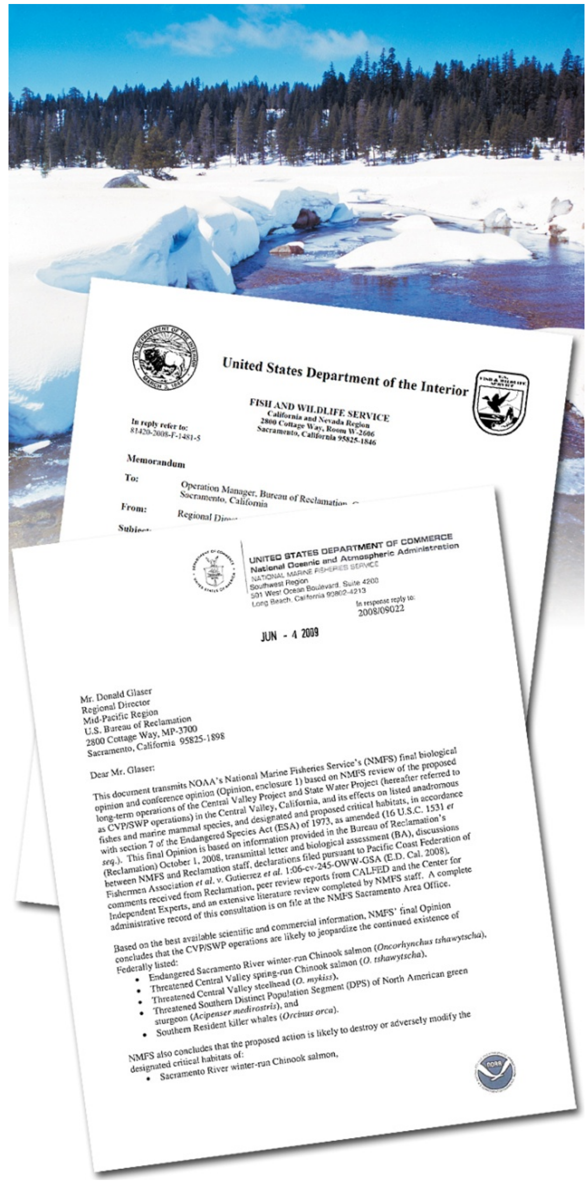
Usually, a local water agency, in coordination with the public it serves, determines the level of water delivery reliability that it considers acceptable. The water agency then plans for new facilities, programs, or additional sources of water to meet or maintain this level of reliability.

Calculating SWP Water Delivery Reliability

DWR calculates the water delivery reliability of the SWP using the CalSim-II computer model, which simulates existing and future operations of the SWP. No model or tool can predict what actual, natural water supplies will be for any year or years, but a system of probability can be used to calculate water delivery reliability. The analyses of SWP delivery reliability contained in Chapters 6 and 7 of this report are based on modeling conducted using 82 years of historical data (water years 1922–2003) for rainfall and runoff. Those data were adjusted to reflect current and future levels of development in the source areas. The resulting data were then used to forecast the amount of water available to the SWP under current and future conditions (with the effects of climate change factored into the modeling for future conditions). The annual amounts of estimated SWP water deliveries are ranked from smallest to largest and the probability that various quantities of SWP Table A water will be delivered to each SWP contractor is estimated.

Factors that Can Influence the SWP's Water Delivery Reliability

Forecasting water delivery reliability is a difficult task because California is such a large state with numerous microclimates. In a typical year, some areas receive as little as 2 inches of rain, while others receive more than 100 inches. In addition, the determinants of water delivery for a specific water supply system continually change over time and can be difficult to determine and/or model. For example, water use in Sacramento River watersheds has increased over time. The historical data upon which a water supply forecast is based must be adjusted to reflect the current and, if necessary, future use in these watersheds.



Natural factors such as snowmelt and human influences such as federal biological opinions can both influence the SWP's water delivery reliability.

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

- water availability at the source,
- water rights with priority over the SWP,
- regulatory restrictions on SWP Delta exports (imposed by federal biological opinions [BOs] and State water quality plans),
- climate change,

- ongoing environmental and policy planning efforts, and
- Delta levee failure.

Water Availability at the Source

This factor affects the SWP's water delivery reliability because it is inherently variable; availability of water at the source depends on the amount and timing of rain and snow that fall in any given year, the amount and timing of runoff, and the level of development (that is, the use of water) in the SWP's source areas. The location, amount, and form of precipitation in California in any given year cannot be accurately predicted, introducing the greatest uncertainty to the availability of future SWP source water and hence future SWP deliveries.

Generally, during a single dry year or two, surface water and groundwater storage can supply most water deliveries, but dry years can result in critically low water reserves.

DWR measures the water content of snowpack in the northern Sierra Nevada to forecast snowmelt runoff.

Greater reliance on groundwater during dry years results in high costs for many users and increases groundwater overdraft. Further, the ability of some contractors to use local groundwater may be limited; some groundwater basins may be contaminated by toxins such as methyl tertiary butyl ether (commonly known as MBTE), an ingredient in gasoline, and other aquifers may be too deep to reach economically. This makes the availability of the SWP's surface water to contractors especially important.

DWR manually measures snowpack in the northern Sierra Nevada monthly between early January and early May to forecast snowmelt runoff. These surveys and real-time electronic measurements taken throughout the winter measure the snowpack's water content. The size of the snowpack in the Feather River watershed on April 1—when snowpack water content normally is at its peak before the spring runoff—and the storage in Lake Oroville are key components of the SWP's delivery capabilities from April through September.

However, in some years, even measurements taken in the northern Sierra Nevada earlier in the year can demonstrate an apparent trend in water delivery reliability for the rest of the year (assuming that the weather follows typical patterns in spring). For example, manual readings conducted by DWR on December 28, 2010, off U.S. Highway 50 near Echo Summit showed snow-water equivalents in the state's northern mountains at 169% of normal for that date and 57% of the normal value for April 1. By contrast, the readings taken on the same date in 2009 had indicated snow-water equivalents in the northern mountains at 77% of normal for the date and 26% of the normal value for April 1. These findings indicated the potential for SWP deliveries in 2011 to increase relative to deliveries that occurred in 2010, a below-normal water year.

Water Rights with Priority Over the SWP

California's water rights system affects the SWP indirectly. There are two types of legally protected rights to surface water in California:

- *Appropriative* water rights allow the user to divert surface water for beneficial use. The user must first have obtained a permit from the State Water Resources Control Board (State Water Board), unless the appropriative water right predates 1914. Appropriative water rights may be lost if the water has gone unused for 5 years. The SWP diverts water from the Delta under appropriative water rights.
- *Riparian* water rights apply to lands traversed by or bordering on a natural watercourse. No permit is required to use this water, which must be used on riparian (adjacent) land and cannot be stored for later use.

Generally, the priority of an appropriative water right in California is "first in time, first in right"; therefore, an appropriative water right is subordinate to all prior water rights, whether appropriative or riparian. This means that if another entity with a prior water right increases its use of one of the SWP's sources of water supply—the Delta, the upstream Sacramento or San Joaquin River, or a tributary to either river—the overall amount of water available to the SWP will decrease. Thus, water users with prior water rights are assigned top priority for water in DWR's modeling of the SWP's water delivery reliability, even ahead of SWP Table A water deliveries.

Regulatory Restrictions on SWP Delta Exports

Multiple needs converge in the Delta: the need to protect a fragile ecosystem, to support Delta recreation and farming, and to provide water for agricultural and urban needs throughout much of California. Various regulatory requirements are placed on the SWP's Delta operations to protect special-status species such as delta smelt and spring- and winter-run Chinook salmon. As a result, as described below, restrictions on SWP operations imposed by State and federal agencies contribute substantially to the challenge of accurately determining the SWP's water delivery reliability in any given year.

Biological Opinions on Effects of Coordinated SWP and CVP Operations

Several fish species listed under the federal Endangered Species Act (ESA) as endangered or threatened are found in the Delta. The continued viability of populations of these species in the Delta depends in part on Delta flow levels. For this reason, the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) have issued several BOs since the 1990s on the effects of coordinated SWP/CVP operations on several species.

These BOs affect the SWP's water delivery reliability for two reasons. Most obviously, they include terms that specifically restrict SWP pumping levels in the Delta at certain times under certain conditions. In addition, the BOs' requirements are based on physical and biological phenomena that occur daily while DWR's water supply models are based on monthly data.

The first BOs on the effects of SWP (and CVP) operations were issued in February 1993 (NMFS BO on effects of project operations on winter-run Chinook salmon) and March 1995 (USFWS BO on project effects on delta smelt and splittail). Among other things, the BOs contained requirements for Delta inflow, Delta outflow, and reduced export pumping to meet specified incidental take limits. These fish protection requirements imposed substantial constraints on Delta water supply operations. Many were incorporated into the 1995 *Water Quality Control Plan for the San Francisco Bay/Sacramento–San Joaquin Delta* (1995 WQCP), as described in the "Water Quality Objectives" section later in this chapter.

The terms of the USFWS and NMFS BOs have become increasingly restrictive in recent years. In December 2008, USFWS issued a new BO covering effects of the SWP and CVP on delta smelt, and in June 2009, NMFS issued a BO covering effects on winter-run and spring-run Chinook salmon, steelhead, green sturgeon, and killer whales. These BOs replaced BOs issued earlier by the federal agencies.

The USFWS BO includes additional requirements in all but 2 months of the year. The BO calls for "adaptively managed" (adjusted as necessary based on the results of monitoring) flow restrictions in the Delta intended to protect delta smelt at various life stages. USFWS determines the required target flow, with the reductions accomplished primarily by reducing SWP and CVP exports. Because this flow restriction is determined based on fish location and decisions by USFWS staff, predicting the flow restriction and corresponding effects on export pumping with any great certainty poses a challenge. The USFWS BO also includes an additional salinity requirement in the Delta for September and October in wet and above-normal water years, calling for increased releases from SWP and CVP reservoirs to reduce salinity. Among other provisions included in the NMFS BO, limits on total Delta exports have been established for the months of April and May. These limits are mandated for all but extremely wet years.

The 2008 and 2009 BOs were issued shortly before and shortly after the Governor proclaimed a statewide water shortage state of emergency in February 2009, amid the threat of a third consecutive dry year. NMFS calculated that implementing its BO would reduce SWP and CVP Delta exports by a combined 5% to 7%, but DWR's initial estimates showed an impact on exports closer to 10% in average years, combined with the effects of pumping restrictions imposed by BOs to protect delta smelt and other species. The 2008 USFWS and 2009 NMFS BOs have been subject to considerable litigation. Recent decisions by U.S. District Judge Oliver Wanger changed specific operational rules for the fall/winter of 2011–2012, and both the USFWS BO and NMFS BO have been remanded to the agencies for further review and analysis. However, the operational rules specified in the 2008 and 2009 BOs continue to be legally required and are the rules used in the analyses presented in Chapters 5, 6, and 7 of this report. Chapter 5 presents a comparison of monthly Delta exports as estimated for this 2011 Report with those estimated for the 2005 Report, illustrating how the 2008 and 2009 BOs have affected export levels from the Delta.

The California Department of Fish and Game (DFG) issued consistency determinations for both BOs under Section 2080.1 of the California Fish and Game Code. The consistency determinations stated that the USFWS BO and the NMFS BO would be consistent with the California Endangered Species Act (CESA). Thus, DFG allowed incidental take of species listed under both the federal ESA and CESA to occur during SWP and CVP operations without requiring DWR or the U.S. Bureau of Reclamation to obtain a separate State-issued permit.

Specific restrictions on Delta exports associated with the USFWS and NMFS BOs and their effects on SWP pumping levels are described further in Chapter 5, "SWP Delta Exports," of this report.

Water Quality Objectives

Because the Delta is an estuary, salinity is a particular concern. In the 1995 WQCP, the State Water Board set water quality objectives to protect beneficial uses of water in the Delta and Suisun Bay. The objectives must be met by the SWP (and federal CVP), as specified in the water right permits issued to DWR and the U.S. Bureau of Reclamation. Those objectives—minimum Delta outflows, limits on SWP and CVP Delta exports, and maximum allowable salinity levels—are enforced through the provisions of the State Water Board's Water Right Decision 1641 (D-1641), issued in December 1999 and updated in March 2000.

DWR and Reclamation must monitor the effects of diversions and SWP and CVP operations to ensure compliance with existing water quality standards. Monitoring stations are shown in Figure 4-1.

Among the objectives established in the 1995 WQCP and D-1641 are the “X2” objectives. D-1641 mandates the X2 objectives so that the State Water Board can regulate the locations of the Delta estuary’s salinity gradient during the months of February–June. X2 is the position in the Delta where the electrical conductivity (EC) level, or salinity, of Delta water is 2 parts per thousand. The location of X2 is used as a surrogate measure of Delta ecosystem health. For the X2 objective to be achieved, the X2 position must remain downstream of Collinsville in the Delta (shown in Figure 4-1) for the entire 5-month period, and downstream of other specific locations in the Delta on a certain number of days each month from February through June. This means that Delta outflow must be at certain specified levels at certain times—which can limit the amount of water the SWP may pump at those times at its Harvey O. Banks Pumping Plant in the Delta. Because of the relationship between seawater intrusion and interior-Delta water quality, meeting the X2 objective also improves water quality at Delta drinking-water intakes; however, meeting the X2 objectives can require a relatively large volume of water for outflow during dry months that follow months with large storms.

The 1995 WQCP and D-1641 also established an export/inflow (E/I) ratio. The E/I ratio, presented in Table 3 of the 1995 WQCP (SWRCB 1995:18–22), is designed to provide protection for the fish and wildlife beneficial uses in the Bay-Delta estuary (SWRCB 1995:15). The E/I ratio limits the fraction of Delta inflows that are exported. When other restrictions are not controlling, Delta exports are limited to 35% of total Delta inflow from February through June and 65% of inflow from July through January.

Climate Change

The *California Water Plan Update 2009* identified climate change as a key consideration in planning for the State’s water management. California’s reservoirs and water delivery systems were developed based on historical hydrology; future weather patterns have long been assumed to be similar to those in the past. However, as climate change continues to affect California, past hydrology is no longer a reliable guide to future conditions. This section discusses effects on the SWP that could result from specific aspects of climate change.

Decreased Water Availability with Reduced Snowpack

As the effects of climate change continue, mean temperatures are predicted to increase, both globally and regionally. Climate projections used to assess the reliability of California’s future water supply forecast average air temperature increases for the Sacramento region of 1.3 to 4.0 degrees Fahrenheit by the middle of the 21st century and 2.7 to 8.1 degrees by the end of the century (California Climate Change Center 2009a:8). Climate change is anticipated to bring warmer storms that result in less snowfall at lower elevations, reducing total snowpack. Loss of snowpack is projected to be greater in the northern Sierra Nevada—and thus closer to the Feather River watershed, the origin of SWP water—than in the southern Sierra Nevada because of the relative proportions of land at low and middle elevations.

Snowmelt provides an average of 15 million acre-feet of water for California per year, slowly released from about April to July each year (DWR 2006:2-22). Much of the state’s water infrastructure, including the SWP, was designed to capture slow spring runoff and deliver it during the drier summer and fall months. However, during the 20th century, the average early-spring

Figure 4-1. Delta Salinity Monitoring Locations of Importance to the SWP

snowpack in the Sierra Nevada decreased by about 10%, resulting in the loss of 1.5 million acre-feet of snowpack storage (DWR 2008:3). Using historical data and modeling, DWR projects that by 2050 the Sierra snowpack will be reduced from its historical average by 25% to 40% (DWR 2008:4). Increased precipitation falling as rain instead of snow during winter could result in a larger number of "rain-on-snow" events. This would cause the snow to melt earlier in the year and over fewer days than historically, thus adversely affecting availability of water for pumping by the SWP during summer.

Such reductions in snowpack could have dire consequences. Under climate change and in some years, water levels in Lake Oroville, the SWP's main supply reservoir, could fall below the lowest release outlets, making the system vulnerable to operational interruption. DWR expects that a water shortage worse than the one during the 1977 drought could occur in 1 out of every 6–8 years by the middle of the 21st century and in 1 out of every 3–4 years at the end of the century (California Climate Change Center 2009a:46). In those years, it is estimated that an additional 575,000–850,000 acre-feet per year of water would be needed to meet current regulatory requirements and to maintain minimum system operations. This could preclude the SWP from pumping as much water as it would otherwise.

Climate change is also expected to reduce the SWP's median reservoir carryover storage. Carryover water is like a water savings account for water managers to use during shortage periods. Thus, a climate change–generated reduction in the amount of carryover water available to SWP contractors would reduce the system's flexibility during dry and critical water years.

Increased SWP Water Demands

Even as water shortages may result from reduced snowpack, climate change may also cause water demand by SWP contractors to increase. Warmer temperatures may increase rates of evapotranspiration (loss of water from soil by evaporation and plant transpiration) and may extend growing seasons. A larger amount of water may be needed for irrigation of certain crops, urban landscaping, and environmental needs. Warmer temperatures will also increase evaporation from surface reservoirs. Reduced soil moisture and surface flow will disproportionately affect the environment and other water users that rely heavily on annual rainfall such as rainfed agriculture, livestock grazing on nonirrigated rangeland, and recreation.

Sea Level Rise

During the last century, sea level rose 7 inches along California's coast. Estimates of future sea level rise range from 4 to 16 inches by the middle of the 21st century and 7–55 inches by 2100 (DWR 2009b:4-37). The increases in sea level that are expected to continue could affect SWP water delivery reliability in several ways:

- Most of the land in the Delta is below sea level—by as much as 20 feet—as a consequence of ongoing subsidence (Figure 4-2). Increases in sea level could place more pressure on the Delta's already fragile levee system and, as a consequence, cause levee breaches that could threaten SWP Delta exports.
- As salty water from the Pacific Ocean moves farther upstream into the Delta, DWR could be required to increase the amounts of freshwater released from Lake Oroville to maintain compliance with Delta water quality standards.
- Sea level rise is expected to cause salt water to flow farther inland. The resulting increase in saltwater intrusion into coastal aquifers would make increasing amounts of groundwater unsuitable for water supply or irrigation (California Climate Change Center 2009b:80–81). The reduced availability of groundwater would likely contribute to further increases in demands for surface water from the SWP, especially by the coastal SWP contractors.

Source: DWR 1995:28

Figure 4-2. Areas of the Delta that Have Subsided to Below Sea Level

Adapting to Climate Change Effects in Forecasting Water Delivery Reliability

Chapter 7, "Future SWP Water Delivery Reliability (2031)," of this report estimates the SWP's delivery reliability for conditions 20 years in the future (2031), reflecting potential hydrologic changes that could result from climate change. Further details on these future projections are included in a technical addendum to this report (posted on the Internet and available upon request).

For purposes of this report and the technical addendum, the 2031 delivery estimates are based on a single median-impact future climate projection. To identify this projection, DWR analyzed the 12 climate projections for midcentury that were used in *Using Future Climate Projections to Support Water Resources Decision Making in California* (California Climate Change Center 2009a). The resulting water supply effects were examined to determine which one most closely represented the "central" or "median" projection. The analysis examined the following projected climate and hydrology variables and their effects on SWP exports: temperature, precipitation, total inflow to major reservoirs, shifts in timing of runoff, and Delta exports.

Ongoing Environmental and Policy Planning Efforts

As discussed earlier, the Delta is an essential part of the conveyance system for the SWP. SWP pumping at the Banks Pumping Plant is regulated to protect the many uses of the Delta. However, today's uses in the Delta are not sustainable over the long term under current management practices and regulatory requirements. As discussed below, two large-scale plans for the Delta that are in development could affect SWP water delivery reliability: the Delta Plan and the Bay Delta Conservation Plan (BDCP).

Delta Plan

After years of concern about the Delta amid rising water demand and habitat degradation, the Delta Stewardship Council was created in legislation to achieve State-mandated coequal goals for the Delta. As specified in Section 85054 of the California Water Code:

> "Coequal goals" means the two goals of providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem. The coequal goals shall be achieved in a manner that protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place.

The draft Delta Plan seeks to reduce reliance on Delta water supplies. In a series of policies and recommendations, the draft plan aims to encourage farms and cities to increase conservation and become more self-sufficient, particularly in the event of a disaster in the Delta. It calls for agricultural water agencies to change pricing to encourage conservation. It also urges the State Water Board to set enforceable flow objectives for the Delta and its tributaries that take into account wildlife and habitat needs. In the future, government projects in the Delta must prove they are consistent with the Delta Plan.

The Delta Stewardship Council is preparing the draft Delta Plan and environmental impact report. Scheduled for adoption and implementation in 2012, the Delta Plan is intended to serve as California's guiding policy document for the Delta and Suisun Marsh for the next 88 years (that is, through the year 2099), with frequent updates.

Bay Delta Conservation Plan

The BDCP is being prepared by a group of local water agencies, environmental and conservation organizations, State and federal agencies, and other interest groups. An outgrowth of the CALFED Bay-Delta Plan's Ecosystem Restoration Program Conservation Strategy, the BDCP has been in development since 2006. The heart of the BDCP is a long-term conservation strategy that sets forth actions needed for a healthy Delta. The BDCP would do all of the following:

- identify conservation strategies to improve the overall ecological health of the Delta;
- identify ecologically friendly ways to move freshwater through and/or around the Delta;
- address toxic pollutants, invasive species, and impairments to water quality; and
- establish a framework and funding to implement the plan over time.

A draft environmental impact report is planned to be released for public review in mid-2012. The report is targeted to be final in 2013, after which a decision to proceed with the program would be made. Upon adoption, the BDCP would provide the basis for issuance of endangered species permits for the continued operation of the SWP and CVP. The plan would be implemented over a 50-year period.

Delta Levee Failure

The fragile Delta faces a multitude of risks that could affect millions of Californians. Foremost among those risks, as they could affect the SWP's water delivery reliability, are the potential for levee failure and the ensuing flooding and water quality issues.

The Delta Risk Management Strategy (DRMS) was initiated in response to Assembly Bill 1200 (2005), which directed DWR to use 50-, 100-, and 200-year projections to evaluate the potential impacts on Delta water supplies associated with continued land subsidence, earthquakes, floods, and climate change. The discussions below describe DRMS Phase 1, which evaluated the risks, and DRMS Phase 2, which is proposing various solutions. Also discussed are other efforts currently being undertaken by DWR and other agencies to reduce risks to the Delta, enhance emergency response capabilities, and reduce the risk of interruption of Delta water exports by the SWP and CVP.

Effects of Emergencies on Water Supplies: Delta Risk Management Strategy, Phase 1

Phase 1 of the DRMS, completed in 2008, assessed the performance of Delta and Suisun Marsh levees under various stressors and hazards and evaluated the consequences of levee failures to California as a whole.

The Delta is protected by levees built about 150 years ago. The levees are vulnerable to failure because most original levees were simply built with soils dredged from nearby channels, and were never engineered. Most islands in the Delta have flooded at least once over the past 100 years. For example, on June 3, 2004, a huge dry-weather levee failure occurred without warning on Upper Jones Tract in the south Delta, inundating 12,000 acres of farmland with about 160,000 acre-feet of water. Because many Delta islands are below sea level, deep and prolonged flooding could occur during a levee failure event, which could disrupt the quality and use of Delta water.

Levee failure can result from the combination of high river inflows, high tide, and high winds; however, levees can also fail in fair weather—even in the absence of a flood or seismic event—in a so-called "sunny day event." Damage caused by rodents, piping (in which a pipe-like opening develops below the base of the levee), or foundation movement could cause sunny-day levee breaches.

Many vulnerable Delta levees require installation of rock revetments, riprap, or other engineered structures along eroding banks to reduce erosion and protect levee foundations.

A breach of one or more levees and island flooding may affect Delta water quality and SWP operations. Depending on the hydrology and the size and locations of the breaches and flooded islands, a large amount of salt water may be pulled into the interior Delta from Suisun and San Pablo Bays. When islands are flooded, DWR may need to drastically decrease or even cease SWP Delta exports to evaluate the distribution of salinity in the Delta and avoid drawing saltier water toward the pumps.

Delta levees are prone to failure, increasing risks to State water supplies.

An earthquake could also put Delta levees, and thus SWP water supplies, at risk. In 2008, the 2007 Working Group on California Earthquake Probabilities estimated a probability of 63% that a magnitude 6.7 or greater earthquake would strike the San Francisco Bay Area in the next 30 years (Working Group 2008:6). An earthquake could severely damage Delta levees, causing islands to flood with salty water. The locations most likely to be affected by an earthquake are the west and southwest portions of the Delta because these areas are closer to potential earthquake sources. Flooding of the west and southwest Delta is also more likely to interfere with conveyance of freshwater to export pumps (DWR 2007:17).

Modeling of the effects of earthquakes on Delta islands was conducted by DWR for the DRMS Phase 1 report. Described in the *California Water Plan Update 2009*, the assessment found a 40% probability that a major earthquake occurring between 2030 and 2050 would cause 27 or more islands to flood at the same time. If 20 islands were flooded as a result of a major earthquake, the export of freshwater from the Delta could be interrupted by about a year and a half (DWR 2009b:5-15). Water supply losses of up to 8 million acre-feet would be incurred by SWP (and CVP) contractors and local water districts.

Managing and Reducing Risks: Delta Risk Management Strategy, Phase 2

The Phase 2 report for the DRMS, issued in June 2011, evaluates alternatives to reduce the risk to the Delta and the state from adverse consequences of levee failure (DWR 2011b). "Building blocks" (individual improvements or projects, such as improving levees or raising highways) and trial scenarios (various combinations of building blocks) were developed for the DRMS Phase 2 report. The building blocks fall into three main categories:

- conveyance improvements/
  flood risk reduction and life safety,
- infrastructure risk reduction, and
- environmental risk mitigation.

The first of these categories is most relevant to the SWP in terms of reducing the risk of disruption of SWP Delta exports, but the environmental risk mitigation category includes a building block (Building Block 3.6) calling for reduction of water exports from the Delta.

Four trial scenarios were developed to represent a range of possible risk reduction strategies:

- *Trial Scenario 1—Improved Levees:* Improve the reliability of Delta levees against flood-induced failures by providing up to 100-year flood protection.
- *Trial Scenario 2—Armored Pathway (Through-Delta Conveyance):* Improve the reliability of water conveyance by creating a route through the Delta that has high reliability and the ability to minimize saltwater intrusion into the south Delta.
- *Trial Scenario 3—Isolated Conveyance Facility:* Provide high reliability for conveyance of export water by building an isolated conveyance facility on the east side of the Delta.
- *Trial Scenario 4—Dual Conveyance:* Improve reliability and flexibility for conveyance of export water by constructing an isolated conveyance facility and a through-Delta conveyance. (This scenario would be much like a combination of Trial Scenarios 2 and 3.)

The findings of the DRMS Phase 2 report on these scenarios, as they apply to seismic risk and potential for disruption of SWP Delta exports, are as follows:

- Trial Scenario 1 (Improved Levees) would not reduce the risk of potential water export interruptions, nor would it change the seismic risk of most levees.
- Trial Scenario 2 (Armored Pathway [Through-Delta Conveyance]) would have the joint benefit of reducing the likelihood of levee failures from flood events and earthquakes and of significantly reducing the likelihood of export disruptions.
- The effects of Trial Scenario 3 (Isolated Conveyance) would be similar to those for the Armored Pathway scenario, but Trial Scenario 3 would not reduce the seismic risk of levee failure on islands that are not part of the isolated conveyance facility.
- Trial Scenario 4 (Dual Conveyance) would avoid the vulnerability of water exports associated with Delta levee vulnerability and would offer flexibility in water exports from the Delta and/or the isolated conveyance facility. However, seismic risk would not be reduced on islands not part of the export conveyance system or infrastructure pathway.

As noted in the discussion of the "enhanced emergency preparedness/response" building block in the DRMS Phase 2 report, analyses on resuming water exports after a levee failure were conducted by the Metropolitan Water District of Southern California, an SWP contractor. The studies found that a promising way to resume water exports would be to place structural barriers at selected channel locations in the Delta and complete strategic levee repairs, thus isolating an emergency freshwater conveyance "pathway" through channels that may be surrounded by islands flooded with saline water (Moffatt and Nichol 2007, cited in DWR 2011b:5-1).

Delta Flood Emergency Preparedness, Response, and Recovery Program and Delta Multi-Hazard Coordination Task Force

In the last 5 years, DWR has worked to improve its ability to respond quickly and effectively to simultaneous levee failures on multiple islands within the Delta. The *Delta Emergency Operations Plan Concept Paper* released in April 2007 (DWR 2007) was the initial product of this effort. To enhance the State's ability to prepare for, respond to, and recover from a catastrophic Delta levee failure, DWR subsequently began development of the Delta Flood Emergency Preparedness, Response, and Recovery Program. This program is intended to supplement DWR's emergency operations plan. The goal is to protect lives, property, and critical infrastructure in the Delta while minimizing impacts on the ecosystem. The program consists of three components:

- develop DWR's Delta response and recovery plan,
- coordinate DWR's plan with other Delta flood emergency response agencies, and

- design and implement flood emergency response facilities within the Delta.

The flood emergency response plan for the Delta will describe the actions DWR will take before, during, and after a levee-endangering event or levee failure in the Delta. The Delta Flood Emergency Preparedness, Response, and Recovery Program is conducting an extensive effort to model water quality implications of levee failure and salinity changes associated with different levee repair strategies. DWR is coordinating this effort with the U.S. Army Corps of Engineers and expects to reach out to the five Delta counties during plan development.

DWR is also a member of the Sacramento–San Joaquin Delta Multi-Hazard Coordination Task Force, which was created in 2008 in the wake of passage of the Sacramento–San Joaquin Delta Emergency Preparedness Act of 2008. The task force is led by the California Emergency Management Agency (CalEMA); in addition to DWR, the Delta Protection Commission and representatives from each of the five Delta counties also participate in task force activities. An Emergency Preparedness and Response White Paper was prepared for the Delta Stewardship Council on November 8, 2010, describing the operations of this task force.

The Sacramento–San Joaquin Delta Multi-Hazard Coordination Task Force was created to make recommendations to CalEMA on creating a framework for an interagency unified command system, coordinate the development of a draft emergency preparedness and response strategy for the Delta region, and develop and conduct an all-hazards emergency response exercise in the Delta. The task force's draft emergency preparedness and response strategy includes a process for allocating scarce resources and a statement of priorities agreed to by the members of the task force. The original deadline for the task force's report has been legislatively extended to January 1, 2013.





Chapter 5

SWP Delta Exports

The purpose of this chapter is to illustrate the effects of factors described in Chapter 4, “Factors that Affect Water Delivery Reliability,” on SWP water supplies transferred through the Delta and pumped at the Harvey O. Banks Pumping Plant in the south Delta. These supplies are referred to as “Delta exports.” Past SWP delivery reliability reports characterized SWP deliveries in their entirety but did not focus specifically on Delta exports. This chapter describes SWP Delta exports to illustrate how regulatory requirements and climate change have affected or will affect the SWP’s Delta water supplies, and to describe the general pattern of monthly SWP exports from the Delta.

This chapter focuses only on Delta exports that are associated with the SWP, not on CVP water that may have been exported through the Banks Pumping Plant via the CVP/SWP joint point of diversion.

This chapter briefly explains the difference between Delta exports and SWP deliveries, then describes trends in projected average annual exports and SWP Table A water deliveries under various recent existing-conditions scenarios. In addition, monthly exports estimated for this *State Water Project Delivery Reliability Report 2011* (2011 Report) are compared with those estimated for the *State Water Project Delivery Reliability Report 2005* (2005 Report) to illustrate the effect of regulatory restrictions.

This chapter also summarizes the primary factors influencing the SWP’s Delta export operations and deliveries, presents estimates of exports for the existing-conditions and future-conditions scenarios, and characterizes the likelihood of such exports. Estimated SWP Delta exports by water year type are depicted relative to exports that were estimated for the existing-conditions and future-conditions scenarios in the *State Water Project Delivery Reliability Report 2009* (2009 Report).

SWP Delta Exports versus SWP Deliveries

SWP Delta exports and SWP deliveries are characterized in separate chapters (this chapter for Delta exports, Chapters 6 and 7 for SWP deliveries) because these two terms are not one and the same.

Water pumped from the Delta is the primary source of SWP supply for 24 of the

29 SWP water contractors listed in Chapter 3, "SWP Contractors and Water Contracts." (Occasionally, during very wet periods, flood flows can enter the aqueduct and contribute to SWP supply south of the Delta.) As used in this report, "Delta exports" are the water supplies that are transferred ("exported") directly to SWP contractors or to San Luis Reservoir storage via the Banks Pumping Plant.

SWP Delta exports do not include deliveries of SWP water to the two North Bay Area contractors, which receive SWP water pumped by the Barker Slough Pumping Plant and conveyed by the North Bay Aqueduct. (Water conveyed to the SWP's three Feather River Area contractors is not transferred through the Delta and is not the focus of this chapter or of Chapters 6 and 7.)

By contrast, SWP Table A water deliveries from the Delta include both water pumped by the Banks Pumping Plant and conveyed by the California Aqueduct and water pumped by the Barker Slough Pumping Plant and conveyed by the North Bay Aqueduct. Thus, Table A water deliveries, as described in Chapters 6 and 7, also include deliveries to the two North Bay Area contractors, for a total of 26 SWP contractors.

SWP Delta exports include nearly all types of SWP water, not merely Table A water (see the explanation of SWP water types in Chapter 3). As allowed under the SWP's water supply contracts, the amount pumped from the Delta can be exported in the same year as Table A water, or can be exported as Article 21 water if available. A contractor can opt to have exported Table A water held in San Luis Reservoir as carryover water—that is, as part of the contractor's supply for a subsequent year or made available to another SWP contractor as turnback pool water. Article 21 water must be delivered immediately to SWP contractors when exported and cannot be stored in SWP facilities.

Recent Trends in SWP Delta Exports and Table A Deliveries

SWP Delta exports and Table A deliveries estimated for this 2011 Report are reduced by the operational restrictions imposed on the SWP by the biological opinions (BOs) issued by the U.S. Fish and Wildlife Service (USFWS) in December 2008 and the National Marine Fisheries Service (NMFS) in June 2009. This same scenario occurred in the 2009 Report. By contrast, the *State Water Project Delivery Reliability Report 2007* (2007 Report) incorporated interim, less restrictive operational rules established by U.S. District Judge Oliver Wanger in December 2007 while the USFWS and NMFS BOs were rewritten. The 2005 Report was based on much less restrictive operational rules contained in the BOs that had been issued in late 2004 and 2005.

Overall trends in both SWP Delta exports and Table A deliveries under existing conditions are summarized below. (For further detail on estimated SWP Table A deliveries for the existing-conditions and future-conditions scenarios, respectively, see Chapters 6 and 7.)

Annual Exports and Table A Deliveries—2005–2011 Scenarios

Figure 5-1 illustrates the effect of the operational restrictions imposed by the USFWS and NMFS BOs on estimated average annual Delta exports and Table A water deliveries. The figure depicts the average values estimated for existing conditions in the 2005, 2007, 2009, and 2011 Reports.

As shown in Figure 5-1, estimated average annual Delta exports and SWP Table A water deliveries have generally decreased since 2005, when rules affecting SWP pumping operations began to become more restrictive. Under existing conditions, average annual Delta exports have decreased since 2005 from 2,958 thousand acre-feet per year (taf/year) to 2,607 taf/year in 2011, a decrease of 351 taf or 11.9%; average annual Table A deliveries have decreased since 2005 from 2,818 taf/year to

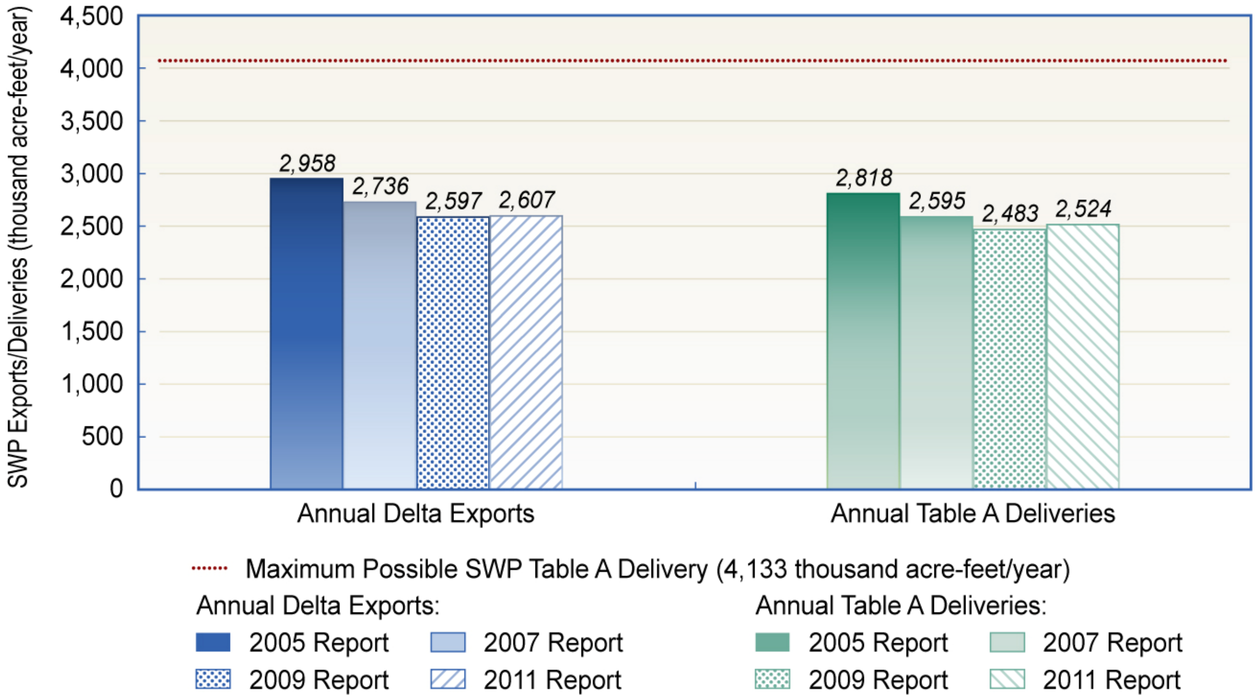


Figure 5-1. Trends in Estimated Average Annual Delta Exports and SWP Table A Water Deliveries (Existing Conditions)

2,524 taf/year in 2011, a decrease of 294 taf or 10.4%. The reasons for these decreases are described under "Primary Factors Affecting SWP Delta Export Operations and Table A Water Deliveries," below.

Monthly Delta Exports—2011 Scenario versus 2005 Scenario

Figure 5-2 illustrates the effects of the operational restrictions imposed by the BOs on SWP Delta exports since 2005 by comparing monthly existing-conditions exports estimated for this 2011 Report with those estimated for the 2005 Report. The bar charts show the average exports for each month under each scenario estimated for both reports.

As shown in Figure 5-2, average monthly SWP Delta exports estimated for the 2011 Report are lower than those estimated for the 2005 Report both in the first half of the year and from October through December. The reductions in exports for January through June are substantial, ranging from 22% in June to 58% in April. Exports for July and August as estimated for the 2011 Report exceed those estimated for the 2005 Report, but the increases (17% in August and approximately 45% in July) are generally smaller than the reductions seen earlier in the year.

Compiling the monthly average values for exports for the entire year under each scenario reveals that, as indicated previously in the description of annual exports, the average annual exports estimated for the 2011 Report are 11.9% less than those estimated for the 2005 Report.

Primary Factors Affecting SWP Delta Export Operations and Table A Water Deliveries

Under current operational constraints on the SWP, maximum exports from the Banks Pumping Plant are generally limited to 6,680 cubic feet per second, except between December 15 and March 15, when exports can be increased by one-third of the San Joaquin River

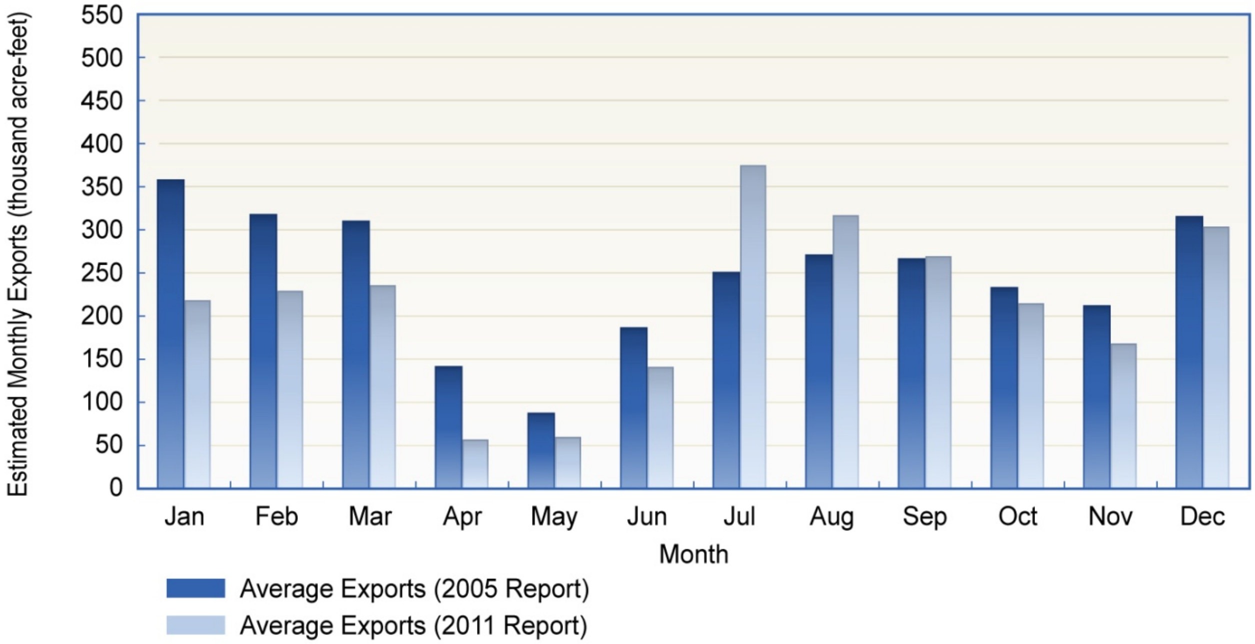


Figure 5-2. Estimated Monthly SWP Delta Exports (Existing Conditions), 2011 Scenario versus 2005 Scenario

flow at the Vernalis gauge (when the Vernalis flow is greater than 1,000 cubic feet per second). As explained previously in Chapter 4, regulatory restrictions on the SWP's Delta operations have been among the major factors affecting SWP water delivery reliability. Several of those influence SWP exports from the Banks Pumping Plant and, at times, impose particular limitations on exports. These limits are summarized here to illustrate how they affect the values shown in Figure 5-2:

- *2008 USFWS and 2009 NMFS BOs:* These BOs are much more restrictive than the BOs they replaced. The USFWS BO includes flow restrictions to protect delta smelt, with requirements in all but 2 months of the year. The NMFS BO contains similar limits for January through mid-June, but the greatest restriction imposes limits on total Delta exports in the months of April and May in most years to protect salmon and steelhead.
- *X2:* The "X2" objective mandated by the State Water Resources Control Board (State Water Board) regulates Delta salinity levels in the months of February–June. For the X2 position to be located in the appropriate location to achieve the State Water Board's salinity objective, Delta outflow must be at certain specified levels at certain times between February and June—which can constrain SWP pumping at the Banks Pumping Plant at those times.
- *Export/inflow ratio:* The 1995 *Water Quality Control Plan for the San Francisco Bay/Sacramento–San Joaquin Delta* and State Water Board Decision 1641 (D-1641) limits Delta exports to 35% of total Delta inflow from February through June. Thus, even if substantial runoff occurs during those months (such as during a year with considerable rain-on-snow events, projected to be more likely as the effects of climate change increase), the SWP is limited in its ability to benefit from the availability of that extra water in the Delta by increasing its pumping beyond this limit. Allowable exports increase to 65% of inflow from July through January.
- *Spring Export Limitations:* Spring is an important time in the life cycles of fish

protected by the USFWS and NMFS BOs. As a result, requirements for Delta exports exist in several places. D-1641 limits SWP and CVP exports to 100% of the base flow of the San Joaquin River for 31 days during the April/May period. The NMFS BO limits the combined exports during all of April and May to a given percentage of the flow: 25% during above-normal and wet years to 100% in critical years. Finally, the previously mentioned flow requirements contained in the USFWS BO to protect delta smelt can also restrict exports during this time.

Figure 5-2 shows reductions in the values estimated for the 2011 Report during January through June and October through December that result from these restrictions. The period of July through September is the time when exports are less restricted. As a result—and to recover some of the water supply lost during the other months—the exports estimated for the 2011 Report for July–September are higher than those estimated for the 2005 Report.

Another factor described in Chapter 4, climate change, is expected to affect the Delta—and SWP exports from the Banks Pumping Plant—under future conditions. The effects of climate change on SWP operations have been factored into DWR's modeling for future conditions.

Estimated SWP Export Amounts—Existing Conditions and Future Conditions

This section provides estimates of average, maximum, and minimum annual Delta exports for both existing (2011) and future (2031) conditions. (Discussions of the assumptions used to develop both existing and future scenarios for this report are included in Chapters 6 and 7, respectively.) This section also summarizes SWP Delta exports by month and by water year type, demonstrating the effects of the USFWS and NMFS BOs and other factors influencing SWP Delta exports.

Average, Maximum, and Minimum Annual Delta Exports

Table 5-1 presents the estimated average, maximum, and minimum annual SWP Delta exports for the existing-conditions and future-conditions scenarios.

Table 5-1. Estimated Average, Maximum, and Minimum Annual SWP Exports (Existing and Future Conditions)

	Existing	Future
Average	2,607	2,521
Maximum	4,066	4,106
Minimum	876	810

Table 5-2. Average Estimated SWP Exports by Month (Existing and Future Conditions)

Month	Estimated SWP Exports (thousand acre-feet)		Difference, Existing vs. Future Conditions (thousand acre-feet and %)
	Existing	Future	
January	214	217	+4 (+2%)
February	228	217	-10 (-5%)
March	232	228	-5 (-2%)
April	60	65	+5 (+8%)
May	65	67	+2 (+4%)
June	145	131	-14 (-9%)
July	365	352	-12 (-3%)
August	316	311	-6 (-2%)
September	268	271	+3 (+1%)
October	223	186	-37 (-16%)
November	174	169	-5 (-3%)
December	317	305	-12 (-4%)

Exports by Month

Table 5-2, above, shows the average estimated SWP exports from the Delta by month under existing and future conditions. As shown in the table, in most months, the average estimated monthly SWP exports for future conditions are generally similar to or slightly lower than the estimated monthly exports for existing conditions. The most notable exceptions are in

April and May. Under both existing and future conditions, the values for those months are essentially the same, reflecting the regulations in place during that time of the year.

Figure 5-3 depicts the annual pattern of the monthly values for existing conditions as well as the maximum and minimum estimated exports for each month. The pattern and ranges of the monthly values under future conditions are very similar to those shown in Figure 5-3.

As shown in Figure 5-3 and Table 5-2, estimated SWP exports are highest on average in July, averaging 365 taf under existing conditions and 352 taf under future conditions. Exports are consistently lowest in April and May, averaging 60 taf in April and 65 taf in May for 2011, and 65 taf in April and 67 taf in May for 2031.

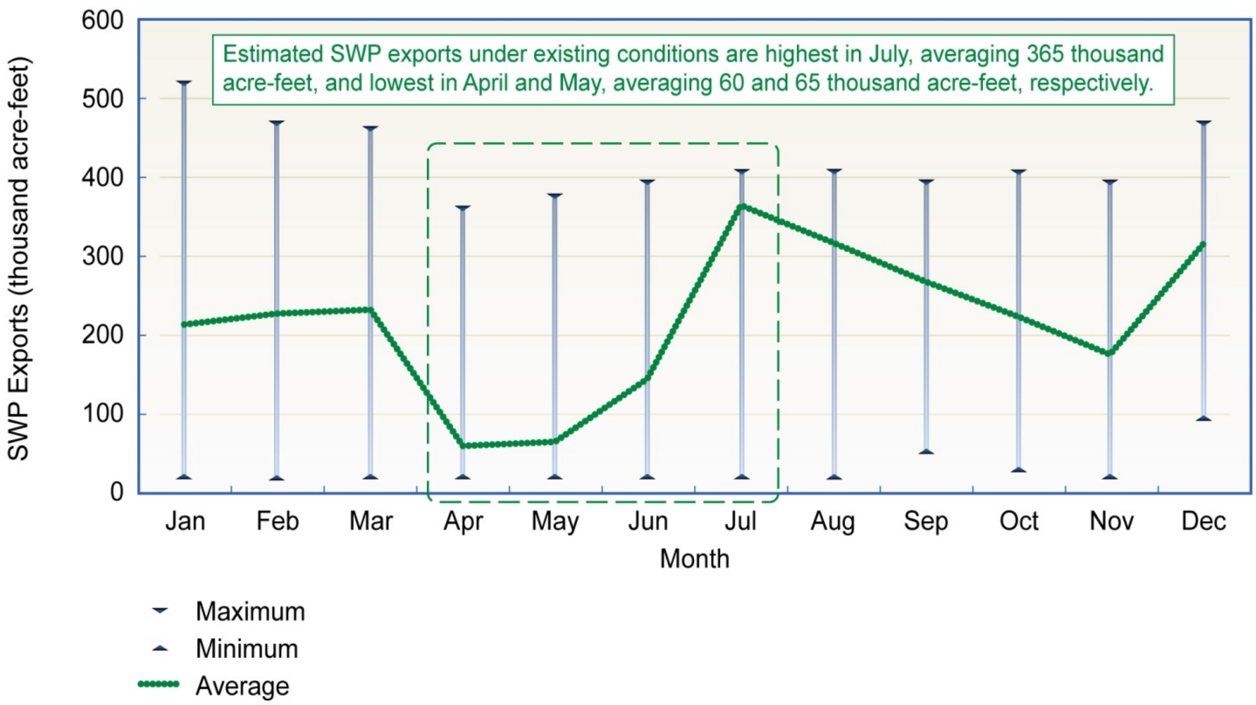


Figure 5-3. Monthly Range of Estimated SWP Exports (Existing Conditions)

Exports by Water Year Type

Tables 5-3 and 5-4 compare SWP exports by water year type under existing conditions and future conditions, as estimated for the 2009 Report and for this 2011 Report. As shown, the existing SWP exports estimated for this 2011 Report are very similar to the existing SWP exports estimated for the 2009 Report for most water year types. The same can be said of the values estimated for future conditions.

Table 5-3. Estimated SWP Exports by Water Year Type—Existing Conditions

Water Year Type	Estimated Existing SWP Exports (thousand acre-feet)	
	2009 Report	2011 Report
Wet	3,233	3,210
Above Normal	2,774	2,784
Below Normal	2,617	2,643
Dry	2,290	2,320
Critical	1,486	1,512
Average	*2,598*	*2,607*

Table 5-4. Estimated SWP Exports by Water Year Type—Future Conditions

Water Year Type	Estimated Future SWP Exports (thousand acre-feet)	
	2009 Report	2011 Report
Wet	3,196	3,182
Above Normal	2,734	2,753
Below Normal	2,557	2,556
Dry	2,173	2,120
Critical	1,526	1,414
Average	*2,550*	*2,521*

Likelihood of SWP Exports—Existing and Future Conditions

The estimated likelihood of a given level of SWP exports under existing conditions and under future conditions is presented in Figure 5-4. As shown in the figure, 4,106 taf is the largest export amount that was modeled for the 2011 Report.

As shown in Figure 5-4, in 79% of simulated cases for existing conditions, estimated SWP exports are between 2,000 and 3,500 taf/year. SWP exports of other amounts are less likely, with the next most likely export amount being between 1,000 and 1,500 taf/year.

Likewise, in about 76% of simulated cases for future conditions, estimated SWP exports are between 2,000 and 3,500 taf/year (Figure 5-4). SWP exports of other amounts are less likely, with the next most likely export amount again being between 1,000 and 1,500 taf/year.

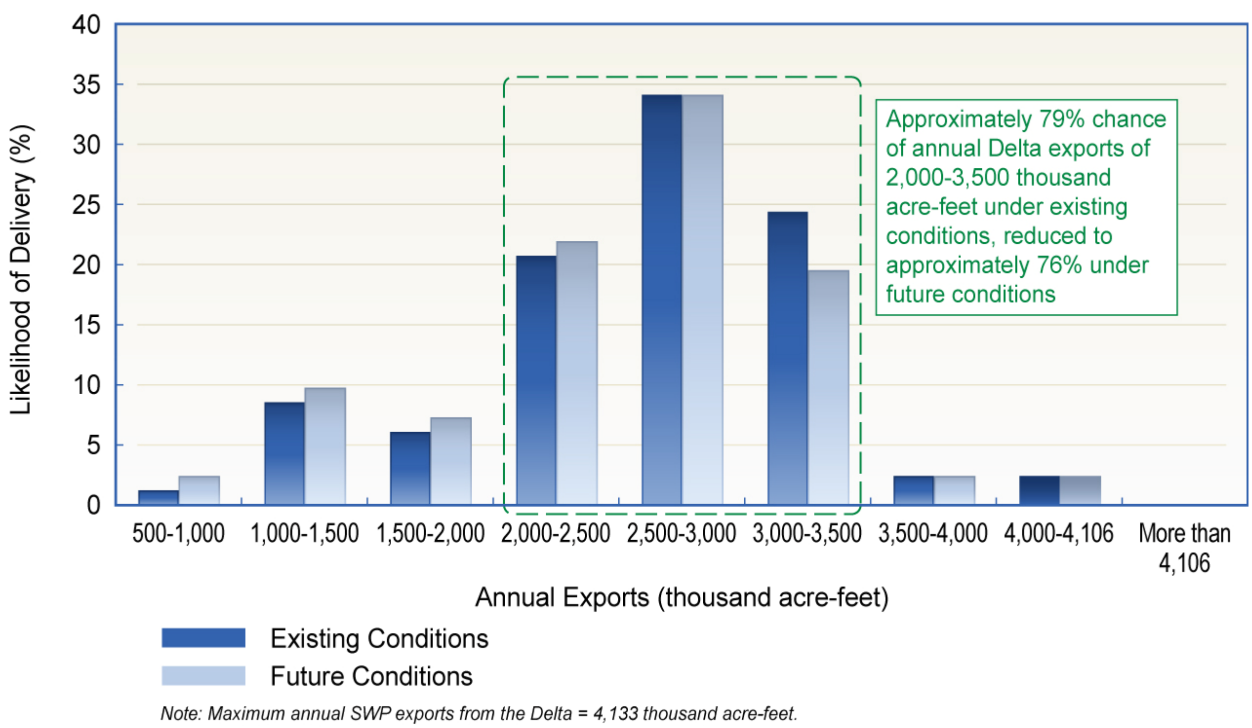


Figure 5-4. Estimated Likelihood of SWP Exports, by Increments of 500 Acre-Feet (under Existing and Future Conditions)

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Chapter 6

Existing SWP Water Delivery Reliability (2011)





This chapter presents estimates of the SWP's existing (2011) water delivery reliability. The estimates are presented below, alongside the reliability results obtained from the *State Water Project Delivery Reliability Report 2009* (2009 Report). Like this *State Water Project Delivery Reliability Report 2011* (2011 Report), the 2009 Report incorporated into its results the requirements of biological opinions issued by the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) in December 2008 and June 2009, respectively, on the effects of coordinated operations of the SWP and Central Valley Project. These BOs are discussed in detail in Chapter 2, "A Closer Look at the State Water Project," and Chapter 4, "Factors that Affect Water Delivery Reliability."

The discussions of SWP water delivery reliability in this chapter and Chapter 7 present the results of DWR's updated modeling of the SWP's water delivery reliability. A tabular summary of the modeling results is presented in the technical addendum to this report, which is available online at http://baydeltaoffice.water.ca.gov/. The technical addendum also contains curves of annual delivery probability (i.e., exceedence plots) to graphically show the estimated percentage of years in which a given annual delivery is equaled or exceeded.

Hydrologic Sequence

SWP delivery amounts are estimated in this 2011 Report for existing conditions using computer modeling that incorporates the historic range of hydrologic conditions (i.e., precipitation and runoff) that occurred from water years 1922 through 2003. The historic hydrologic conditions are adjusted to account for land-use changes (i.e., the current level of development) and upstream flow regulations that characterize 2011. By using this 82-year historical flow record, the delivery estimates modeled for existing conditions reflect a reasonable range of potential hydrologic conditions from wet years to critically dry years.

Existing Demand for Delta Water

Demand levels for the SWP water users in this report are derived from historical data and information from the SWP contractors themselves. The amount of water that SWP contractors request each year (i.e., demand) is related to:

- the magnitude and types of water demands,
- the extent of water conservation measures,
- local weather patterns, and
- water costs.

The existing level of development (i.e., the level of water use in the source areas from which the water supply originates) is based on recent land uses, and is assumed to be representative of existing conditions for the purposes of this 2011 Report.

SWP Table A Water Demands

The current combined maximum Table A amount is 4,172 thousand acre-feet per year (taf/year). See "'Table A' Water" in Chapter 3, "SWP Contractors and Water Contracts," for a full discussion of Table A, which is a table within each water supply contract. Of the combined maximum Table A amount, 4,133 taf/year is the SWP's maximum Table A water available for delivery from the Delta. The estimated demands by SWP contractors for deliveries of Table A water from the Delta under existing conditions, as determined for the 2011 Report and previously for the 2009 Report, are shown in Table 6-1. The estimated average demand for SWP Table A water is shown, along with maximum and minimum demands, because demands vary annually depending on local hydrologic patterns and other factors (e.g., demand management and the amount of water storage within the service area).

Table 6-1. Comparison of Estimated Average, Maximum, and Minimum Demands for SWP Table A Water (Existing Conditions)

	2009 Report	2011 Report
Average	3,711	3,722
Maximum	4,115	4,120
Minimum	3,007	3,043

As estimated for the 2011 Report, annual demands for SWP Table A water range between 3,043 taf and 4,120 taf under existing conditions, with an average demand of 3,722 taf. There is a 95% likelihood that more than 3,200 taf/year will be requested (i.e., demanded) for delivery under existing conditions. The estimated maximum SWP Table A water demand in the 2011 Report is very near the maximum possible Table A water delivery amount of 4,133 taf/year; however, the average annual demand of 3,722 taf is approximately 400 taf less than the possible maximum annual delivery.

Figure 6-1 shows that estimated annual demands for deliveries of SWP Table A water, as calculated for the 2009 and 2011 Reports, are essentially the same. Demands calculated for both reports range between 3,000 and 4,120 taf/year, regardless of whether a year is critical, wet, or anywhere in between.

SWP Article 21 Water Demands

Under Article 21 of the SWP's long-term water supply contracts, contractors may receive additional water deliveries only under the following specific conditions:

- such deliveries do not interfere with SWP Table A allocations and SWP operations;
- excess water is available in the Delta;
- capacity is not being used for SWP purposes or scheduled SWP deliveries; and
- contractors can use the SWP Article 21 water directly or can store it in their own system (i.e., the water cannot be stored in the SWP system).

The demand for SWP Article 21 water by SWP contractors is assumed to vary depending on the month and weather conditions (i.e., amounts of precipitation and runoff). For the purposes of this discussion of SWP Article 21 water demands, a Kern wet year is defined as a year when the annual Kern River flow is projected to be greater than 1,500 taf. Kern River inflows are significant

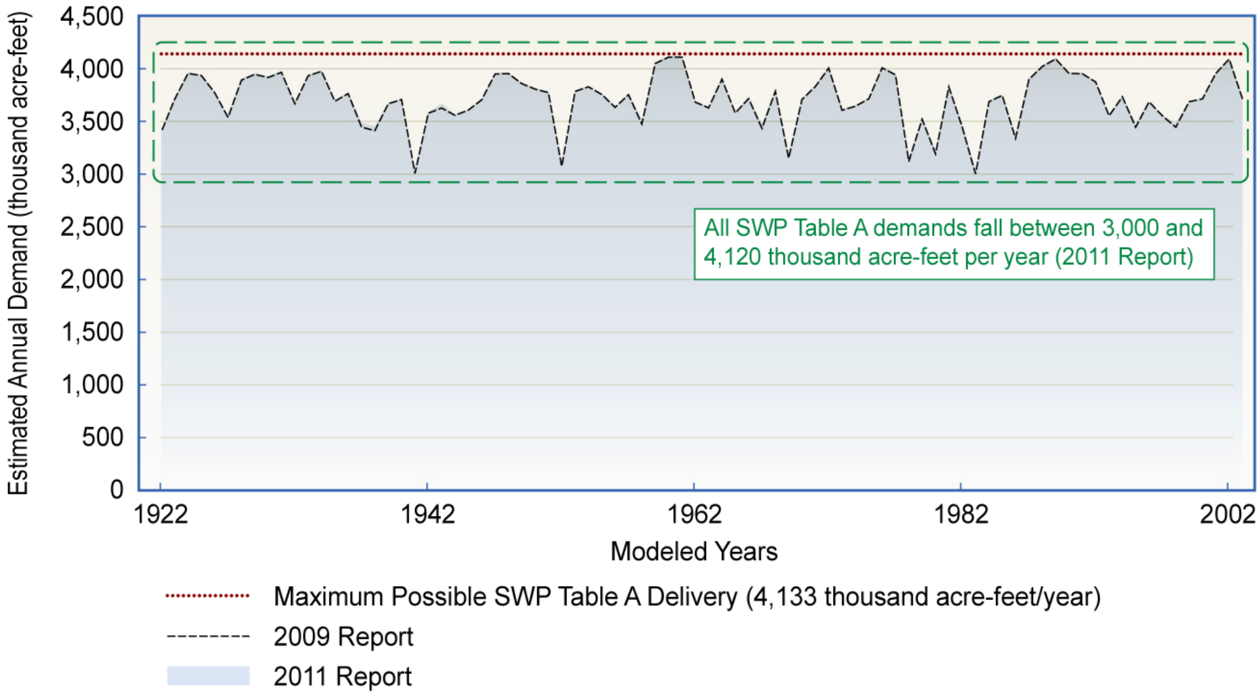


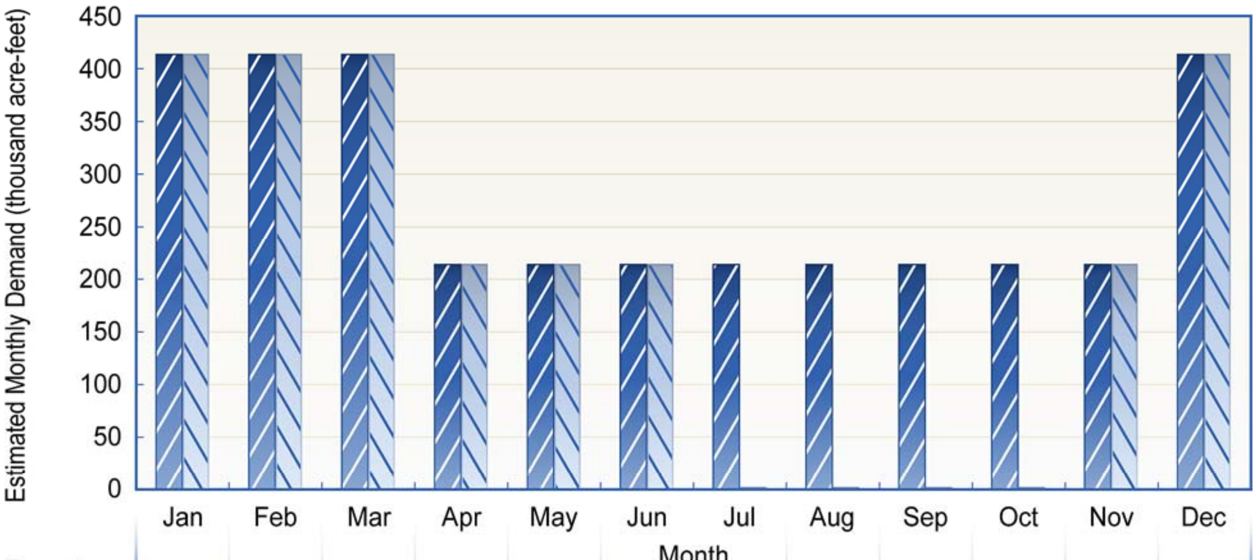
Figure 6-1. Comparison of Estimated Demands for SWP Table A Water on an Annual Basis, Using 82 Years of Hydrology (Existing Conditions)

because they are a major local water supply component for the Kern County Water Agency, which is the second largest SWP contractor and possesses significant local groundwater recharge capability. Using Kern River flows to recharge their groundwater storage significantly reduces their demand for Article 21 supply.

As shown in Figures 6-2 and 6-3, existing demands for SWP Article 21 water estimated for this 2011 Report are assumed to be high during the spring and late fall in non–Kern wet years (214 taf/month), as well as during the winter months of December through March in all weather year types (202 taf in Kern wet years and 414 taf in other years). Demands for SWP Article 21 water are assumed to be very low (2 taf/month) from April through November of Kern wet years and from July through October of other years.

Relative to levels of demand for SWP Article 21 water presented in the 2009 Report for existing conditions, the monthly existing-conditions demands for Article 21 water are 212 taf lower from July through October in normal weather years. This reduction in demand occurs because the modeling was revised for the 2011 Report to assume that only SWP contractors receiving water from the North Bay Aqueduct will have SWP Article 21 water demands during those months. A second revision to the modeling assumptions relative to the 2009 Report resulted in the addition of a year-round demand for 2 taf/month through the North Bay Aqueduct in 2011 during wet weather years.

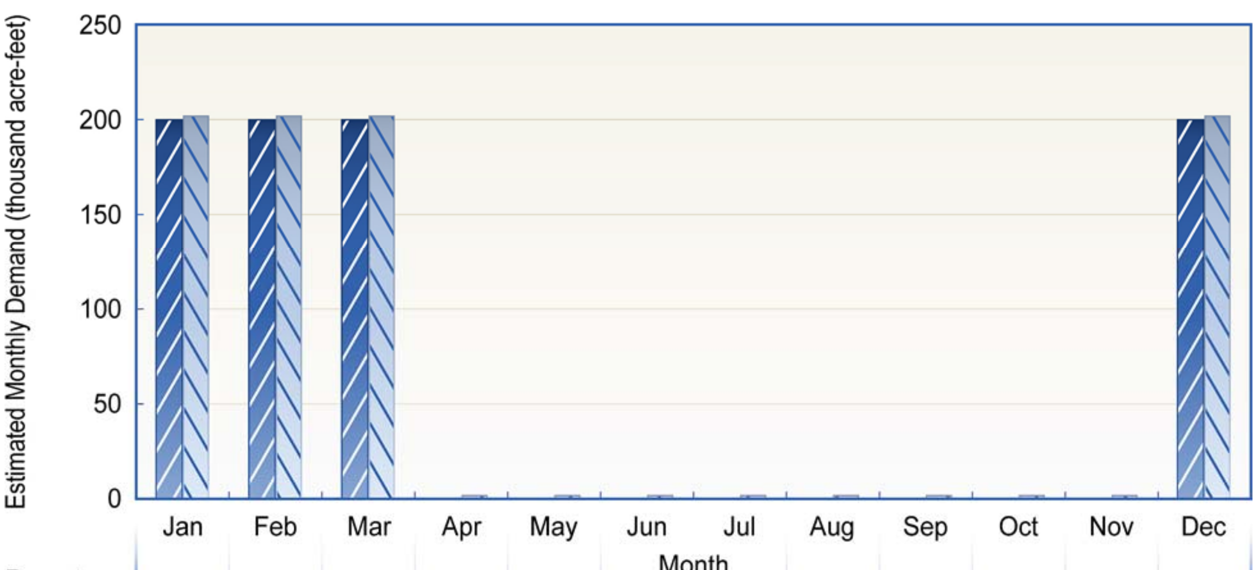
The estimated reduction in existing-conditions demand for SWP Article 21 water in this 2011 Report relative to the 2009 Report is the result of discussions with DWR's Operations and Maintenance staff and State Water Contractors staff, and it represents their best estimates of current practices. The SWP Article 21 water demands used in the 2009 Report, on the other



Report:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2009	414	414	414	214	214	214	214	214	214	214	214	414
2011	414	414	414	214	214	214	2	2	2	2	214	414

Figure note: Values shown are the maximum amount that can be delivered monthly. However, the actual capability of SWP water contractors to take this amount of SWP Article 21 water is not the sum of these maximum monthly values.

Figure 6-2. Estimated Demands for SWP Article 21 Water in Years When Kern River Flow is Less than 1,500 Thousand Acre-Feet (Existing Conditions)



Report:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2009	200	200	200	0	0	0	0	0	0	0	0	200
2011	202	202	202	2	2	2	2	2	2	2	2	202

Figure note: Values shown are the maximum amount that can be delivered monthly. However, the actual capability of SWP water contractors to take this amount of SWP Article 21 is not the sum of these maximum monthly values.

Figure 6-3. Estimated Demands for SWP Article 21 Water in Years When Kern River Flow is Greater than 1,500 Thousand Acre-Feet (Existing Conditions) hand, match the demands assumed in the studies conducted for the 2008 USFWS BO and 2009 NMFS BO, and those demands capture the upper boundary of the potential impact of SWP Article 21 exports on the Delta ecosystem. This assumption reflects a condition in which SWP contractors are able to use essentially any available SWP Article 21 water when capacity for moving that water exists in the SWP delivery system.

Estimates of SWP Table A Water Deliveries

Table 6-2 presents the annual average, maximum, and minimum estimates of SWP Table A deliveries from the Delta for existing conditions, as calculated for the 2009 and 2011 Reports. The Table A deliveries are similar between the 2009 and 2011 Reports. Assumptions about Table A and Article 21 water demands, along with operations for carryover water, have been updated in the model based on discussions with State Water Contractors staff and DWR's Operations and Control Office.

Table 6-2. Comparison of Estimated Average, Maximum, and Minimum Deliveries of SWP Table A Water (Existing Conditions, in Thousand Acre-Feet per Year)

	2009 Report	2011 Report
Average	2,483	2,524
Maximum	3,338	3,365
Minimum	301	380

The estimated likelihood of delivery of a given amount of SWP Table A water under the existing conditions scenario, as estimated for both the 2009 and 2011 Reports, is presented in Figure 6-4. Figure 6-4 shows that the likelihood that 2,000–3,365 taf/year of Table A water will be delivered is now 82%. There is a 48% likelihood that 2,500–3,000 taf of Table A water will be delivered, a 5% likelihood of delivery of less than 1,000 taf, and 0% likelihood of delivery of more than 3,365 taf in a given year. To compare the results estimated for this 2011 Report with results from the 2009 Report, an SWP contractor is just slightly more likely to receive a larger Table A water delivery under the current estimates.

Dry-Year Deliveries of SWP Table A Water

Table 6-3 displays estimates of SWP Table A water deliveries under existing conditions during possible drought conditions and compares them with the corresponding delivery estimates calculated for the 2009 Report. Droughts are analyzed using the historical drought-period precipitation and runoff patterns from 1922 through 2003 as a reference, although existing 2011 conditions (e.g., land use, water infrastructure) are also accounted for in the modeling. For reference, the worst multiyear drought on record was the 1929–1934 drought, although the brief drought of 1976–1977 was more intensely dry.

The results of modeling existing conditions for potential drought-year scenarios indicate that SWP Table A water deliveries during dry years can be expected to range from between 380 and 1,573 taf/year.

Wet-Year Deliveries of SWP Table A Water

Table 6-4 presents estimates of SWP Table A water deliveries under existing conditions during possible wet conditions and compares them with corresponding delivery estimates calculated for the 2009 Report. Wet periods for 2011 are analyzed using historical precipitation and runoff patterns from 1922–2003 as a reference, while accounting for existing 2011 conditions (e.g., land use, water infrastructure). For reference, the wettest single year on record was 1983.

The results of modeling existing conditions for potential wet periods indicate that estimated SWP Table A water deliveries during wet years can be expected to range between 2,833 and 2,958 taf/year.

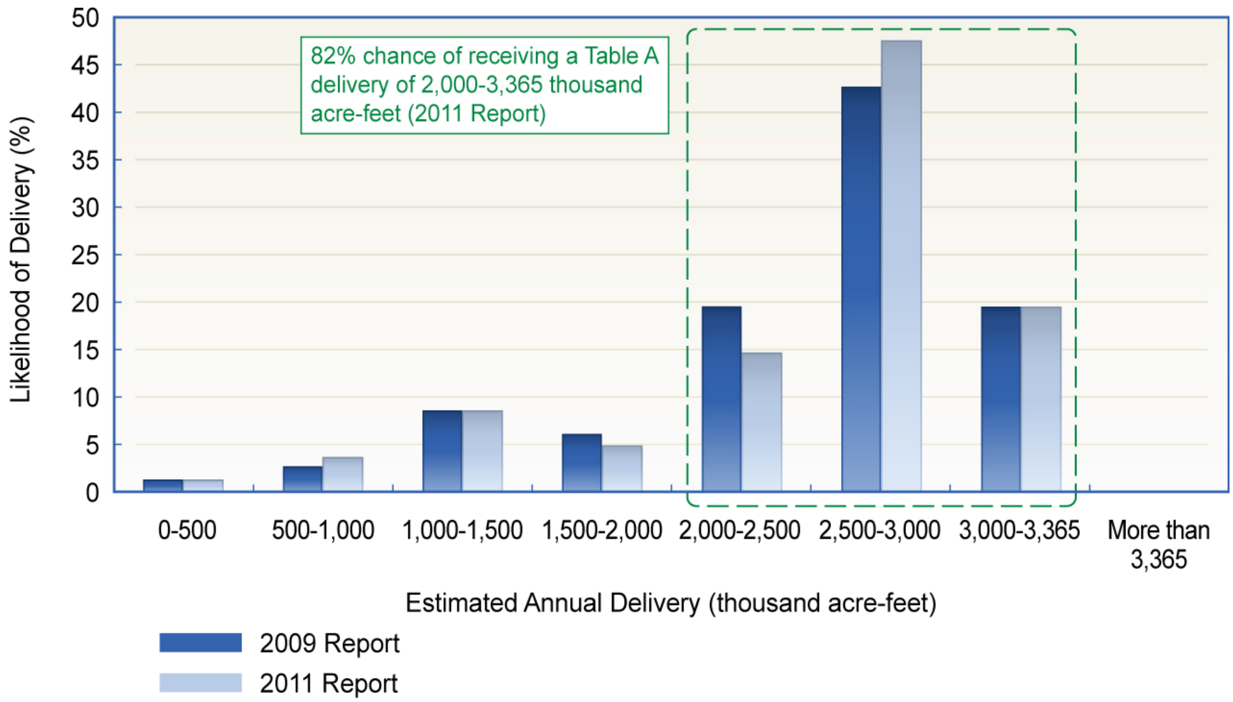


Figure 6-4. Estimated Likelihood of SWP Table A Water Deliveries (Existing Conditions)

Table 6-3. Estimated Average and Dry-Period Deliveries of SWP Table A Water (Existing Conditions), in Thousand Acre-Feet (Percent of Maximum SWP Table A Amount, 4,133 taf/year)

	Long-term Average	Single Dry Year (1977)	2-Year Drought (1976–1977)	4- Year Drought (1931–1934)	6-Year Drought (1987–1992)	6-Year Drought (1929–1934)
2009 Report	2,483 (60%)	302 (7%)	1,496 (36%)	1,402 (34%)	1,444 (35%)	1,398 (34%)
2011 Report	2,524 (61%)	380 (9%)	1,573 (38%)	1,454 (35%)	1,462 (35%)	1,433 (35%)

Table 6-4. Estimated Average and Wet-Period Deliveries of SWP Table A Water (Existing Conditions), in Thousand Acre-Feet (Percent of Maximum SWP Table A Amount, 4,133 taf/year)

	Long-term Average	Single Wet Year (1983)	2-Year Wet (1982–1983)	4-Year Wet (1980–1983)	6-Year Wet (1978–1983)	10-Year Wet (1978–1987)
2009 Report	2,483 (60%)	2,813 (68%)	2,935 (71%)	2,817 (68%)	2,817 (68%)	2,872 (67%)
2011 Report	2,524 (61%)	2,886 (70%)	2,958 (72%)	2,872 (69%)	2,873 (70%)	2,833 (69%)

Estimates of SWP Article 21 Water Deliveries

SWP water delivery is a combination of deliveries of Table A water and Article 21 water. Some SWP contractors store Article 21 water locally when extra water and capacity are available beyond that needed by normal SWP operations. Deliveries of SWP Article 21 water vary not only by year, but also by month. In the summer and early fall months (July through October), a maximum of 1 taf can be delivered. From November through June, maximum deliveries of SWP Article 21 water can be as high as 299 taf and as low as approximately 80 taf in a given month; however, water deliveries average in the range of 0–30 taf. The estimated range of monthly deliveries of SWP Article 21 water is displayed in Figure 6-5.

The estimated likelihood that a given amount of SWP Article 21 water will be delivered is presented in Figure 6-6. There is a 26% likelihood that more than 20 taf/year of SWP Article 21 water will be delivered under existing conditions. There is a 74% likelihood that less than 20 taf/year of SWP Article 21 water will be delivered.

Dry-Year Deliveries of SWP Article 21 Water

Although deliveries of SWP Article 21 water are smaller during dry years than during wet ones, opportunities exist to deliver SWP Article 21 water during multiyear drought periods. Deliveries in dry years are shown to often be small (less than 5 taf); however, longer drought periods can include several years that support Article 21 deliveries. Annual average Article 21 estimates for drought periods of 4 and 6 years vary significantly and can approach or exceed the average annual estimate, as shown in Table 6-5.

Wet-Year Deliveries of SWP Article 21 Water

Table 6-6 shows the estimates of deliveries of SWP Article 21 water during wet periods under existing conditions. Estimated deliveries in wet years are approximately 1.75 to seven times larger than the average delivery of SWP Article 21 water.

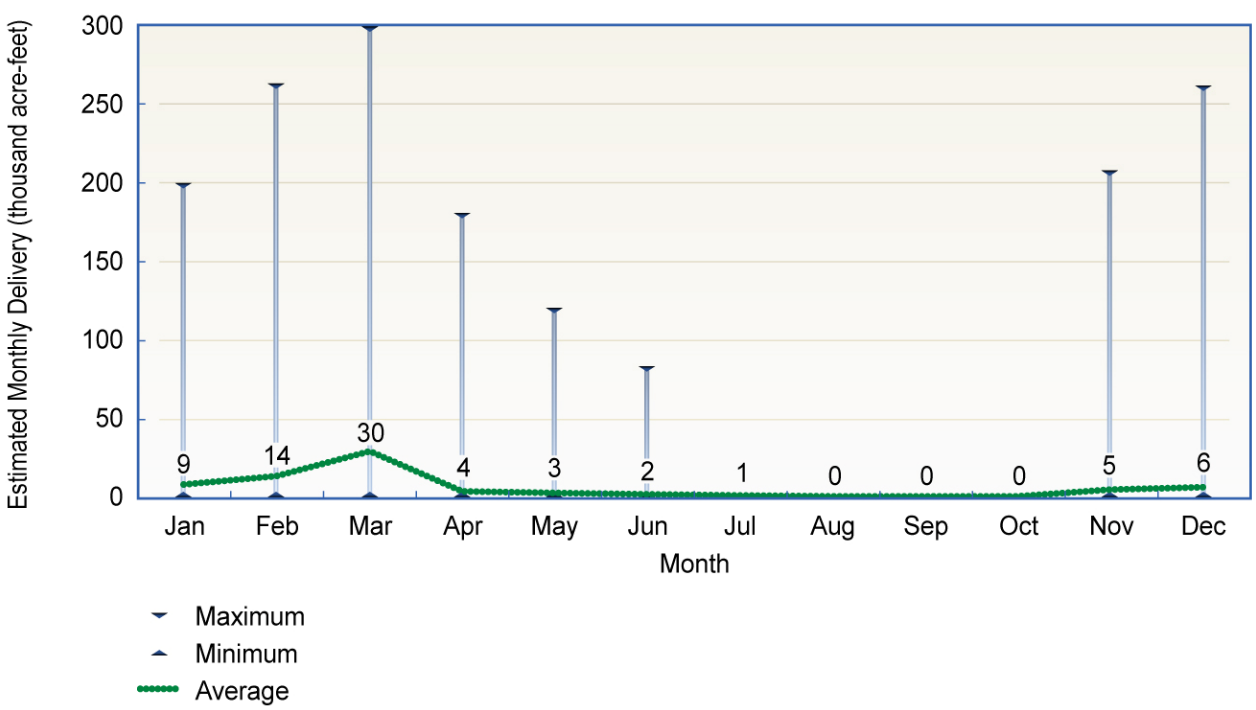


Figure 6-5. Estimated Range of Monthly Deliveries of SWP Article 21 Water (2011 Report—Existing Conditions)

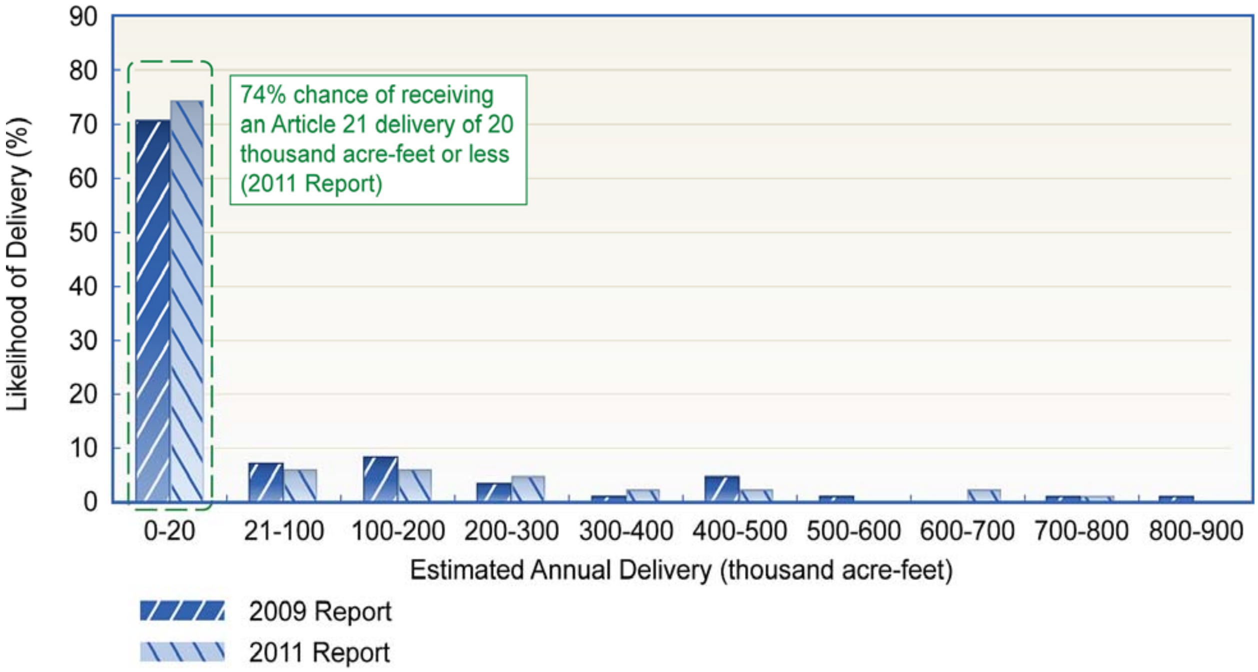


Figure 6-6. Estimated Probability of Annual Deliveries of SWP Article 21 Water (Existing Conditions)

Table 6-5. Estimated Average and Dry-Period Deliveries of SWP Article 21 Water (Existing Conditions, in Thousand Acre-Feet per Year)

	Long-term Average	Single Dry Year (1977)	2-Year Drought (1976-1977)	4- Year Drought (1931-1934)	6-Year Drought (1987-1992)	6-Year Drought (1929-1934)
2009 Report	85	2	6	142	10	98
2011 Report	76	3	5	69	9	49

Table 6-6. Estimated Average and Wet-Period Deliveries of SWP Article 21 Water (Existing Conditions, in Thousand Acre-Feet per Year)

	Long-term Average	Single Wet Year (1983)	2-Year Wet (1982-1983)	4-Year Wet (1980-1983)	6-Year Wet (1978-1983)	10-Year Wet (1978-1987)
2009 Report	85	853	659	379	273	230
2011 Report	76	608	533	307	225	207

Chapter 7

Future SWP Water Delivery Reliability (2031)

This chapter presents estimates of the SWP's delivery reliability for conditions 20 years in the future (2031). These estimates reflect hydrologic changes that could result from climate change, but they incorporate the same requirements that are assumed under existing conditions, including the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) biological opinions (BOs).

This chapter also compares these estimates of future conditions with the future-condition results presented in the *State Water Project Delivery Reliability Report 2009* (2009 Report) for the year 2029.

For consistency with previous reports, a tabular summary of the modeling results for the future conditions scenario is presented in the technical addendum to this report. The technical addendum also contains curves of annual delivery probability (i.e., exceedence plots) to graphically show the estimated percentage of years in which a given annual delivery is equaled or exceeded.

Future Demand for Delta Water

Demand levels for the SWP water users in this report are derived from historical data and information from the SWP contractors themselves. The 2031 level of development (i.e., the level of water use in the source areas from which the water supply originates) is based on the projected assumptions for land use for that year, and is assumed to be representative of future conditions for the purposes of this 2011 Report.

SWP Table A Water Demands

Future demands for SWP Table A water, as calculated for this 2011 Report, are assumed to be the maximum possible annual amount of 4,133 thousand acre-feet (taf). There is no assumed variation in demand as a result of different annual precipitation and runoff conditions; it is assumed that by 2031, the maximum amount of SWP Table A water will be requested every year. As a reminder, 4,133 taf/year is the maximum Delta SWP Table A amount.

The SWP Table A water demands under future conditions as presented in the 2009 Report are also assumed to be the maximum amount of 4,133 taf/year.

SWP Article 21 Water Demands

The assumed future demands for SWP Article 21 water are the same as those assumed for existing conditions (see Chapter 6, "Existing SWP Water Delivery Reliability [2011]").

Estimates of Future SWP Deliveries

When modeling water supply deliveries 20 years in the future, the unknowns are considerable and many assumptions must be made. As was assumed for existing conditions (see Chapter 6), modeling of SWP deliveries for 2031 take into account current Delta water quality regulations and the requirements of the USFWS and NMFS BOs. Climate change as well as changes to water uses in the upstream watersheds (i.e., source watersheds) are also taken into account when modeling water supply deliveries under future conditions. Additional discussion of how the modeling of SWP water delivery reliability is adjusted to account for climate change is provided in Chapter 4, "Factors that Affect Water Delivery Reliability."

One of the most important assumptions when modeling SWP water delivery under future conditions is that the rules and facilities related to Delta conveyance will remain at the status quo. That is, in the future-conditions scenario, no new facilities to convey water through or around the Delta are assumed to be in place because no new programs have been sufficiently developed that can be assumed with certainty.

Future Deliveries of SWP Table A Water

Table 7-1 presents the annual average, maximum, and minimum estimates of SWP Table A water deliveries from the Delta for future conditions, as calculated for the 2009 and 2011 Reports. The SWP Table A water deliveries under future conditions are similar between the 2009 and 2011 Reports. The maximum possible delivery of SWP Table A water, 4,133 taf/year, is not reached under future conditions.

Table 7-1. Comparison of Estimated Average, Maximum, and Minimum Deliveries of SWP Table A Water (Future Conditions, in Thousand Acre-Feet per Year)

	2009 Report	2011 Report
Average	2487	2,466
Maximum	3,999	4,063
Minimum	458	443

The estimated likelihood that a given amount of SWP Table A water will be delivered under future conditions is presented in Figure 7-1. Currently, there is a 70% likelihood that 2,000–3,500 taf of SWP Table A water will be delivered under the future-conditions scenario. There is a 17% likelihood of an SWP Table A water delivery of 1,000–2,000 taf, a 7% likelihood of less than 1,000 taf, and a 6% likelihood of more than 3,500 taf. In general, the estimates of the likelihood that an SWP contractor will receive a specific amount of SWP Table A water under future conditions, as presented in the 2009 and 2011 Reports, are very similar.

Dry-Year Deliveries of SWP Table A Water under Future Conditions

Table 7-2 presents estimates of future SWP Table A water deliveries during possible drought conditions and compares them with the corresponding delivery estimates calculated for the 2009 Report. Drought scenarios for future conditions in this 2011 Report are analyzed using the historical drought-period precipitation and runoff patterns from 1922–2003 as a reference, while accounting for future 2031 conditions (e.g., land use, climate change).

The results of modeling future conditions under potential drought-year scenarios indicate that estimated dry-year SWP deliveries can be expected to range between 443 and 1,457 taf/year.

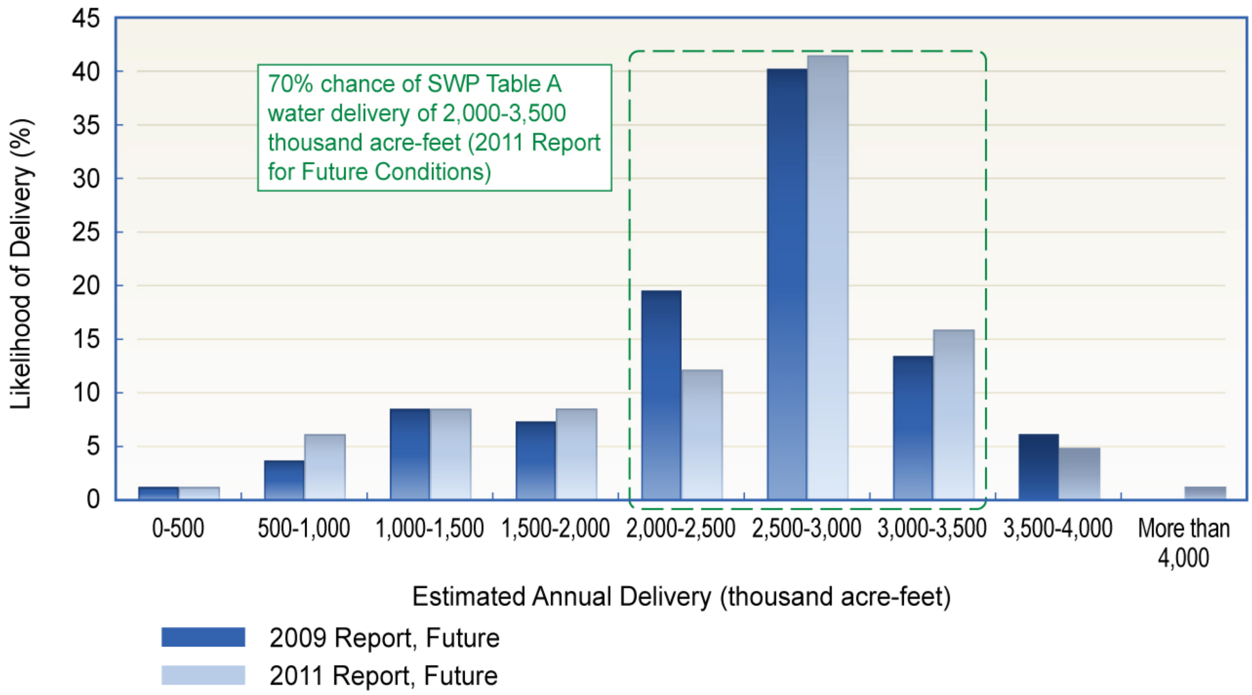


Figure 7-1. Estimated Likelihood of SWP Table A Water Deliveries, by Increments of 500 Thousand Acre-Feet (Future Conditions)

Table 7-2. Estimated Average and Dry-Period Deliveries of SWP Table A Water (Future Conditions), in Thousand Acre-Feet (Percent of Maximum SWP Table A Amount, 4,133 taf/year)

	Long-term Average	Single Dry Year (1977)	2-Year Drought (1976–1977)	4- Year Drought (1931–1934)	6-Year Drought (1987–1992)	6-Year Drought (1929–1934)
2009 Report	2,487 (60%)	458 (11%)	1,570 (38%)	1,431 (35%)	1,308 (32%)	1,480 (36%)
2011 Report	2,466 (60%)	443 (11%)	1,457 (35%)	1,401 (34%)	1,227 (30%)	1,366 (33%)

Wet-Year Deliveries of SWP Table A Water under Future Conditions

Table 7-3 presents estimates of future SWP Table A water deliveries during a wet year and compares them with the corresponding delivery estimates calculated for the 2009 Report. Wet periods were modeled for this 2011 Report using historical precipitation and runoff patterns from 1922–2003 as a reference and accounting for 2031 future conditions such as land use and climate change.

The results of modeling future conditions for potential wet periods indicate that estimated SWP Table A water deliveries during wet years can be expected to range between 2,972 and 4,063 taf/year.

SWP Article 21 Water Deliveries under Future Conditions

Estimated deliveries of SWP Article 21 water under future conditions vary not only by year, depending on the precipitation and runoff, but also by month. In the spring, summer, and early fall months (May through October), deliveries of SWP Article 21 water under future conditions are estimated to be low, with a maximum of approximately 10 taf/month and a minimum of 0 taf/month. From November through April, maximum estimated future deliveries of SWP

Table 7-3. Estimated Average and Wet-Period Deliveries of SWP Table A Water (Future Conditions), in Thousand Acre-Feet (Percent of Maximum SWP Table A Amount, 4,133 taf/year)						
	Long-term Average	Single Wet Year (1983)	2-Year Wet (1982–1983)	4-Year Wet (1980–1983)	6-Year Wet (1978–1983)	10-Year Wet (1978–1987)
2009 Report	2,487 (60%)	3,990 (97%)	3,843 (93%)	3,401 (82%)	3,250 (79%)	2,975 (72%)
2011 Report	2,466 (60%)	4,063 (98%)	3,908 (95%)	3,396 (82%)	3,248 (79%)	2,972 (72%)

Article 21 water can be as high as 251 taf and as low as 50 taf in a given month; however, water deliveries average in the range of 2–22 taf. The estimated range of monthly deliveries of SWP Article 21 water is displayed in Figure 7-2.

The estimated likelihood that a given amount of SWP Article 21 water will be delivered under future conditions is presented in Figure 7-3. Currently, there is a 22% likelihood that more than 20 taf/year of SWP Article 21 water will be delivered under future conditions, and a 78% likelihood that 20 taf/year or less will be delivered.

In both the 2009 and 2011 Reports, estimated deliveries of SWP Article 21 water under future conditions are generally 20 taf/year or less (72% and 78% likelihood, respectively).

Dry-Year Deliveries of SWP Article 21 Water under Future Conditions

Table 7-4 shows the estimates of future deliveries of SWP Article 21 water during dry periods. The results of modeling future conditions for potential drought scenarios indicate that deliveries of SWP Article 21 water during dry years can be expected to range between 4 and 50 taf/year. This is a 0% to 92% decrease in Article 21 water deliveries from the average estimated future-conditions delivery calculated for this report. Although drought-period deliveries are typically less than deliveries in average years, Table 7-4 shows that opportunities to deliver SWP Article 21 water exist during multiyear drought periods.

Wet-Year Deliveries of SWP Article 21 Water under Future Conditions

Table 7-5 shows the estimates of deliveries of SWP Article 21 water during wet periods under future conditions. The results of modeling future conditions for potential wet periods indicate that wet-year SWP deliveries can be expected to range between 83 and 291 taf. This is a 66% to 483% increase in deliveries of SWP Article 21 water from the average estimated future-conditions delivery calculated for this report.

Table 7-4. Estimated Average and Dry-Period Deliveries of SWP Article 21 Water (Future Conditions, in Thousand Acre-Feet per year)						
	Long-term Average	Single Dry Year (1977)	2-Year Drought (1976–1977)	4- Year Drought (1931–1934)	6-Year Drought (1987–1992)	6-Year Drought (1929–1934)
2009 Report	60	3	7	169	27	142
2011 Report	50	4	7	50	10	37

Table 7-5. Estimated Average and Wet-Period Deliveries of SWP Article 21 Water (Future Conditions, in Thousand Acre-Feet per year)						
	Long-term Average	Single Wet Year (1983)	2-Year Wet (1982–1983)	4-Year Wet (1980–1983)	6-Year Wet (1978–1983)	10-Year Wet (1978–1987)
2009 Report	60	509	306	165	123	139
2011 Report	50	291	190	120	83	122

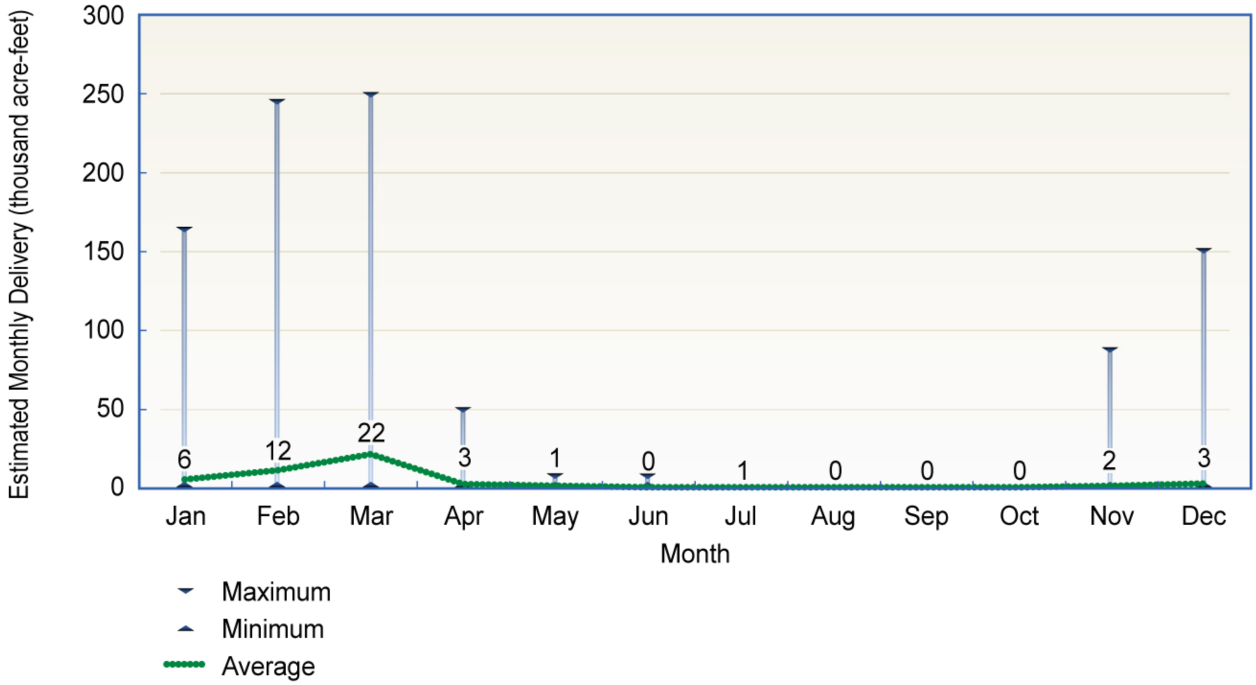


Figure 7-2. Estimated Range of Monthly Deliveries of SWP Article 21 Water (2011 Report—Future Conditions)

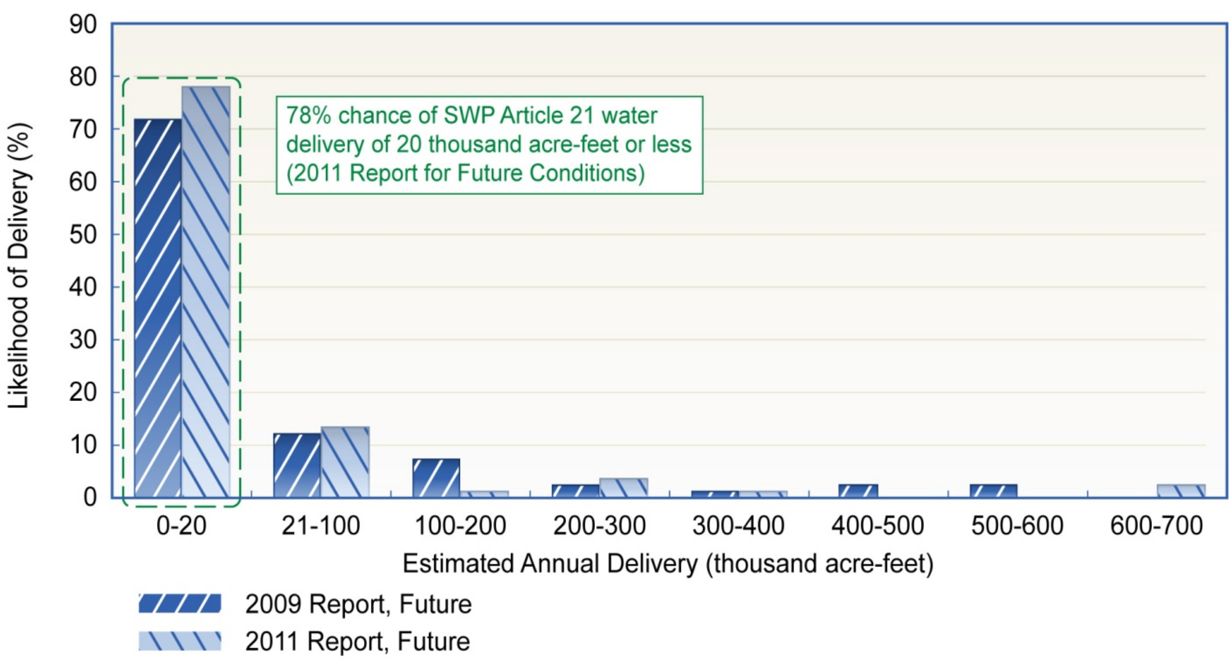


Figure 7-3. Estimated Probability of Annual Deliveries of SWP Article 21 Water (Future Conditions)

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Glossary

acre-foot The volume of water (about 325,900 gallons) that would cover an area of 1 acre to a depth of 1 foot. This is enough water to meet the annual needs of one to two households.

agricultural water supplier As defined by the California Water Code, a public or private supplier that provides water to 2,000 or more irrigated acres per year for agricultural purposes or serves 2,000 or more acres of agricultural land. This can be a water district that directly supplies water to farmers or a contractor that sells water to the water district.

annual Delta exports The total amount of water transferred ("exported") to areas south of the Delta through the Harvey O. Banks Pumping Plant (SWP) and the C. W. "Bill" Jones Pumping Plant (CVP) in 1 year.

appropriative water rights Rights allowing a user to divert surface water for beneficial use. The user must first have obtained a permit from the State Water Resources Control Board, unless the appropriative water right predates 1914.

Article 21 water Water that a contractor can receive in addition to its allocated Table A water. This water is only available if several conditions are met: (1) excess water is flowing through the Delta; (2) the contractor can use the surplus water or store it in the contractor's own system; and (3) delivering this water will not interfere with Table A allocations, other SWP deliveries, or SWP operations.

biological opinion A determination by the U.S. Fish and Wildlife Service or National Marine Fisheries Service on whether a proposed federal action is likely to jeopardize the continued existence of a threatened or endangered species or result in the destruction or adverse modification of designated "critical habitat." If jeopardy is determined, certain actions are required to be taken to protect the species of concern.

CALSIM II A computer model, jointly developed by DWR and the U.S. Bureau of Reclamation, that simulates existing and future operations of the SWP and CVP. The hydrology used by this model was developed by adjusting the historical flow record (1922–2003) to account for the influence of changes in land uses and regulation of upstream flows.


Among the SWP's facilities are more than 700 miles of canals that distribute water to urban and agricultural water suppliers in Northern California, the San Francisco Bay Area, the San Joaquin Valley, the Central Coast, and Southern California.

carryover deliveries See "carryover water."

carryover water A water supply "savings account" for SWP water that is allocated to an SWP contractor in a given year, but not used by the end of the year. Carryover water is stored in the SWP's share of San Luis Reservoir, when space is available, for the contractor to use in the following year.

Central Valley Project (CVP) Operated by the U.S. Bureau of Reclamation, the CVP is a water storage and delivery system consisting of 20 dams and reservoirs (including Shasta, Folsom, and New Melones Reservoirs), 11 power plants, and 500 miles of major canals. CVP facilities reach some 400 miles from Redding to Bakersfield and deliver about 7 million acre-feet of water for agricultural, urban, and wildlife use.

cubic feet per second (cfs) A measure of the rate at which a river of stream is flowing. The flow is 1 cfs if a cubic foot (about 7.48 gallons) of water passes a specific point in 1 second. A flow of 1 cubic foot per second for a day is approximately 2 acre-feet.

Delta exports Water transferred ("exported") to areas south of the Delta through the Harvey O. Banks Pumping Plant (SWP) and the C. W. "Bill" Jones Pumping Plant (CVP). The SWP's Delta exports are the primary component of total SWP deliveries.

Delta inflow The combined total of water flowing into the Delta from the Sacramento River, San Joaquin River, and other rivers and waterways.

exceedence curve For the SWP, a chart showing SWP delivery probability (especially for Table A water)—specifically, the likelihood that SWP contractors will receive a certain volume of water under current or future conditions.

existing-conditions scenario For the SWP delivery reliability reports, the results of modeling for SWP Delta exports or deliveries for the year the report was written.

future-conditions scenario For the SWP delivery reliability reports, the results of modeling for SWP Delta exports or SWP deliveries for 20 years into the future.

incidental take permit A permit issued by the U.S. Fish and Wildlife Service, under Section 10 of the federal Endangered Species Act, to private nonfederal entities undertaking otherwise lawful projects that might result in the "take" of an endangered or threatened species. In California, take may be authorized under Section 2081 of the California Fish and Game Code through issuance of either an incidental take permit or a consistency determination. The California Department of Fish and Game is authorized to accept a federal biological opinion as the take authorization for a State-listed species when a species is listed under both the federal and California Endangered Species Acts.

riparian water rights Water rights that apply to lands traversed by or bordering on a natural watercourse. No permit is required to use this water, which must be used on riparian (adjacent) land and cannot be stored for later use.

State Water Project (SWP) Operated by DWR, a water storage and delivery system of 33 storage facilities, 701 miles of open canals and pipelines, five hydroelectric power plants, and 20 pumping plants that extends for more than 600 miles in California. Its main purpose is to store and distribute water to 29 urban and agricultural water suppliers in Northern California, the San Francisco Bay Area, the San Joaquin Valley, the Central Coast, and Southern California. The SWP provides supplemental water to approximately 25 million Californians (two-thirds of California's population) and about 750,000 acres of irrigated farmland. Water deliveries have ranged from 1.4 million acre-feet in a dry year to more than 4.0 million acre-feet in a wet year.

SWP contractors Twenty-nine entities that receive water for agricultural or municipal and industrial uses through the SWP. Each contractor has executed a long-term water supply contract with DWR. Also sometimes referred to as "State Water Contractors."

Table A water (Table A amounts) The maximum amount of SWP water that the State agreed to make available to an SWP contractor for delivery during the year. Table A amounts determine the maximum water a contractor may request each year from DWR. The State and SWP contractors also use Table A amounts to serve as a basis for allocation of some SWP costs among the contractors.

turnback pool water Allocated water that individual SWP contractors may offer early in the year for other SWP contractors to buy later at a set price.

urban water supplier As defined by the California Water Code, a public or private supplier that provides water for municipal use directly or indirectly to more than 3,000 customers or supplies more than 3,000 acre-feet of water in a year. This can be a water district that provides the water to local residents for use at home or work, or a contractor that distributes or sells water to that water district.

Water Rights Decision 1641 (D-1641) A regulatory decision issued by the State Water Resources Control Board in 1999 (updated in 2000) to implement the 1995 *Water Quality Control Plan for the San Francisco Bay/Sacramento–San Joaquin Delta*. D-1641 assigned primary responsibility for meeting many of the Delta's water quality objectives to the SWP and CVP, thus placing certain limits on SWP and CVP operations.

water year In reports on surface water supply, the period extending from October 1 through September 30 of the following calendar year. The water year refers to the September year. For example, October 1, 2010, through September 30, 2011 is the 2011 water year.

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DWR and DFG. *See* California Department of Water Resources and California Department of Fish and Game.

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Appendix A

Historical SWP Delivery Tables for 2001–2010

The State Water Project (SWP) contracts define several types of SWP water available for delivery to contractors under specific circumstances: Table A water, Article 21 water, turnback pool water, and carryover water. (See the glossary for definitions of these terms; Chapter 3 describes each type of SWP water in greater detail.) Many SWP contractors frequently use Article 21, turnback pool, and carryover water to increase or decrease the amount of water available to them under SWP Table A.

The Sacramento River Index, previously referred to as the "4 River Index" or "4 Basin Index," is the sum of the unimpaired runoff of four rivers: the Sacramento River above Bend Bridge near Red Bluff, Feather River inflow to Lake Oroville Reservoir, Yuba River at Smartville, and American River inflow to Folsom Lake. The five water year types used in the Sacramento River Index are as follows:

Sacramento River Index	Water Year Type
1	Wet
2	Above Normal
3	Below Normal
4	Dry
5	Critical

Tables A-1 through A-10 list annual historical deliveries by SWP water type for each contractor for 2001 through 2010. The Sacramento River Index and water year type are presented along with the delivery results for each year. Similar delivery tables are presented for years 1999–2008 in the *State Water Project Delivery Reliability Report 2009*. SWP contractors are listed in Tables A-1 through A-10 by location, as follows:

- *Feather River Area:* Butte County, Yuba City, and Plumas County Flood Control and Water Conservation District (FCWCD)
- *North Bay Area:* Napa County FCWCD and Solano County Water Agency (WA)
- *South Bay Area:* Alameda County FCWCD, Zone 7; Alameda County Water District (WD); and Santa Clara Valley WD
- *San Joaquin Valley Area:* Dudley Ridge WD, Empire West Side Irrigation District (ID), Kern County WA, Kings County, Oak Flat WD, and Tulare Lake Basin Water Storage District (WSD)

- *Central Coastal Area:* San Luis Obispo County FCWCD and Santa Barbara County FCWCD
- *Southern California Area:* Antelope Valley–East Kern WA, Castaic Lake WA, Coachella Valley WD, Crestline–Lake Arrowhead WA, Desert Water Agency, Littlerock Creek ID, Metropolitan WD of Southern California, Mojave WA, Palmdale WD, San Bernardino Valley Municipal Water District (MWD), San Gabriel Valley MWD, San Gorgonio Pass WA, and Ventura County Watershed Protection District (WPD)

Table A-1. Historical State Water Project Deliveries, 2001
Sacramento River Index = 4, Water Year Type = Dry

Contractor Location	SWP Contractor	SWP Water Type Delivered (acre-feet)				Total SWP Deliveries (acre-feet)
		Table A*	Article 21	Carryover	Turnback	
Feather River Area	Butte County	513	–	–	–	513
	Yuba City	1,065	–	–	–	1,065
	Plumas County FCWCD	–	–	–	–	–
North Bay Area	Napa County FCWCD	4,293	996	1,723	82	7,094
	Solano County WA	17,756	2,304	1,021	–	21,081
South Bay Area	Alameda County FCWCD, Zone 7	22,307	–	5,990	308	28,605
	Alameda County WD	13,695	10	4,192	107	18,004
	Santa Clara Valley WD	35,689	–	12,233	–	47,922
San Joaquin Valley Area	Dudley Ridge WD	18,467	933	6,815	347	26,562
	Empire West Side ID	–	253	1,107	–	1,360
	Kern County WA	363,204	23,233	92,052	6,502	484,991
	Kings County	1,560	–	–	–	1,560
	Oak Flat WD	2,089	–	101	22	2,212
	Tulare Lake Basin WSD	40,830	8,755	7,889	769	58,243
Central Coastal Area	San Luis Obispo County FCWCD	4,184	–	–	99	4,283
	Santa Barbara County FCWCD	14,285	396	–	296	14,977
Southern California Area	Antelope Valley–East Kern WA	45,071	–	–	899	45,970
	Castaic Lake WA (+Rch 31A, 5 & 7)	30,471	850	–	618	31,939
	Coachella Valley WD	9,009	–	–	91	9,100
	Crestline–Lake Arrowhead WA	1,057	–	–	–	1,057
	Desert WA	14,859	–	–	151	15,010
	Littlerock Creek ID	–	–	–	–	–
	Metropolitan WD of Southern California	686,545	10,415	200,000	7,949	904,909
	Mojave WA	4,433	–	–	–	4,433
	Palmdale WD	8,170	–	2,257	–	10,427
	San Bernardino Valley MWD	26,488	–	–	–	26,488
	San Gabriel Valley MWD	6,534	–	–	–	6,534
	San Gorgonio Pass WA	–	–	–	–	–
	Ventura County WPD	1,850	–	–	–	1,850
	Total SWP Deliveries	**1,374,424**	**48,145**	**335,380**	**18,240**	**1,776,189**
	Total Deliveries from the Delta**	**1,372,846**	**48,145**	**335,380**	**18,240**	**1,774,611**

* Table A = State Water Project Analysis Office current-year deliveries + next year's Article 14B carryover water

** Total deliveries from the Delta = Total SWP deliveries – Feather River Service Area deliveries (Butte County, Yuba City, and Plumas County Flood Control and Water Conservation District)

Table A-2. Historical State Water Project Deliveries, 2002 Sacramento River Index = 4, Water Year Type = Dry						
Contractor Location	SWP Contractor	SWP Water Type Delivered (acre-feet)				Total SWP Deliveries (acre-feet)
		Table A*	Article 21	Carryover	Turnback	
Feather River Area	Butte County	419	–	–	–	419
	Yuba City	1,181	–	–	–	1,181
	Plumas County FCWCD	–	–	–	–	–
North Bay Area	Napa County FCWCD	2,022	827	3,743	283	6,875
	Solano County WA	28,223	2,242	–	–	30,465
South Bay Area	Alameda County FCWCD, Zone 7	40,707	1,484	8,113	556	50,860
	Alameda County WD	24,250	83	2,331	862	27,526
	Santa Clara Valley WD	55,896	202	3,311	2,053	61,462
San Joaquin Valley Area	Dudley Ridge WD	38,688	1,861	1,994	1,177	43,720
	Empire West Side ID	1,278	26	101	–	1,405
	Kern County WA	670,884	21,951	15,680	20,543	729,058
	Kings County	2,800	–	–	54	2,854
	Oak Flat WD	3,841	50	134	76	4,101
	Tulare Lake Basin WSD	73,785	3,749	5,385	2,289	85,208
Central Coastal Area	San Luis Obispo County FCWCD	4,355	–	–	–	4,355
	Santa Barbara County FCWCD	24,166	436	3,455	324	28,381
Southern California Area	Antelope Valley–East Kern WA	53,907	–	3,256	1,008	58,171
	Castaic Lake WA (+Rch 31A, 5 & 7)	61,880	280	6,657	–	68,817
	Coachella Valley WD	16,170	111	–	474	16,755
	Crestline–Lake Arrowhead WA	2,189	–	–	–	2,189
	Desert WA	26,670	189	–	781	27,640
	Littlerock Creek ID	–	–	–	–	–
	Metropolitan WD of Southern California	1,273,205	9,624	97,940	14,335	1,395,104
	Mojave WA	4,346	–	–	–	4,346
	Palmdale WD	8,359	–	–	437	8,796
	San Bernardino Valley MWD	68,268	–	3,801	–	72,069
	San Gabriel Valley MWD	18,353	–	4,698		23,051
	San Gorgonio Pass WA	–	–	–	–	–
	Ventura County WPD	4,998	–	–	–	4,998
Total SWP Deliveries		**2,510,840**	**43,115**	**160,599**	**45,252**	**2,759,806**
Total Deliveries from the Delta**		**2,509,240**	**43,115**	**160,599**	**45,252**	**2,758,206**

* Table A = State Water Project Analysis Office current-year deliveries + next year's Article 14B carryover water

** Total deliveries from the Delta = Total SWP deliveries – Feather River Service Area deliveries (Butte County, Yuba City, and Plumas County Flood Control and Water Conservation District)

Table A-3. Historical State Water Project Deliveries, 2003
Sacramento River Index = 2, Water Year Type = Above Normal

Contractor Location	SWP Contractor	SWP Water Type Delivered (acre-feet)				Total SWP Deliveries (acre-feet)
		Table A*	Article 21	Carryover	Turnback	
Feather River Area	Butte County	551	–	–	–	551
	Yuba City	1,324	–	–	–	1,324
	Plumas County FCWCD	–	–	–	–	–
North Bay Area	Napa County FCWCD	6,026	376	1,055	180	7,637
	Solano County WA	25,135	2,280	1,918	–	29,333
South Bay Area	Alameda County FCWCD, Zone 7	30,695	–	13,099	656	44,450
	Alameda County WD	31,086	–	5,150	354	36,590
	Santa Clara Valley WD	90,620	936	14,104	841	106,501
San Joaquin Valley Area	Dudley Ridge WD	49,723	1,928	1,452	482	53,585
	Empire West Side ID	1,074	175	187	–	1,436
	Kern County WA	841,697	27,891	22,380	8,419	900,387
	Kings County	3,600	58	–	34	3,692
	Oak Flat WD	4,059	19	140	48	4,266
	Tulare Lake Basin WSD	94,376	6,243	4,284	938	105,841
Central Coastal Area	San Luis Obispo County FCWCD	4,417	36	–	–	4,453
	Santa Barbara County FCWCD	24,312	339	2,274	43	26,968
Southern California Area	Antelope Valley–East Kern WA	52,730	–	7,049	250	60,029
	Castaic Lake WA (+Rch 31A, 5 & 7)	49,895	991	4,760	90	55,736
	Coachella Valley WD	14,045	204	–	194	14,443
	Crestline–Lake Arrowhead WA	1,563	–	–	–	1,563
	Desert WA	23,168	330	–	321	23,819
	Littlerock Creek ID	–	–	–	–	–
	Metropolitan WD of Southern California	1,550,356	17,622	134,845	16,920	1,719,743
	Mojave WA	10,907	–	3,528	–	14,435
	Palmdale WD	9,701	–	1,846	–	11,547
	San Bernardino Valley MWD	25,371	200	1,844	–	27,415
	San Gabriel Valley MWD	13,034	200	–	–	13,234
	San Gorgonio Pass WA	116	–	–	–	116
	Ventura County WPD	5,000	–	–	–	5,000
	Total SWP Deliveries	**2,964,581**	**59,828**	**219,915**	**29,770**	**3,274,094**
	Total Deliveries from the Delta**	**2,962,706**	**59,828**	**219,915**	**29,770**	**3,272,219**

* Table A = State Water Project Analysis Office current-year deliveries + next year's Article 14B carryover water

** Total deliveries from the Delta = Total SWP deliveries – Feather River Service Area deliveries (Butte County, Yuba City, and Plumas County Flood Control and Water Conservation District)

Table A-4. Historical State Water Project Deliveries, 2004
Sacramento River Index = 3, Water Year Type = Below Normal

Contractor Location	SWP Contractor	SWP Water Type Delivered (acre-feet)				Total SWP Deliveries (acre-feet)
		Table A*	Article 21	Carryover	Turnback	
Feather River Area	Butte County	1,440	–	–	–	1,440
	Yuba City	1,434	–	–	–	1,434
	Plumas County FCWCD	–	–	–	–	–
North Bay Area	Napa County FCWCD	5,030	1,450	1,602	52	8,134
	Solano County WA	17,991	7,787	47	–	25,825
South Bay Area	Alameda County FCWCD, Zone 7	39,898	–	11,466	–	51,364
	Alameda County WD	20,956	–	6,714	214	27,884
	Santa Clara Valley WD	52,867	2,983	–	508	56,358
San Joaquin Valley Area	Dudley Ridge WD	36,377	7,393	2,185	291	46,246
	Empire West Side ID	1,310	626	1,626	–	3,562
	Kern County WA	640,190	86,513	40,120	5,075	771,898
	Kings County	5,850	3,157	–	46	9,053
	Oak Flat WD	4,324	–	276	29	4,629
	Tulare Lake Basin WSD	58,575	15,299	5,638	489	80,001
Central Coastal Area	San Luis Obispo County FCWCD	4,096	69	–	–	4,165
	Santa Barbara County FCWCD	29,566	–	–	122	29,688
Southern California Area	Antelope Valley–East Kern WA	50,532	–	9,199	–	59,731
	Castaic Lake WA (+Rch 31A, 5 & 7)	46,358	1,618	35,785	–	83,761
	Coachella Valley WD	8,631	–	6,745	89	15,465
	Crestline–Lake Arrowhead WA	2,006	–	–	–	2,006
	Desert WA	9,966	–	11,122	102	21,190
	Littlerock Creek ID	–	–	–	–	–
	Metropolitan WD of Southern California	1,195,807	91,601	215,000	10,223	1,512,631
	Mojave WA	11,176	–	–	–	11,176
	Palmdale WD	10,549	–	1,613	–	12,162
	San Bernardino Valley MWD	35,522	–	20,631	–	56,153
	San Gabriel Valley MWD	15,600	–	–	–	15,600
	San Gorgonio Pass WA	841	–	–	–	841
	Ventura County WPD	5,250	–	–	–	5,250
	Total SWP Deliveries	**2,312,142**	**218,496**	**369,769**	**17,240**	**2,917,647**
	Total Deliveries from the Delta**	**2,309,268**	**218,496**	**369,769**	**17,240**	**2,914,773**

* Table A = State Water Project Analysis Office current-year deliveries + next year's Article 14B carryover water

** Total deliveries from the Delta = Total SWP deliveries – Feather River Service Area deliveries (Butte County, Yuba City, and Plumas County Flood Control and Water Conservation District)

Table A-5. Historical State Water Project Deliveries, 2005
Sacramento River Index = 2, Water Year Type = Above Normal

Contractor Location	SWP Contractor	SWP Water Type Delivered (acre-feet)				Total SWP Deliveries (acre-feet)
		Table A*	Article 21	Carryover	Turnback	
Feather River Area	Butte County	527	–	–	–	527
	Yuba City	1,894	–	–	–	1,894
	Plumas County FCWCD	–	–	–	–	–
North Bay Area	Napa County FCWCD	5,322	606	1,741	–	7,669
	Solano County WA	24,515	10,421	83	–	35,019
South Bay Area	Alameda County FCWCD, Zone 7	38,388	–	7,849	275	46,512
	Alameda County WD	36,469	846	6,341	943	44,599
	Santa Clara Valley WD	89,476	6,298	11,899	342	108,015
San Joaquin Valley Area	Dudley Ridge WD	51,609	28,197	821	1,286	81,913
	Empire West Side ID	1,448	1,799	587	–	3,834
	Kern County WA	893,439	453,078	9,851	22,397	1,378,765
	Kings County	8,100	11,504	–	202	19,806
	Oak Flat WD	4,067	–	–	127	4,194
	Tulare Lake Basin WSD	86,604	47,267	3,973	2,158	140,002
Central Coastal Area	San Luis Obispo County FCWCD	4,006	245	–	–	4,251
	Santa Barbara County FCWCD	22,981	–	–	155	23,136
Southern California Area	Antelope Valley–East Kern WA	57,205	–	2,626	–	59,831
	Castaic Lake WA (+Rch 31A, 5 & 7)	54,303	2,451	2,702	–	59,456
	Coachella Valley WD	26,984	–	12,819	2,716	42,519
	Crestline–Lake Arrowhead WA	807	–	–	–	807
	Desert WA	33,168	–	14,799	1,122	49,089
	Littlerock Creek ID	–	–	–	–	–
	Metropolitan WD of Southern California**	1,269,291	168,300	106,032	6,530	1,550,153
	Mojave WA	10,360	–	1,201	–	11,561
	Palmdale WD	10,174	–	1,538	–	11,712
	San Bernardino Valley MWD	31,211	56	283	–	31,550
	San Gabriel Valley MWD	10,500	–	–	–	10,500
	San Gorgonio Pass WA	655	15	–	22	692
	Ventura County WPD	1,665	–	–	–	1,665
Total SWP Deliveries		**2,775,168**	**731,083**	**185,145**	**38,275**	**3,729,671**
Total Deliveries from the Delta* **		**2,772,747**	**731,083**	**185,145**	**38,275**	**3,727,250**

* Table A = State Water Project Analysis Office current-year deliveries + Next year's Article 14B carryover water

** Metropolitan Water District of Southern California 2005 Table A deliveries have been updated to reflect the addition of Article 14B carryover water that was previously omitted.

*** Total deliveries from the Delta = Total SWP deliveries – Feather River Service Area deliveries (Butte County, Yuba City, and Plumas County Flood Control and Water Conservation District)

Table A-6. Historical State Water Project Deliveries, 2006 Sacramento River Index = 1, Water Year Type = Wet						
Contractor Location	SWP Contractor	SWP Water Type Delivered (acre-feet)				Total SWP Deliveries (acre-feet)
		Table A*	Article 21	Carryover	Turnback	
Feather River Area	Butte County	468	–	–	–	468
	Yuba City	4,148	1,194	–	–	5,342
	Plumas County FCWCD	–	–	–	–	–
North Bay Area	Napa County FCWCD	7,312	300	172	–	7,784
	Solano County WA	12,070	18,195	390	–	30,655
South Bay Area	Alameda County FCWCD, Zone 7	50,785	–	2,252	491	53,528
	Alameda County WD	–	2,375	1,331	39,373	43,079
	Santa Clara Valley WD	47,344	26,769	524	–	74,637
San Joaquin Valley Area	Dudley Ridge WD	55,343	18,515	–	1,068	74,926
	Empire West Side ID	1,500	1,124	658	–	3,282
	Kern County WA	961,882	256,634	5,418	18,610	1,242,544
	Kings County	8,991	366	–	173	9,530
	Oak Flat WD	4,118	–	17	107	4,242
	Tulare Lake Basin WSD	48,361	59,424	–	1,787	109,572
Central Coastal Area	San Luis Obispo County FCWCD	3,382	827	–	–	4,209
	Santa Barbara County FCWCD	19,255	4,020	–	–	23,275
Southern California Area	Antelope Valley–East Kern WA	76,623	–	3,761	–	80,384
	Castaic Lake WA (+Rch 31A, 5 & 7)	56,758	2,089	3,905	–	62,752
	Coachella Valley WD	121,100	–	–	–	121,100
	Crestline–Lake Arrowhead WA	257	–	–	–	257
	Desert WA	50,000	–	–	–	50,000
	Littlerock Creek ID	–	–	–	–	–
	Metropolitan WD of Southern California	1,103,538	238,478	136,424	11,638	1,490,078
	Mojave WA	32,496	–	1,518	–	34,014
	Palmdale WD	10,374	1,653	335	130	12,492
	San Bernardino Valley MWD	31,902	–	3,427	–	35,329
	San Gabriel Valley MWD	13,524	–	–	–	13,524
	San Gorgonio Pass WA	4,262	–	–	–	4,262
	Ventura County WPD	1,850	–	–	–	1,850
Total SWP Deliveries		**2,727,643**	**631,963**	**160,132**	**73,377**	**3,593,115**
Total Deliveries from the Delta**		**2,723,027**	**630,769**	**160,132**	**73,377**	**3,587,305**

* Table A = State Water Project Analysis Office current-year deliveries + next year's Article 14B carryover water

** Total deliveries from the Delta = Total SWP deliveries – Feather River Service Area deliveries (Butte County, Yuba City, and Plumas County Flood Control and Water Conservation District)

Table A-7. Historical State Water Project Deliveries, 2007
Sacramento River Index = 4, Water Year Type = Dry

Contractor Location	SWP Contractor	SWP Water Type Delivered (acre-feet)				Total SWP Deliveries (acre-feet)
		Table A*	Article 21	Carryover	Turnback	
Feather River Area	Butte County	956	–	–	–	956
	Yuba City	2,327	–	–	–	2,327
	Plumas County FCWCD	–	–	–	–	–
North Bay Area	Napa County FCWCD	6,362	3,597	998	–	10,957
	Solano County WA	14,892	8,217	1,822	–	24,931
South Bay Area	Alameda County FCWCD, Zone 7	32,972	912	2,895	378	37,157
	Alameda County WD	16,541	550	2,103	197	19,391
	Santa Clara Valley WD	38,812	4,840	8,161	469	52,282
San Joaquin Valley Area	Dudley Ridge WD	28,457	8,953	2,000	269	39,679
	Empire West Side ID	397	1,172	515	–	2,084
	Kern County WA	592,423	99,861	19,645	4,683	716,612
	Kings County	4,924	474	–	43	5,441
	Oak Flat WD	3,430	41	69	27	3,567
	Tulare Lake Basin WSD	57,272	12,902	16,459	450	87,083
Central Coastal Area	San Luis Obispo County FCWCD	3,752	24	–	–	3,776
	Santa Barbara County FCWCD	24,760	1,070	1,390	–	27,220
Southern California Area	Antelope Valley–East Kern WA	74,459	–	4,364	–	78,823
	Castaic Lake WA (+Rch 31A, 5 & 7)	44,974	–	4,216	–	49,190
	Coachella Valley WD	72,660	–	–	568	73,228
	Crestline–Lake Arrowhead WA	1,768	–	–	–	1,768
	Desert WA	30,000	–	–	234	30,234
	Littlerock Creek ID	1,380	–	–	–	1,380
	Metropolitan WD of Southern California	1,146,900	166,517	28,098	8,962	1,350,477
	Mojave WA	45,372	–	737	–	46,109
	Palmdale WD	12,780	843	985	100	14,708
	San Bernardino Valley MWD	57,116	–	–	–	57,116
	San Gabriel Valley MWD	10,000	–	–	–	10,000
	San Gorgonio Pass WA	4,009	–	–	–	4,009
	Ventura County WPD	3,000	–	–	–	3,000
	Total SWP Deliveries	**2,332,695**	**309,973**	**94,457**	**16,380**	**2,753,505**
	Total Deliveries from the Delta**	**2,329,412**	**309,973**	**94,457**	**16,380**	**2,750,222**

* Table A = State Water Project Analysis Office current-year deliveries + next year's Article 14B carryover water

** Total deliveries from the Delta = Total SWP deliveries – Feather River Service Area deliveries (Butte County, Yuba City, and Plumas County Flood Control and Water Conservation District)

Table A-8. Historical State Water Project Deliveries, 2008
Sacramento River Index = 5, Water Year Type = Critical

Contractor Location	SWP Contractor	SWP Water Type Delivered (acre-feet)				Total SWP Deliveries (acre-feet)
		Table A*	Article 21	Carryover	Turnback	
Feather River Area	Butte County	9,436	–	–	–	9,436
	Yuba City	1,923	–	–	–	1,923
	Plumas County FCWCD	243	–	–	–	243
North Bay Area	Napa County FCWCD	3,636	1,219	7,363	21	12,239
	Solano County WA	10,436	1,510	12,389	–	24,335
South Bay Area	Alameda County FCWCD, Zone 7	13,633	–	15,400	–	29,033
	Alameda County WD	4,206	–	8,659	37	12,902
	Santa Clara Valley WD	11,133	–	21,188	88	32,409
San Joaquin Valley Area	Dudley Ridge WD	12,260	–	5,949	51	18,260
	Empire West Side ID		–	915	–	915
	Kern County WA	271,636	–	6,815	883	279,334
	Kings County	3,187	–	–	8	3,195
	Oak Flat WD	1,929	–	–	5	1,934
	Tulare Lake Basin WSD	32,302	–	281	85	32,668
Central Coastal Area	San Luis Obispo County FCWCD	8,512	–	–	–	8,512
	Santa Barbara County FCWCD	11,311	–	2,532	40	13,883
Southern California Area	Antelope Valley–East Kern WA	31,082	–	10,381	125	41,588
	Castaic Lake WA (+Rch 31A, 5 & 7)	18,710	–	12,146	–	30,856
	Coachella Valley WD	42,385	–	–	107	42,492
	Crestline–Lake Arrowhead WA	1,159	–	689	–	1,848
	Desert WA	17,500	–	–	44	17,544
	Littlerock Creek ID	805	–	–	–	805
	Metropolitan WD of Southern California	654,304	–	–	1,689	655,993
	Mojave WA	26,288	–	108	–	26,396
	Palmdale WD	4,226	–	–	19	4,245
	San Bernardino Valley MWD	30,562	–	4,444	–	35,006
	San Gabriel Valley MWD	10,080	–	–	–	10,080
	San Gorgonio Pass WA	5,419	–	300	–	5,719
	Ventura County WPD	3,798	–	–	–	3,798
	Total SWP Deliveries	**1,242,101**	**2,729**	**109,559**	**3,202**	**1,357,591**
	Total Deliveries from the Delta**	**1,230,499**	**2,729**	**109,559**	**3,202**	**1,345,989**

* Table A = State Water Project Analysis Office current-year deliveries + next year's Article 14B carryover water

** Total deliveries from the Delta = Total SWP deliveries – Feather River Service Area deliveries (Butte County, Yuba City, and Plumas County Flood Control and Water Conservation District)

Table A-9. Historical State Water Project Deliveries, 2009
Sacramento River Index = 4, Water Year Type = Dry

Contractor Location	SWP Contractor	SWP Water Type Delivered (acre-feet)				Total SWP Deliveries (acre-feet)
		Table A*	Article 21	Carryover	Turnback	
Feather River Area	Butte County	581	–	–	–	581
	Yuba City	2,114	–	–	–	2,114
	Plumas County FCWCD	200	–	–	–	200
North Bay Area	Napa County FCWCD	2,723	1,588	4,475	13	8,799
	Solano County WA	8,618	4,444	3,123	–	16,185
South Bay Area	Alameda County FCWCD, Zone 7	12,093	–	14,584	–	26,677
	Alameda County WD	5,911	–	10,494	8	16,413
	Santa Clara Valley WD	9,188	–	23,867	54	33,109
San Joaquin Valley Area	Dudley Ridge WD	13,185	–	7,810	32	21,027
	Empire West Side ID	1,034	–	–	–	1,034
	Kern County WA	226,631	–	56,367	544	283,542
	Kings County	3,153	–	70	5	3,228
	Oak Flat WD	1,825	–	66	1	1,892
	Tulare Lake Basin WSD	35,160	–	1,271	52	36,483
Central Coastal Area	San Luis Obispo County FCWCD	3,799	–	–	–	3,799
	Santa Barbara County FCWCD	12,746	–	4,523	25	17,294
Southern California Area	Antelope Valley–East Kern WA	14,419	–	18,408	77	32,904
	Castaic Lake WA (+Rch 31A, 5 & 7)	14,858	–	9,529	52	24,439
	Coachella Valley WD	40,845	–	–	66	40,911
	Crestline–Lake Arrowhead WA	–	–	893	–	893
	Desert WA	16,865	–	–	27	16,892
	Littlerock Creek ID	–	–	–	–	–
	Metropolitan WD of Southern California	544,304	–	10,721	1,042	556,067
	Mojave WA	21,312	–	242	–	21,554
	Palmdale WD	12,095	–	3,229	–	15,324
	San Bernardino Valley MWD	26,785	–	9,348	–	36,133
	San Gabriel Valley MWD	11,516	–	–	–	11,516
	San Gorgonio Pass WA	5,612	–	480	–	6,092
	Ventura County WPD	3,890	–	–	–	3,890
Total SWP Deliveries		**1,051,462**	**6,032**	**179,500**	**1,998**	**1,238,992**
Total Deliveries from the Delta**		**1,048,567**	**6,032**	**179,500**	**1,998**	**1,236,097**

* Table A = State Water Project Analysis Office current-year deliveries + next year's Article 14B carryover water

** Total deliveries from the Delta = Total SWP deliveries – Feather River Service Area deliveries (Butte County, Yuba City, and Plumas County Flood Control and Water Conservation District)

Table A-10. Historical State Water Project Deliveries, 2010
Sacramento River Index = 3, Water Year Type = Below Normal

Contractor Location	SWP Contractor	SWP Water Type Delivered (acre-feet)				Total SWP Deliveries (acre-feet)
		Table A*	Article 21	Carryover	Turnback	
Feather River Area	Butte County	807	–	–	–	807
	Yuba City	2,331	–	–	–	2,331
	Plumas County FCWCD	243	–	–	–	243
North Bay Area	Napa County FCWCD	7,275	2,207	2,845	90	12,417
	Solano County WA	16,793	5,298	3,661	–	25,752
South Bay Area	Alameda County FCWCD, Zone 7	28,694	–	12,756	249	41,699
	Alameda County WD	11,668	–	10,889	14	22,571
	Santa Clara Valley WD	6,068	–	10,741	34	16,843
San Joaquin Valley Area	Dudley Ridge WD	15,833	–	9,752	156	25,741
	Empire West Side ID	380	–	–	–	380
	Kern County WA	375,426	–	55,419	3,044	433,889
	Kings County	4,094	–	522	29	4,645
	Oak Flat WD	2,412	–	455	18	2,885
	Tulare Lake Basin WSD	35,985	–	3,199	275	39,459
Central Coastal Area	San Luis Obispo County FCWCD	3,480	–	277	–	3,757
	Santa Barbara County FCWCD	8,640	–	7,134	140	15,914
Southern California Area	Antelope Valley–East Kern WA	36,462	–	20,813	438	57,713
	Castaic Lake WA (+Rch 31A, 5 & 7)	37,054	–	14,501	295	51,850
	Coachella Valley WD	69,175	–	7,595	429	77,199
	Crestline–Lake Arrowhead WA	357	–	–	–	357
	Desert WA	27,875	–	3,135	173	31,183
	Littlerock Creek ID		–	–	–	–
	Metropolitan WD of Southern California	817,765	–	67,783	5,922	891,470
	Mojave WA	35,241	–	20	–	35,261
	Palmdale WD	5,585	–	5,325	59	10,969
	San Bernardino Valley MWD	37,733	–	11,273	–	49,006
	San Gabriel Valley MWD	19,180	–	–	–	19,180
	San Gorgonio Pass WA	6,626	–	–	6	6,632
	Ventura County WPD	4,075	–	–	–	4,075
	Total SWP Deliveries	**1,617,257**	**7,505**	**248,095**	**11,371**	**1,884,228**
	Total Deliveries from the Delta**	**1,613,876**	**7,505**	**248,095**	**11,371**	**1,880,847**

* Table A = State Water Project Analysis Office current-year deliveries + next year's Article 14B carryover water

** Total deliveries from the Delta = Total SWP deliveries – Feather River Service Area deliveries (Butte County, Yuba City, and Plumas County Flood Control and Water Conservation District)

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Appendix B

Comment Letters on the Draft Report and the Department's Responses





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THE METROPOLITAN WATER DISTRICT
OF SOUTHERN CALIFORNIA

Office of the General Manager

March 12, 2012

Ms. Cynthia Pierson
California Department of Water Resources
SWP Delivery Reliability Report – Attn: Cynthia Pierson
P.O. Box 942836
Sacramento, CA 94236-0001

Dear Ms. Pierson:

State Water Project Delivery Reliability Report 2011 – January 2012 Draft

The Metropolitan Water District of Southern California (Metropolitan) has reviewed the Department of Water Resources (Department) January 2012 draft of the State Water Project (SWP) Delivery Reliability Report 2011 (DRR) and offers the following comments and observations.

Metropolitan understands the Department's desire to produce a public outreach document with the intent to educate Californians about the SWP and its operations. However, we do not agree that this should be the purpose of the DRR. The preparation of this report should be to satisfy the obligation set forth in the 2003 Monterey Settlement (Settlement) between DWR, the State Water Contractors (SWC) and the Monterey Amendment Plaintiffs. The Settlement requires a report on the delivery capability of the SWP facilities to be distributed biannually to all SWP contractors, city and county planning departments, and regional and metropolitan planning departments in the SWP's service area. Metropolitan suggests that the Department refocus the report to provide a summary of the technical analysis including the assumptions used in the analysis and a description of the results. Similar to previous versions of the DRR, the report should focus on the technical needs of the SWC and regional planning agencies for information on the reliability of the SWP. This report should not be used as a larger public outreach document.

Metropolitan believes that an education can be provided to readers of the DRR while remaining true to its original intent. To that end, we encourage the Department to reconsider the use of the term "Delta exports", which may mislead the reader. This term is used throughout the report in a fashion that promotes the notion that we are exporting a native supply out of the Delta. Rather, these supplies were developed through SWP Conservation Facilities and SWP water rights and represent a small percentage of the total flows passing through the Delta. We would like to see the report be clear on the fact that the water diverted is a SWP developed supply.

Metropolitan acknowledges the difficulties in preparing a report of this magnitude particularly with the variability in hydrology, regulatory restrictions and climate change uncertainties. Metropolitan continues to offer its assistance with the development of this report. We encourage the Department to engage not only Metropolitan but other SWP contractors early in the preparation of the document. We believe a more collaborative process will facilitate feedback from the end users resulting in an improved document.

Very truly yours,

Deven N. Upadhyay
Manager, Water Resource Management

DJP:jc
o:\a\s\c\2012\DJP_SWPDel Rel comment.doc

Mr. Mark Cowin
Director, California Department of Water Resources
P.O. Box 942836, Room 1115-1
Sacramento, CA 94236-0001

Ms. Katherine Kelly
Chief, Bay-Delta Office
California Department of Water Resources
1416, 9th Street, Room 215-37
Sacramento, CA 95814

Mr. Terry Erlewine
General Manager
State Water Contractors
1121 L Street, Suite 1050
Sacramento, CA 95814

STATE OF CALIFORNIA – CALIFORNIA NATURAL RESOURCES AGENCY **EDMUND G. BROWN JR.**, *Governor*

DEPARTMENT OF WATER RESOURCES
1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 94236-0001
(916) 653-5791

June 25, 2012

Mr. Deven N. Upadhyay
Manager, Water Resources Management
The Metropolitan Water District of Southern California
PO Box 54153
Los Angeles, California 90054-0153

Dear Mr. Upadhyay:

This letter responds to your letter dated March 12, 2012 commenting on the draft State Water Project Delivery Reliability Report (2011). We appreciate your review and subsequent comments to the draft report.

Your first comment is regarding the format of the report. Metropolitan would like the Department of Water Resources to focus on the technical needs of the State Water Contractors and regional planning agencies for information on the reliability of the State Water Project (SWP) and not plan to use the report as a larger public outreach document.

The reformatting of the Delivery Reliability Report is intended to make the information more understandable to the public. The Monterey Settlement (2003) requires a report covering this subject to be published every two years and that the information contained in the report be readily understandable by the public. The previous versions of the report focus on estimated amounts for Table A deliveries and other categories of deliveries defined in the SWP water delivery contracts. We agree that this is valuable information for our contractors and planning entities within the SWP service area however, it is not readily understandable to the public. Our intent in reformatting the report is to meet the needs of both audiences. The main report is intended for the public audience and the accompanying technical addendum intended for State Water Contractors and regional planning agencies. The technical addendum includes descriptions of the analyses, the results, and the breakdown of the information for each contractor.

Your second comment is regarding the use of the term "Delta exports" for the water pumped from the Delta by the SWP. Your observation is that the term is used in a manner that may mislead the reader by promoting the notion that the SWP exports a "native supply" from the Delta rather than one developed through the SWP conservation facilities and water rights. The term "Delta exports" is one that is commonly used in Department reports. It refers to the water that is released from Oroville Reservoir and transferred across the Delta as well as other flows that enter the Delta and are available to the SWP while meeting the relevant water rights' requirements and other export regulations. Chapters 2 through 4 are intended to inform the reader about the history, facilities and requirements for operation of the SWP. It is our hope that this information will help to avoid any potential misinterpretation by the reader regarding what is meant by the term "Delta exports".

The final 2011 State Water Project Delivery Reliability Report is nearing completion and is expected to be available next month. If you would like to discuss your concerns further, please contact me at (916) 653-1099 or kkelly@water.ca.gov.

Sincerely,

Katherine Kelly

Katherine F. Kelly, Chief
Bay-Delta Office

Mojave Water Agency

13846 Conference Center Drive ♦ Apple Valley, California 92307
Phone (760) 946-7000 ♦ Fax (760) 240-2642 ♦ www.mojavewater.org

VIA ELECTRONIC MAIL

March 12, 2012

California Department of Water Resources
SWP Delivery Reliability Report- Attn: Cynthia Pierson
P.O. Box 942836
Sacramento, CA 94236-0001

RE: Comments on the State Water Project Draft Delivery Reliability Report 2011

Dear Ms. Pierson:

The Mojave Water Agency has reviewed the SWP Draft Delivery Reliability Report 2011 ("2011 DRR") and offers these comments. In general, we appreciated the format and information included in the 2009 DRR and would like to see the same level of detail and information presented in the 2011 DRR. Please consider the following comments:

1. Individual Contractor Modeling Results: We appreciate the inclusion of individual contractor modeling outputs in the Technical Addendum.
2. Reliability Numbers: In addition to the charts in the 2011 DRR (figures 6-5 thru 6-9), the body of the report should include SWP reliability percentages, either in the text or in tables, as was done in the 2009 DRR. This should be done for current and future conditions for the long-term average, drought cycles, and wet cycles (example: Tables 6.1 thru 6.4 in the 2009 DRR). Average-year and dry-year numbers are critical information for urban water suppliers to include in their Urban Water Management Plans, which are used to demonstrate water supply sufficiency for their service areas.
3. Effects of Climate Change: We appreciate the inclusion of modeling results comparing future SWP deliveries with and without the effects of climate change; this will be of great help to agencies preparing climate change evaluations for water supply planning purposes.
4. Factors Affecting Reliability: Chapter 4 describes a number of factors that have reduced or have the potential to reduce future water supply reliability. The chapter should also "disclose" that some future actions may actually increase future reliability:
   a. The recent court decisions overturning Federal Biological Opinions (BO's) were mentioned; but it should be mentioned that implementation of future BO's may result in less restriction on delta exports.
   b. The Bay Delta Conservation Plan (BDCP) was described briefly, but it should also indicate that the conveyance piece of the BDCP will likely result in increased reliability.

Thank you for your consideration of our comments.

Sincerely,

Kirby Brill
General Manager

DEPARTMENT OF WATER RESOURCES
1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 94236-0001
(916) 653-5791

May 23, 2012

Kirby Brill
General Manager
Mojave Water Agency
13846 Conference Center Drive
Apple Valley, California 92307

Dear Mr. Brill,

This letter is in response to your letter dated March 12, 2012 providing the comments of the Mojave Water Agency for the Draft 2011 SWP Delivery Reliability Report. Our responses to your four comments are attached.

I appreciate you and your staff's comments. If you or your staff wish to discuss this report further, please contact me at (916) 653-1099 or kkelly@water.ca.gov. For specific questions regarding the analyses used for the report, please contact Francis Chung at (916) 653-5924.

Sincerely,

Katherine Kelly

Katherine F. Kelly, Chief
Bay-Delta Office

Attachment:

Attachment

The following responses are to the comments provided in the March 12, 2012 letter from the Mojave Water Agency. The comments are shown in italics.

1. <u>*Individual Contractor Modeling Results*</u>*: We appreciate the inclusion of individual contractor modeling outputs in the Technical Addendum.*

   Thank you. We strive to make the Delivery Reliability Report as informative and useful as possible.

2. <u>*Reliability Numbers*</u>*: In addition to the charts in the 2011 DRR (figures 6-5 thru 6-9), the body of the report should include SWP reliability percentages, either in the text or in tables, as was done in the 2009 DRR. This should be done for current and future conditions for the long-term average, drought cycles, and wet cycles (example: Tables 6.1 thru 6.4 in the 2009 DRR). Average-year and dry-year numbers are critical information for urban water suppliers to include in their Urban Water Management Plans, which are used to demonstrate water supply sufficiency for their service areas.*

   Tables 6-3, 6-4, 7-2, and 7-3 have been added to the report to include this information.

3. *Effects of Climate Change: We appreciate the inclusion of modeling results comparing future SWP deliveries with and without the effects of climate change; this will be of great help to agencies preparing climate change evaluations for water supply planning purposes.*

   Thank you. We are glad you found this information beneficial.

4. *Factors Affecting Reliability: Chapter 4 describes a number of factors that have reduced or have the potential to reduce future water supply reliability. The chapter should also "disclose" that some future actions may actually increase future reliability:*
   a. *The recent court decision overturning Federal Biological Opinions (BO's) were mentioned; but it should be mentioned that implementation of future BO's may result in less restriction on Delta exports.*
   b. *The Bay Delta Conservation Plan (BDCP) was described briefly, but it should also indicate that the conveyance piece of the BDCP will likely result in increased reliability.*

   We appreciate your suggestion. However, we feel it is premature to discuss the effects of potential future BOs or BDCP alternatives. This is something that we can keep in mind and discuss further as we begin to develop the 2013 SWP Delivery Reliability Report.

March 12, 2012

California Department of Water Resources
SWP Delivery Reliability Report-Attn: Cynthia Pierson
P.O. Box 942836
Sacramento, CA 94236-0001

Comments on 2011 SWP Draft Delivery Reliability Report

Dear Ms. Pierson:

The State Water Contractors (SWC) has reviewed the 2011 SWP Draft Delivery Reliability Report and offers these comments. The SWC are generally concerned about the level of detail in the presentation. Additionally, the SWC has also identified numerous specific editorial changes for your consideration.

The SWC are interested in discussing our concerns with DWR, primarily in relation to the forthcoming 2013 SWP Reliability Report. If you have any questions about our concerns or specific comments, please contact me at (916) 447-7357.

Sincerely,

Terry L. Erlewine
General Manager

Attachment

State Water Contractors
Specific Comments on DWR's 2011 State Water Project Delivery Reliability Report

Figure 2-2. This figure shows only inflows and outflows to the Delta, and does not provide information on the magnitude of total flows in the watershed or total outflow. A graph similar to that prepared for the Delta Vision that places the total disposition of water supply into context would be helpful.

Page 13. Discussion of how operations are coordinated with the CVP should reference the Coordinated Operations Agreement, which is the basis for that coordination.

Page 23. There is discussion of how individual SWP contractors manage their water supplies annually on the basis of available water supply. That kind of annual information is <u>not</u> the data that is contained in the Delivery Reliability Report and is provided separately by DWR's Operations Control Office. The discussion here reads as though the Delivery Reliability Report provides that information.

Page 27. The discussion of the status of the 2008 and 2009 Biological Opinions is not very informative. This discussion should expand briefly on Judge Wanger's opinion that the current BOs are BOs are "arbitrary, capricious and unlawful" and are currently being redone. The discussion should also note that a preliminary injunction was issued enjoining implementation of the Fall X2 action of the 2008 Delta Smelt Biological Opinion. Additionally, DWR and other plaintiffs in the case have the option to file actions challenging provisions of the Biological Opinions on a continuing basis until new BOs are developed.

Chapter 5. The SWC question that there is any need for this chapter in this report as this goes beyond the issue of delivery reliability. If DWR wants to report on the topic of exports separately, it should do so in a separate report to meet whatever purpose is identified. If DWR insists of having a chapter on exports, it should be moved to later in the report, after Chapters 6 and 7, which identify the basis for the studies reported on in the export chapter.

Page 37. The statement is made that Delta exports are the only SWP water supply source for 24 of the 29 SWP contractors. In fact, local runoff occasionally provides significant quantities of water supply in some wet years.

Page 38. The reference to "Upper Feather River Area contractors" should drop the term "Upper" and refer simply to the "Feather River contractors." The City of Yuba City is located on the lower Feather River.

Page 38. The discussion of water types is incomplete and confusing. It should either be expanded or dropped. Additionally, the word "surplus" should not be used in relation to Article 21 Water. Surplus water has a distinct meaning under the SWP Water Supply Contracts that is different than Article 21 Water

Figure 5-2. This graph would be better presented as a line graph than as a bar graph.

Page 41. The discussion presents results on existing and future conditions, without describing those conditions. This discussion would be enhanced if the entire Chapter 5 was included after Chapters 6 & 7, which are where the existing and future conditions are described.

Page 44. There is discussion of differences between the 2009 and 2011 Delivery Reliability Report that are not really meaningful and are totally within the margin of error for the modeling analysis. Rather than show repeated figures portraying these meaningless differences between the two reports, it would be preferable to abbreviate the text and figures and include a high level statement that the two reports are essentially identical.

Page 48. The discussion of the basis for local demands changing highlights water conservation as the only specific example of those changes. A much more important factor would be local management (i.e., local storage) within the service area.

Page 48. There is a reference to Kern Wet Year as the basis for variations in Article 21 Water demands, but no explanation of why that would be a factor. It would be useful to state that Kern River inflows are a major local water supply variable in Kern County Water Agency, which is the second largest SWP contractor and possesses significant local groundwater recharge potential.

Pages 51-53. As pointed out earlier, there is extensive discussion and numerous figures are presented to show the differences between the 2009 and 2011 Delivery Reliability Reports, which are essentially not meaningful and within the margin of error of the studies. Rather than included repetitive slides showing the same information, this section should be substantially reduced. In fact, the summary of results presented on Page 57 would suffice for all the presentation starting on page 51 and continuing to Page 57.

Page 57. In discussing the Dry year deliveries of Article 21 Water, there is no indication of the location of those deliveries. Given regulatory restrictions in place, it is likely that all the Article 21 Water Deliveries are made to the SWP contractors located north of the Delta. If so, that should be stated. Otherwise, the reader is left with the impression that Article 21 Water might be available for South of the Delta contractors.

Page 61. There is a reference to 4,133 taf/year as the "maximum Delta SWP Table A." The term Delta should be dropped and the reference should be only to "maximum SWP Table A."

Pages 62-68. Same comment as for Chapter 6. The discussion of differences between essentially identical modeling results is too long and should be truncated. The summary of results starting at page 68 could suffice for this entire discussion.

DEPARTMENT OF WATER RESOURCES
1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 94236-0001
(916) 653-5791

May 25, 2012

Terry L. Erlewine
General Manager
State Water Contractors
1121 L Street, Suite 1050
Sacramento, California 95814-3944

Dear Mr. Erlewine,

This letter is in response to your letter dated March 12, 2012 providing the comments of the State Water Contractors. I appreciate you and your members taking the time to review the Draft 2011 SWP Delivery Reliability Report and providing feedback. Our responses to your comments are attached.

If you or your staff wish to discuss this report further, please contact me at (916) 653-1099 or kkelly@water.ca.gov. For specific questions regarding the analyses used for the report, please contact Francis Chung at (916) 653-5924.

Sincerely,

Katherine Kelly

Katherine F. Kelly, Chief
Bay-Delta Office

Attachment:

Attachment

The following responses are to the comments provided in the March 12, 2012 letter from the State Water Contractors. The comments are shown in italics.

Figure 2-2. This figure shows only inflows and outflows to the Delta, and does not provide information on the magnitude of total flows in the watershed or total outflow. A graph similar to that prepared for the Delta Vision that places the total disposition of water supply into context would be helpful.

> We have updated this figure to include a more thorough mass balance of the Delta.

Page 13. Discussion of how operations are coordinated with the CVP should reference the Coordinated Operation Agreement, which is the basis for that coordination.

> We have updated the text on page 13 to mention the Coordinated Operation Agreement with language similar to that used in the sidebar on page 14 of the report.

Page 23. There is discussion of how individual SWP contractors manage their water supplies annually on the basis of available water supply. That kind of annual information is not the data that is contained in the Delivery Reliability Report and is provided separately by DWR's Operations Control Office. The discussion here reads as though the Delivery Reliability Report provides that information.

> We have updated the language on page 23 to clarify the type of information that can be found in the SWP Delivery Reliability Report.

Page 27. The discussion of the status of the 2008 and 2009 Biological Opinions is not very informative. This discussion should expand briefly on Judge Wanger's opinion that the current BOs are "arbitrary, capricious and unlawful" and are currently being redone. The discussion should also note that a preliminary injunction was issued enjoining implementation of Fall X2 action of the 2008 Delta Smelt Biological Opinion. Additionally, DWR and other plaintiffs in the case have option to file actions challenging provisions of the Biological Opinions on a continuing basis until new BOs are developed.

> Staff from the Bay-Delta Office coordinated with DWR's Office of the Chief Counsel on this section and they felt that this section should be a factual summary of the assumptions and criteria used to operate the projects. As a result, discussion of the related litigation is kept to a minimum.

Chapter 5. The SWC question that there is any need for this chapter in this report as this goes beyond the issue of delivery reliability. If DWR wants to report on the topic of exports separately, it should do so in a separate report to meet whatever purpose is identified. If DWR insists of having a chapter on exports, it should be moved to later in the report, after Chapters 6 and 7, which identify the basis for the studies reported on in the export chapter.

We have placed the "Exports" chapter before the "Deliveries" chapters simply because the exports precede deliveries in operations. Reordering chapters would cause significant rewriting to maintain document flow. We prefer to leave the content intact for the current report but we also want to consider the points you have brought up regarding exports as we start to formulate ideas for content to be included in the 2013 SWP Delivery Reliability Report.

Page 37. The statement is made that Delta exports are the only SWP water supply source for 24 of the 29 SWP contractors. In fact, local runoff occasionally provides significant quantities of water supply in some wet years.

The language on page 37 has been modified to clarify that Delta exports are not the only source of SWP water for the contractors.

Page 38. The reference to "Upper Feather River Area contractors" should drop the term "Upper" and refer simply to the "Feather River contractors." The City of Yuba City is located on the lower Feather River.

We agree completely and have removed the term "upper" from the Feather River description throughout the report and technical addendum.

Page 38. The discussion of water types is incomplete and confusing. It should either be expanded or dropped. Additionally, the word "surplus" should not be used in relation to Article 21 Water. Surplus water has a distinct meaning under the SWP Water Supply Contracts that is different than Article 21 Water.

We have made some modifications to the discussion of water types so it will, hopefully, be more clear now. We have also taken out the word "surplus" when describing Article 21 deliveries, per your suggestion.

Figure 5-2. This graph would be better presented as a line graph than as a bar graph.

We feel that the current graph format is aesthetically more consistent with the report layout.

Page 41. The discussion presents results on existing and future conditions, without describing those conditions. This discussion would be enhanced if the entire Chapter 5 was included after Chapters 6 & 7, which are where the existing and future conditions are described.

We have added text to this section to direct the reader to chapters 6 and 7 for more information regarding the assumptions for modeling existing and future conditions.

Page 44. There is discussion of differences between the 2009 and 2011 Delivery Reliability Report that are not really meaningful and are totally within the margin of error for the modeling analysis. Rather than show repeated figures portraying these meaningless differences between the two reports, it would be preferable to abbreviate the text and figures and include a high level statement that the two reports are essentially identical.

We have condensed the discussion of differences between the 2009 and 2011 report and removed some figures. Here is a list of changes for Chapter 5:

- The discussion in *Average, Maximum, and Minimum Annual Delta Exports* on page 41 of the Draft has been reduced
- Figure 5-3 has been replaced with the new Table 5-1
- Percent changes in Table 5-3 (formerly Table 5-2) have been removed and the discussion of existing exports by water year type has been reduced
- Percent changes in Table 5-4 (formerly Table 5-3) have been removed and the discussion of future exports by water year type has been reduced
- Figures 5-5, 5-6 and 5-7 have been removed
- The discussion in *Likelihood of SWP Exports—Existing and Future Conditions* section has been reduced

Page 48. The discussion of the basis for local demands changing highlights water conservation as the only specific example of those changes. A much more important factor would be local management (i.e., local storage) within the service area.

We have updated this section per your suggestion.

Page 48. There is a reference to Kern Wet Year as the basis for variation in Article 21 Water demands, but no explanation of why that would be a factor. It would be useful to state that Kern River inflows are a major local water supply variable in Kern County Water Agency, which is the second largest SWP contractor and possesses significant local groundwater recharge potential.

We have updated this section per your suggestion.

Page 51-53. As pointed out earlier, there is extensive discussion and numerous figures are presented to show the differences between the 2009 and 2011 Delivery Reliability Reports, which are essentially not meaningful and within the margin of error of the studies. Rather than included repetitive slides showing the same information, this section should be substantially reduced. In fact, the summary of results presented on Page 57 would suffice for all the presentation starting on page 51 and continuing to Page 57.

We have condensed the discussion of differences between the 2009 and 2011 report and removed some figures. Here is a list of changes for Chapter 6:

- Figure 6-1 has been replaced with new Table 6-1
- Figure 6-5 has been replaced with new Table 6-2 and the discussion in the *SWP Table A Water Deliveries* section has been reduced.
- Figure 6-7 has been removed
- Figures 6-8 and 6-9 have been replaced with new Tables 6-3 and 6-4 and the discussion of Dry-Year and Wet-Year Table A deliveries has been reduced on Draft page 53
- The discussion of *SWP Article 21 Water Deliveries* on Draft page 55 has been reduced
- The discussion of Dry-Year and Wet-Year Article 21 deliveries has been reduced on Draft page 57 and Figures 6-12 and 6-13 have been replaced with new Tables 6-5 and 6-6
- The Summary of Results for existing conditions have been worked into the main chapter text

Page 57. In discussion the Dry year deliveries of Article 21 Water, there is no indication of the location of those deliveries. Given regulatory restrictions in place, it is likely that all the Article 21 Water Deliveries are made to the SWP contractors located north of the Delta. If so, that should be stated. Otherwise, the reader is left with the impression that Article 21 Water might be available for South of Delta contractors.

Most of the Article 21 deliveries shown in the report for Dry years are for contractors south of the Delta. It happens during a few months under these conditions:

1. There is a low allocation
2. San Luis is full
3. Banks has capacity for pumping
4. Delta is in surplus conditions

Page 61. There is a reference to 4,133 taf/year as the "maximum Delta SWP Table A." The term Delta should be dropped and the reference should be only to "maximum SWP Table A."

This is meant to clarify that the results being presented are specific to those contractors that rely on delivery of water from the Delta. If we used "maximum SWP Table A" the value would be 4,172 taf/year.

Page 62-68. Same comment as for Chapter 6. The discussion of differences between essentially identical modeling results is too long and should be truncated. The summary of results starting at page 68 could suffice for this entire discussion.

We have condensed the discussion of differences between the 2009 and 2011 report and removed some figures. Here is a list of changes for Chapter 7:

- Figure 7-1 has been replaced with new Table 7-1
- The discussion in *Future Deliveries of SWP Table A Water* on Draft page 62 has been reduced
- Figure 7-3 has been removed
- Figures 7-4 and 7-9 have been replaced with new Tables 7-2 and 7-3 and the discussion of Dry-Year and Wet-Year Table A deliveries has been reduced on Draft page 64
- The discussion of *SWP Article 21 Water Deliveries* starting on Draft page 64 has been reduced
- The discussion of Dry-Year and Wet-Year Article 21 deliveries starting on Draft page 66 has been reduced and Figures 7-8 and 7-9 have been replaced with new Tables 7-4 and 7-5

La Entrada Water Supply Assessment

Appendix A
Water Supply Planning Documents

Part 2
Final Subsequent Program Environmental Impact Report Coachella Valley Water Management Plan Update, June 2012

COACHELLA VALLEY WATER DISTRICT

Final Subsequent Program Environmental Impact Report
Coachella Valley Water Management Plan Update

SCH No. 2007091099
JANUARY 2012

WATER DISTRICT

MWH®
BUILDING A BETTER WORLD

Water Consult
Engineering and Planning Consultants

COACHELLA VALLEY WATER MANAGEMENT PLAN 2010 UPDATE

Final
Subsequent Program Environmental Impact Report
SCH No. 2007091099

Prepared by:

Coachella Valley Water District

P.O. Box 1058
Coachella, California 92236
(760) 398-2651

Steve Robbins
General Manager-Chief Engineer

Patti Reyes
Planning and Special Program Manager

With Assistance from MWH Americas, Inc.
and Water Consult, Inc.

January 2012

Table of Contents

This document, together with the separately bound Draft SPEIR, constitute the Final SPEIR for the Coachella Valley Water Management Plan Update.

Section Name **Page Number**

Section 12
Additions and Corrections

The following items are corrections to minor errors, updates to or amplifications of statements in the Draft SPEIR. Text inserts are shown as underlined and deletions are shown in ~~overstrike~~ format. No significant new information is presented.

1. Table 1-2 is hereby modified as shown on the following pages.

2. The last paragraph on Page 3-7 is modified as follows:

Based upon these scenarios, between ~~292,000~~ 302,000 and ~~453,000~~ 464,000 AFY of additional water supplies (over present) and conservation would be required to meet projected demands in 2045 while providing 10 percent supply buffer, eliminating groundwater overdraft and improving the salt balance of the basin. These supplies represent needs under average hydrologic conditions. The QSA invalidation was based on the lack of quantification for the State's monetary share of Salton Sea mitigation. The QSA parties are working to resolve the issues that resulted in invalidation and are committed moving forward with the QSA. Therefore, the range of additional future supply need is assumed to be ~~292,000~~ 302,000 to ~~325,000~~ 336,000 AFY.

3. Table 3-2 on Page 3-8 is replaced with the following:

Table 12-2
Future Water Supply Scenarios Considered in 2010 WMP Update

Supply Scenario	Delta Conveyance	QSA Valid	Additional Supply Required in 2045 (AFY)
1	Yes	Yes	302,100
2	No	Yes	335,500
3	Yes	No	430,100
4	No	No	463,500

MWH and Water Consult, 2010.

4. The last sentence of the second paragraph of **Section 3.1.5.1 – Water Conservation** on Page 3-9 is modified as follows:

In addition to water conservation included in the baseline water demand projections, the 2010 WMP Update includes at least ~~106,200~~ 117,300 AFY of additional water conservation by 2045. This amount could increase to 147,000 AFY.

5. The last paragraph on Page 3-12 is modified as follows:

As described in **Section 3.1.3,** given uncertainties in the California water supply picture, the average amount of additional imported supply required is in the range of ~~45,000~~ 50,000 to 80,000 AFY. The higher value assumes successful implementation of the BDCP and Delta conveyance facilities while the lower value is based on reduced future SWP reliability (to 50 percent). Of this amount, up to 35,000 AFY would be required to meet future demands in the Indio and Coachella portions of planning area east of the San Andreas fault. Should development in this area occur at a lesser level, less additional water will be required. The amount of additional transfers required do not include additional water needs for the Mission Creek-Garnet Hill water management area which is the subject of a separate water management plan.

6. Table 3-3 page 3-23 is hereby modified as follows:

Table 3-3
2010 WMP Update – Implementation Plan

Plan Element	Responsible Entity(ies)	Completion Year	Environmental Impact Potential
Water Conservation Program			
1. Adopt 2009 CVWD/CVAG Landscape Ordinance or equivalent that meets State requirements	CVWD, ~~DWA,~~ water purveyors, cities, Riverside County	Ongoing	Overall beneficial impact on groundwater volumes; reduction in percolation to groundwater over existing irrigation practices (Section 6); reduced energy use (Section 8)
2. Establish urban water conservation baseline	CVWD, DWA, other urban water purveyors	~~2011~~ Completed	No impacts – study only

7. Southern California Association of Governments (SCAG) Regional Transportation Plan Goal 6 (RTP G6) was not included in the Draft SPEIR and is hereby added to Table 8-2, page 8-11. RTP G6 is "Encourage land use and growth patterns that complement our transportation investments." Under the Statement of Consistency with Coachella Valley 2010 Water Management Plan Update, the response is: "Not Applicable: CVWD has no authority over or responsibility for transportation systems or for land use and growth planning." Therefore, this addition involves no new significant impacts or mitigation measures.

SCAG Growth Vision Principle 3.3 (GV P3.3) is included in the SPEIR Table 8-2, page 8-18. The following statement is hereby added: "CVWD facilities siting considers only water, wastewater and flood control service requirements, regardless of race, ethnicity or income class." Therefore, this addition involves no new significant impacts or mitigation measures.

8. The last sentence on page 6-49 and the top of page 6-50 is hereby modified as follows: "Areas where shallow groundwater levels are at or near the ground surface may adversely impact the operation of individual, ~~and~~ small community and reservation wastewater systems that use septic tanks and leach fields."

9. On page 8-62 paragraph 5 is hereby modified as follows: "For the 2010 WMP Update, the movement of recharge water was also evaluated by running the Coachella Valley groundwater model using updated input conditions. The groundwater model estimates, as under the 2002 Plan, water quality changes from recharge with Colorado River water would affect the groundwater supply of the Torres-Martinez tribe in the East Valley in wells near the recharge facilities and the wells of the Agua Caliente tribe in the West Valley (**Figure 8-2**). The impact on affected water quality in the Basin, in a relative sense, was considered to be potentially significant, as described in Section 6, Groundwater Resources, because salinity would increase. Specifically, the tribes' wells, and all other basin wells, will experience increased salinity over time because of groundwater pumping, use within the basin, and evapotranspiration that leaves behind the salt in the water. Any use of imported water, whether for direct delivery or recharge, brings additional salt to the Valley that would increase the rate of basin salinization." However, it must be noted that a degradation in water quality alone does not necessarily equate to a "substantial interference with the beneficial use or ownership of ITAs." Here, even though there would be an increase in salinity, the resulting water quality would still meet primary health-based water quality standards, and the tribes would be able to use this water for residential, commercial, industrial, and agricultural land uses. Thus, the Project's impact on the beneficial use of ITA, while adverse, would still be less than significant." These additions and corrections involve no new significant impacts or mitigation measures.

10. The following is hereby inserted on page 8-69, following ITA-1, in Section 8.9.4 Mitigation Measures:

The analysis of impacts from the Proposed Project indicates that primary health-based drinking water quality standards will not be exceeded due to the Project and therefore the impacts will be less than significant. Mitigation measure ITA-1 is primarily included as a backup measure to assure that health-based drinking water quality is protected if unforeseen circumstances arise.

11. Labeling of tribal lands on SPEIR Figures 8-2 and 8-3, pages 8-65 and 8-67, respectively, is hereby modified (see revised figures on the following pages). The rectangular area of land immediately south of the word "Cabazon," should be labeled "29 Palms," and that designation should appear in the legend. The section shown immediately northwest of Mecca should be labeled "Cabazon." These additions and corrections involve no new significant impacts or mitigation measures.

12. Mitigation measure ITA-2 is hereby modified as follows to be inclusive of all individual and small community wastewater systems. ITA-2 is hereby renamed GW-3, deleted from page 8-69 and inserted in page 6-63 following mitigation measure GW-2. The text is hereby revised as follows:

~~ITA-2~~ GW-3: Should shallow groundwater rise as a result of implementation of the Water Management Plan, rather than the result of especially high precipitation, to the extent that the function of septic tanks or ~~cesspits~~ leach fields of individuals or small communities, including those on tribal land is impaired, CVWD will work with the affected ~~tribe~~ entities to connect them ~~the affected tribal community~~ to the CVWD sewage collection system. Connection to the CVWD system is voluntary on the part of the affected tribe. If a tribe wants to connect to the CVWD ~~service area~~ system but is outside its service area boundaries, CVWD could annex the tribal land unless the tribal land is within another agency's service area (i.e., ~~Salton Sea Community Services District~~ City of Coachella or Valley Sanitary District). To date, affected tribes have indicated interest in connections to CVWD's systems.

These additions and corrections involve no new significant impacts or mitigation measures.

Table 1-2 (Continued)
Summary of Proposed Project Impacts and Mitigation Measures
(Replace page 1-21)

Category	Impact Discussion	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
Air Quality (continued)	• Pollutant emissions from operation of Valley facilities: pumping stations, combustion engines from equipment and vehicles, treatment facilities, etc.	Potentially Significant	Second tier CEQA documents will contain operations-related mitigation to further reduce less than significant impacts: • Maintain operations equipment in proper tune. • Select operations equipment (including pumps and motors) considering low-emission factors and energy efficiency. • Pumping stations will have electric power.	Less than Significant
	• Air pollutant emissions from energy generation to power Valley facilities including desalination if implemented. • Air pollutant emissions from energy generation for water importation may exceed state thresholds; emissions on the grid may be outside SCAQMD air basin.	Potentially Significant; not mitigable by CVWD	• CVWD will expand use of alternative fuels for its operations. • CVWD will coordinate with SCE and IID on long-term future energy demands. • SCE, ~~and~~ IID and other electricity providers on the grid will mitigate emissions from their systems.	Less than Significant with Mitigation by others
	• Sensitive receptors (schools, hospitals, residences, etc.) may be affected by construction and operational air pollutant emissions.	Potentially Significant	• Locations of sensitive receptors will be identified in second tier documents. • Second tier CEQA documents shall also state that emissive wastewater treatment and other facilities will be enclosed and have odor control devices, as necessary.	Less than Significant

Table 1-2 (Continued)
Summary of Proposed Project Impacts and Mitigation Measures
(Insert after page 1-25)

Category	Impact Discussion	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
Groundwater Levels and Drainage	• Rising shallow groundwater levels could affect the functioning of septic tanks and leach fields that serve individuals, small communities and reservations.	Potentially Significant	• Should shallow groundwater levels rise as a result of implementation of the WMP, rather than the result of especially high precipitation, to the extent that the function of septic tanks or leach fields is impaired, CVWD will work with the affected individual, small community or tribe to connect them to the CVWD sewage collection system. Connection to the CVWD system is voluntary on the part of an affected tribe.	Less Than Significant with Mitigation
Groundwater Levels and Drainage	• Shallow groundwater levels will rise as a result of the proposed project. The existing agricultural drain system will require maintenance and replacement to ensure continued land drainage. As urban development occurs in locations susceptive to shallow perched groundwater, the existing drainage system will need to be replaced.	Potentially Significant	• CVWD will replace and rehabilitate its existing agricultural drains as part of its ongoing operation and maintenance responsibilities. • CVWD is working on legislation to for urban drainage districts in the East Valley, to be funded by developers • Developers will be responsible for the construction of new drains in urbanizing areas through funding the operation of drainage districts.	Less than Significant with Mitigation

Table 1-2 (Continued)
Summary of Proposed Project Impacts and Mitigation Measures
(Replace page 1-28)

Category	Impact Discussion	Significance Before Mitigation	Mitigation Measures	Significance After Mitigation
Indian Trust Assets	• ~~No~~ Less than significant impact on ITA land ownership or beneficial use • ~~Reduced depth to water~~ Increased water levels in producing wells. • Recharged water in East Valley predicted to affect the TDS of nearby Torres-Martinez wells, but not substantially affect ITA beneficial use. • Current and future recharge in West Valley predicted to affect the TDS of Agua Caliente wells, but not substantially affect ITA beneficial use. • No other tribal wells affected.	Less than Significant for land ownership and beneficial use ~~Potentially~~ Less than Significant for groundwater quality effects on beneficial use of ITA Beneficial Effect for reduced depth to water	• Should additional recharge with Colorado River water under the Proposed Project cause any Torres Martinez or Agua Caliente domestic drinking water well to exceed any recognized health-based drinking water quality standard, CVWD and DWA will work with the tribes to bring the drinking water supply of the tribes into compliance by providing domestic water service to the tribes from CVWD's or DWA's respective domestic water system or by providing appropriate well-head treatment.	~~Potentially~~ Less than Significant ~~for groundwater quality~~ (Mitigation included as additional protection)
Traffic, Access and Transportation	• Construction could temporarily interfere with emergency evacuation routes.	Potentially Significant	• Second tier CEQA documents will require that emergency service providers (fire, police, and ambulance) be provided with construction contact names, locations, and schedules and traffic plans, if applicable, prior to the start of construction.	Less than Significant

13. The following references are hereby added to Appendix A:

DWR. 2011. California Statewide Groundwater Elevation Monitoring (CASGEM) Program. Available: http://www.water.ca.gov/groundwater/casgem/

GEI, in association with CH2MHILL, MWH and Dahl Consultants. 2011. SWP Extension Project Development Plan, Draft Final Phase 2 Report (unpublished). Prepared for CVWD, DWA, Metropolitan, Mojave Water Agency and San Gorgonio Pass Water Agency, April 2011.

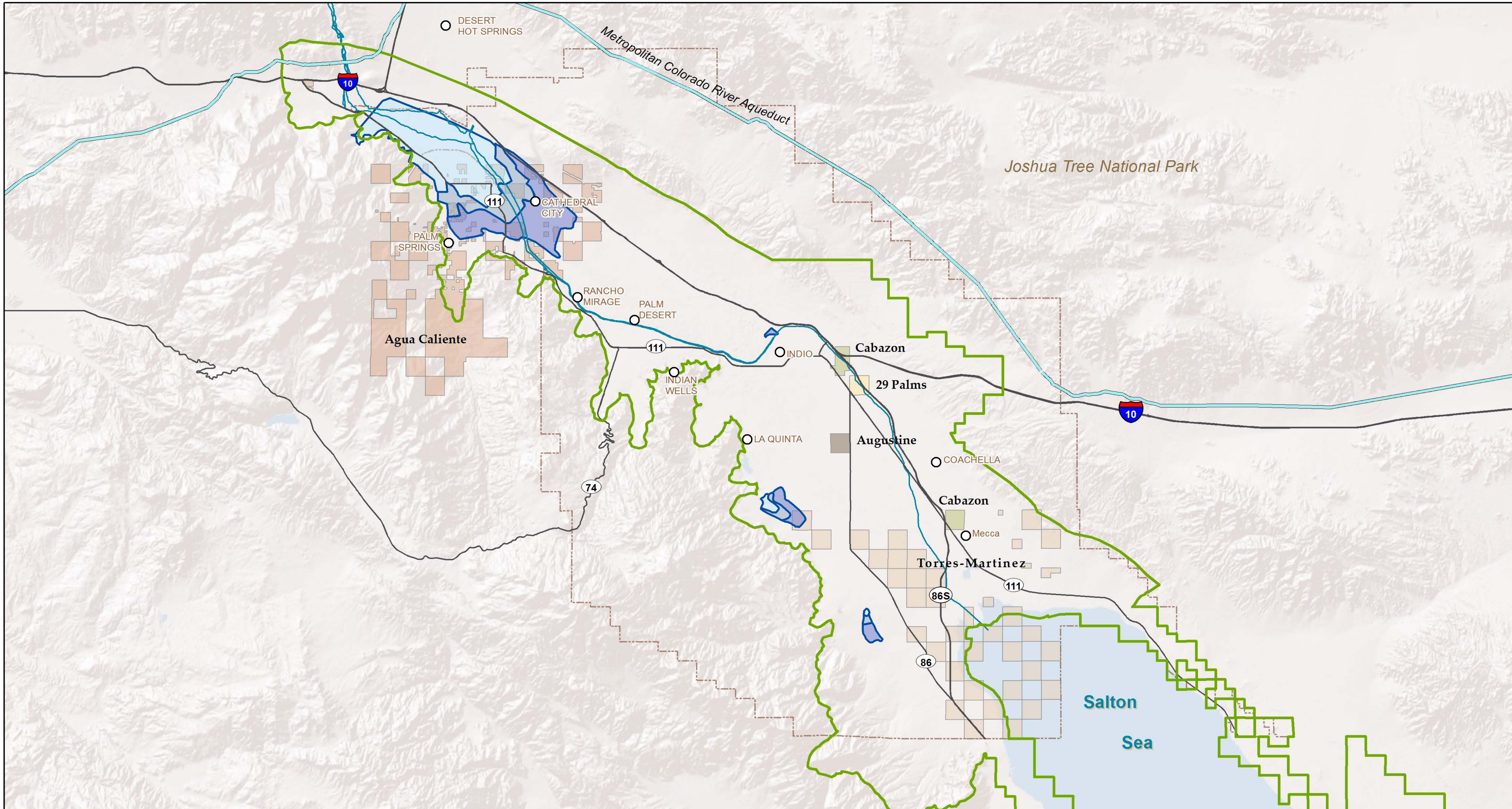
Malcolm Pirnie. 2008a. Phase 2 Draft Surface Water Treatment Process Evaluation Report. Prepared for CVWD. July 2008.

-----. 2008b. Feasibility Study for Full-Scale Brackish Groundwater Treatment Facility. Prepared for CVWD, October, 2008.

Metropolitan, 2010c. Regional Urban Water Management Plan, November 2010.

Superior Court of California. 2010. Judge Roland Candee's judgment on the QSA (Judicial Council Proceeding No. 43530, February 11, 2010.

Hasencamp, et al., pers. comm. 2011. Personal communication with Bill Hasencamp, Joe Vanderhorst, Michael Yu of Metropolitan Water District of Southern California, November 1, 2011.



Key to Features

- Cities
- Aqueduct
- Highways
- Study Area
- CVWD

Tribal Land

- Agua Caliente
- Augustine
- 29 Palms
- Cabazon
- Torres-Martinez
- 1973-2009 Recharge Plume
- 2009-2020 Recharge Plume
- 2020-2045 Recharge Plume

N

0 2.75 5.5 Miles

Document: \Coachella Valley WD\WMP Update\14 Electronic Files - Modeling\GIS\Projects TribalLands.mxd

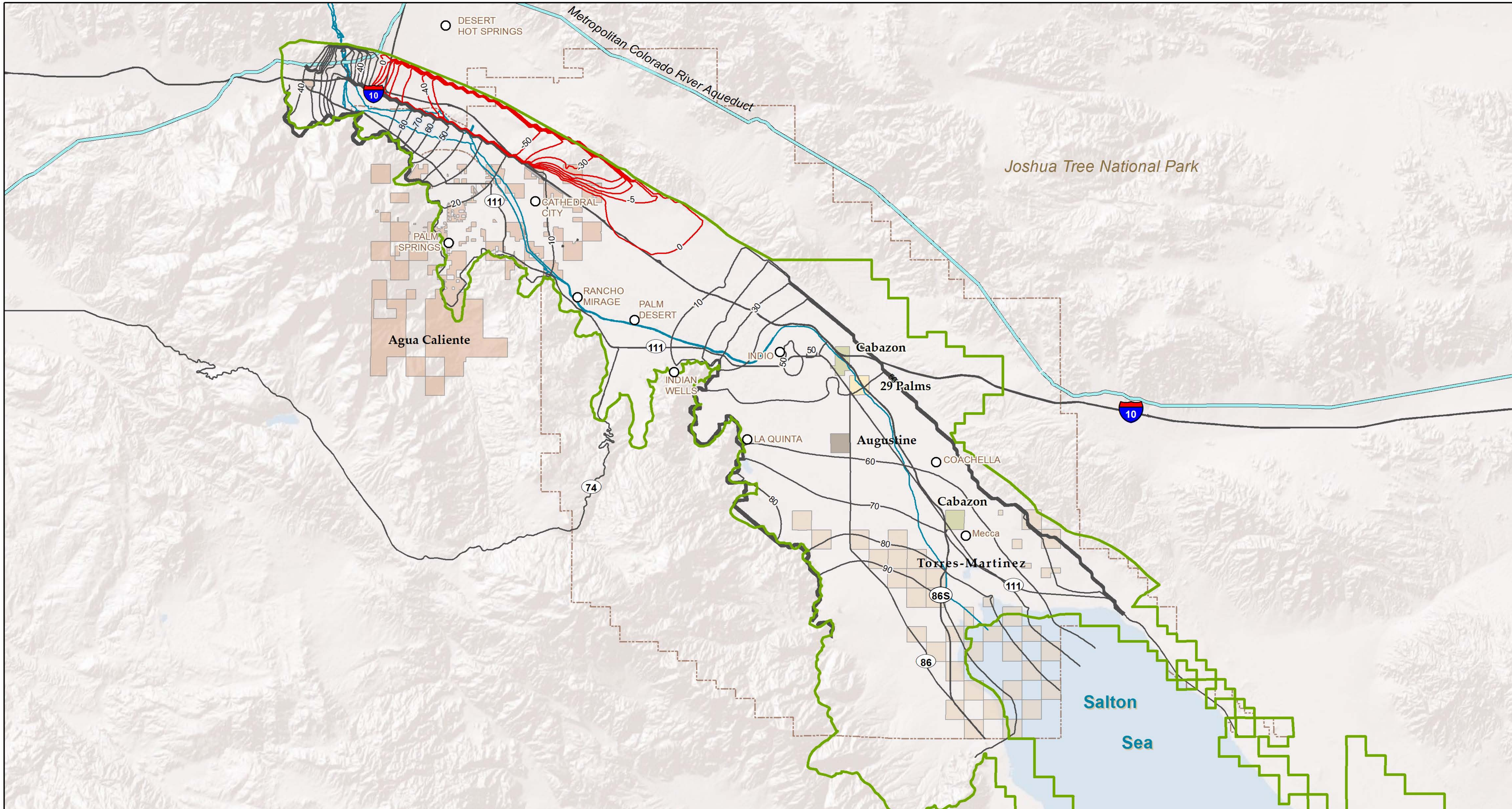
Date: November 2011

Source: DWR, ESRI, County of Riverside

Tribal Lands Potentially Affected by Recharge

Figure 8-2

MWH



Document: \Coachella Valley WD\WMP Update\14 Electronic Files - Modeling\GIS\Projects GWChange.mxd

Date: November 2011 Source: DWR, ESRI, County of Riverside

Change in Ground Water Elevation in Tribal Lands

Figure 8-3

MWH

Section 13
Comments Received and Reponses to Comments

13.1 WRITTEN COMMENTS RECEIVED ON THE DRAFT SPEIR

The following lists the seven entities that provided comments on the Draft Subsequent Environmental Impact Report (SPEIR) for the Coachella Valley Water Management Plan Update. This section presented each comment letter followed by the CVWD responses to each comment letter.

The CEQA public comment period was August 9 through September 22, 2011. Six comments were received during the comment period. In addition, the State Clearinghouse provided a letter indicating the comment period had closed. The U.S. Bureau of Indian Affairs comment letter was dated September 28, 2011 and received after the comment period was closed. CVWD has elected to prepare a response.

Written Comments Received on the Draft SPEIR

Comment Letter Number	Name	Agency/Entity	Page
1	Ben R. Johnson, Planning and Development Supervisor	Strategic Planning Bureau Riverside County Fire Department	13-1-1
2	Dave Singleton Program Analyst	Native American Heritage Commission	13-2-1
3	Jacob Lieb, Manager Environmental and Assessment Services	Southern California Association of Governments	13-3-1
4	Thomas J. Davis, Chief Planning and Development Director	Agua Caliente Band of Cahuilla Indians	13-4-1
5	Scott Morgan, Director	State Clearinghouse	13-5-1
6	Robert Eben, Superintendent	U.S. Bureau of Indian Affairs	13-6-1
7	Christopher S. Harris Acting Executive Director	Colorado River Board	13-7-1

13.2 ORAL COMMENTS RECEIVED AT THE PUBLIC MEETING ON THE SPEIR

A public meeting on the Draft SPEIR was held on September 7, 2011 at CVWD Headquarters, Palm Desert, CA. The Public Meeting notice was included in the Notice of Availability for the Draft SPEIR. There were five attendees at the public meeting, in addition to CVWD staff and consultants, all from the Cabazon Tribe of Mission Indians.

All comments were made by members of the Cabazon Band. All comments were responded to at the meeting by Patti Reyes, CVWD, David Ringel, MWH and Janet Fahey, MWH. No additional responses are deemed necessary.

1. Tribal Chairman Roosevelt asked about private well metering and tribal water use. Patti Reyes explained that CVWD has staff that work with private pumpers to gain the participation in the Replenishment Assessment Program, but that the purpose of the meeting today and the Coachella Valley Water Management Plan is to look at total water needs of the Valley now and in the future.

2. Chairman Roosevelt asked for an explanation of what subsidence is for his younger tribal members. David Ringel explained how soils can collapse when water in soil is withdrawn, causing the overlying materials to fall and affect the foundations or buildings and other infrastructure.

3. Chairman Roosevelt asked if CVWD will try to limit water use. Patti explained that the goal of the Water Management Plan is to ensure enough water is available for future use for the entire planning area.

4. Chairman Roosevelt asked if Salton Sea levels will decrease. Janet Fahey explained that sea levels are projected to decrease rapidly with the cessation of supplemental water inputs from Imperial Irrigation District. As the sea level declines, more shoreline will be exposed, creating a potential for dust emissions. The Water Management Plan will mitigate for its contribution to projected air quality effects (if maximum desalination is implemented) by participation in the QSA 4-step program. Janet also explained that most of the decrease in flow to the sea is from the south end (Imperial Valley); the Coachella Valley contributes only about 6 percent of the total inflow.

5. Chairman Roosevelt asked how much brine would be created by desalinating drain water. David explained that approximately 20 percent of the desalinated water becomes brine, so if maximum desalination is implemented (85,000 acre-feet per year, AFY) about 15,000 to 20,000 AFY would become brine requiring disposal—unless a zero discharge method is employed. Brine management techniques would be evaluated with the desalination project in the future

6. Chairman Roosevelt was interested in possible reuses of the brine, especially if dried to a solid. Several possibilities were discussed and may be revisited in the future. David explained that the Torres Martinez tribe was interested in developing brackish wetlands adjacent to the Salton Sea using the brine.

RIVERSIDE COUNTY FIRE DEPARTMENT
IN COOPERATION WITH
THE CALIFORNIA DEPARTMENT OF FORESTRY AND FIRE PROTECTION

John R. Hawkins ~ Fire Chief
210 West San Jacinto Avenue ~ Perris, CA 92570
(951) 940-6900 ~ www.rvcfire.org

August 11, 2011

Ms. Patti Reyes
Coachella Valley Water District
P.O. Box 1058
Coachella, CA 92236

RE: RCFD response to Draft Subsequent Program EIR, Water Management Plan

Ms. Reyes,

RCFD is in receipt of your Notice of Document Availability for the above referenced project. Thank you for the opportunity to review this EIR. RCFD believes all impacts have been adequately addressed as they pertain to fire and EMS services and has no further comments.

The California Fire Code outlines fire protection standards for the safety, health, and welfare of the public. These standards will be enforced by the Fire Chief.

If I can be of further assistance, please contact me at 951.940.6308 or ben.johnson@fire.ca.gov .

Thank you,

Ben R. Johnson, AICP
Planning & Development Supervisor
Strategic Planning Bureau

1. Response to: Ben Johnson, Planning & Development Supervisor, Riverside County Fire Department

Comment noted. Thank you.

STATE OF CALIFORNIA Edmund G. Brown, Jr., Governor

NATIVE AMERICAN HERITAGE COMMISSION
915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
(916) 653-6251
Fax (916) 657-5390
Web Site www.nahc.ca.gov
ds_nahc@pacbell.net

REC'D SEP 12 2011 CVWD

ORIG/EML: P REYES
M JOHNSON
L STOWE
S BIGLEY
J BARRETT
FILE: 0643.511

August 29, 2011

Ms. Patti Reyes, Planning and Special Program Manager
Coachella Valley Water District
P.O. Box 1058
Coachella, CA 92258

Re: SCH# 2007091099; CEQA Notice of Completion; draft Subsequent Environmental Impact Report (SEIR) for the **"Summary of Coachella Valley Water Management Plan 2010 Update"** located in the Coachella; Riverside County, California.

Dear Ms. Reyes:

The Native American Heritage Commission (NAHC), the State of California 'Trustee Agency' for the protection and preservation of Native American cultural resources pursuant to California Public Resources Code §21070 and affirmed by the Third Appellate Court in the case of EPIC v. Johnson (1985: 170 Cal App. 3rd 604). The NAHC wishes to comment on the proposed project.

This letter includes state and federal statutes relating to Native American historic properties of religious and cultural significance to American Indian tribes and interested Native American individuals as 'consulting parties' under both state and federal law. State law also addresses the freedom of Native American Religious Expression in Public Resources Code §5097.9.

The California Environmental Quality Act (CEQA – CA Public Resources Code 21000-21177, amendments effective 3/18/2010) requires that any project that causes a substantial adverse change in the significance of an historical resource, that includes archaeological resources, is a 'significant effect' requiring the preparation of an Environmental Impact Report (EIR) per the CEQA Guidelines defines a significant impact on the environment as 'a substantial, or potentially substantial, adverse change in any of physical conditions within an area affected by the proposed project, including ... objects of historic or aesthetic significance." In order to comply with this provision, the lead agency is required to assess whether the project will have an adverse impact on these resources within the 'area of potential effect (APE), and if so, to mitigate that effect. The NAHC Sacred Lands File (SLF) search resulted as follows: **Native American cultural resources were not identified** within one-half mile of the 'area of potential effect (APE). Note: the absence of recorded Native American cultural resources does not preclude their existence. The CVWD jurisdiction lies in a very culturally sensitive area.

The NAHC "Sacred Sites,' as defined by the Native American Heritage Commission and the California Legislature in California Public Resources Code §§5097.94(a) and 5097.96. Items in the NAHC Sacred Lands Inventory are confidential and exempt from the Public Records Act pursuant to California Government Code §6254 (r).

5 SCANNED

SCAN & SHRED 5.

2-1 Early consultation with Native American tribes in your area is the best way to avoid unanticipated discoveries of cultural resources or burial sites once a project is underway. Culturally affiliated tribes and individuals may have knowledge of the religious and cultural significance of the historic properties in the project area (e.g. APE). We strongly urge that you make contact with the list of Native American Contacts on the attached list of Native American contacts, to see if your proposed project might impact Native American cultural resources and to obtain their recommendations concerning the proposed project. Pursuant to CA Public Resources Code § 5097.95, the NAHC requests that the Native American consulting parties be provided pertinent project information. Consultation with Native American communities is also a matter of environmental justice as defined by California Government Code §65040.12(e). Pursuant to CA Public Resources Code §5097.95, the NAHC requests that pertinent project information be provided consulting tribal parties. The NAHC recommends *avoidance* as defined by CEQA Guidelines §15370(a) to pursuing a project that would damage or destroy Native American cultural resources and Section 2183.2 that requires documentation, data recovery of cultural resources.

2-2 Furthermore, the NAHC is of the opinion that the current project remains under the jurisdiction of the statutes and regulations of the National Environmental Policy Act (e.g. NEPA; 42 U.S.C. 4321-43351). Consultation with tribes and interested Native American consulting parties, on the NAHC list, should be conducted in compliance with the requirements of federal NEPA and Section 106 and 4(f) of federal NHPA (16 U.S.C. 470 *et seq*), 36 CFR Part 800.3 (f) (2) & .5, the President's Council on Environmental Quality (CSQ, 42 U.S.C 4371 *et seq.* and NAGPRA (25 U.S.C. 3001-3013) as appropriate. The 1992 *Secretary of the Interiors Standards for the Treatment of Historic Properties* were revised so that they could be applied to all historic resource types included in the National Register of Historic Places and including cultural landscapes. Also, federal Executive Orders Nos. 11593 (preservation of cultural environment), 13175 (coordination & consultation) and 13007 (Sacred Sites) are helpful, supportive guides for Section 106 consultation. The aforementioned Secretary of the Interior's *Standards* include recommendations for all 'lead agencies' to consider the historic context of proposed projects and to "research" the cultural landscape that might include the 'area of potential effect.'

2-3 Confidentiality of "historic properties of religious and cultural significance" should also be considered as protected by California Government Code §6254(r) and may also be protected under Section 304 of he NHPA or at the Secretary of the Interior discretion if not eligible for listing on the National Register of Historic Places. The Secretary may also be advised by the federal Indian Religious Freedom Act (cf. 42 U.S.C., 1996) in issuing a decision on whether or not to disclose items of religious and/or cultural significance identified in or near the APEs and possibility threatened by proposed project activity.

Furthermore, Public Resources Code Section 5097.98, California Government Code §27491 and Health & Safety Code Section 7050.5 provide for provisions for accidentally discovered archeological resources during construction and mandate the processes to be followed in the event of an accidental discovery of any human remains in a project location other than a 'dedicated cemetery'.

To be effective, consultation on specific projects must be the result of an ongoing relationship between Native American tribes and lead agencies, project proponents and their contractors, in the opinion of the NAHC. Regarding tribal consultation, a relationship built around regular meetings and informal involvement with local tribes will lead to more qualitative consultation tribal input on specific projects.

If you have any questions about this response to your request, please do not hesitate to contact me at (916) 653-6251.

Sincerely,

Dave

Dave Singleton
Program Analyst

Cc: State Clearinghouse

Attachment: Native American Contact List

California Native American Contact List
Riverside County
August 29, 2011

Cabazon Band of Mission Indians
David Roosevelt, Chairperson
84-245 Indio Springs — Cahuilla
Indio, CA 92203-3499
(760) 342-2593
(760) 347-7880 Fax

Los Coyotes Band of Mission Indians
Shane Chapparosa, Spokesperson
P.O. Box 189 — Cahuilla
Warner, CA 92086
loscoyotes@earthlink.net
(760) 782-0711
(760) 782-2701 - FAX

Ramona Band of Cahuilla Mission Indians
Joseph Hamilton, Chairman
P.O. Box 391670 — Cahuilla
Anza, CA 92539
admin@ramonatribe.com
(951) 763-4105
(951) 763-4325 Fax

Torres-Martinez Desert Cahuilla Indians
Mary Resvaloso, Chairperson
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org
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Torres-Martinez Desert Cahuilla Indians
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(760) 397-8146 Fax

Santa Rosa Band of Mission Indians
Mayme Estrada, Chairwoman
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srbcioffice@yahoo.com
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(951) 658-6733 Fax

Augustine Band of Cahuilla Mission Indians
Mary Ann Green, Chairperson
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Coachella, CA 92236
hhaines@augustinetribe.
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760-369-7161 - FAX

Morongo Band of Mission Indians
Michael Contreras, Cultural Heritage Prog.
12700 Pumarra Road — Cahuilla
Banning, CA 92220 — Serrano
(951) 201-1866 - cell
mcontreras@morongo-nsn.
gov
(951) 922-0105 Fax

This list is current only as of the date of this document.
Distribution of this list does not relieve any person of the statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is applicable for contacting local Native Americans with regard to cultural resources for the proposed SCH#2007091099; CEQA Notice of Completion; draft Subsequent Environmental Impact Report (SEIR); for the Summary of Coachella Valley Water Management Plan 2010 Update of the Coachella Valley Water District; Riverside County, California.

California Native American Contact List
Riverside County
August 29, 2011

Torres-Martinez Desert Cahuilla Indians
Diana L. Chihuahua, Vice Chairperson, Cultural
P.O. Boxt 1160 Cahuilla
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760) 397-0300, Ext. 1209
(760) 272-9039 - cell (Lisa)
(760) 397-8146 Fax

Cabazon Band of Mission Indians
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84-245 Indio Springs Cahuilla
Indio , CA 92203-3499
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(760) 347-7880 Fax

Agua Caliente Band of Cahuilla Indians THPO
Patricia Tuck, Tribal Historic Perservation Officer
5401 Dinah Shore Drive Cahuilla
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ptuck@augacaliente-nsn.gov
(760) 699-6924- Fax

Augustine Band of Cahuilla Mission Indians
Karen Kupcha
P.O. Box 846 Cahuilla
Coachella , CA 92236
(760) 398-6180
916-369-7161 - FAX

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Luther Salgado, Sr., , Chairperson
PO Box 391760 Cahuilla
Anza , CA 92539
tribalcouncil@cahuilla.net
915-763-5549

This list is current only as of the date of this document.
Distribution of this list does not relieve any person of the statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is applicable for contacting local Native Americans with regard to cultural resources for the proposed SCH#2007091099; CEQA Notice of Completion; draft Subsequent Environmental Impact Report (SEIR); for the Summary of Coachella Valley Water Management Plan 2010 Update of the Coachella Valley Water District; Riverside County, California.

2. Response to: Dave Singleton, Program Analyst, Native American Heritage Commission

2-1 CVWD has conducted periodic meetings with the Coachella Valley tribes over the past several years on a variety of topics, and has ongoing relationships with all of them. CVWD concurs that avoidance is the best approach to potential impacts on cultural resources and will continue to consult with the Valley tribes, the Native American Heritage Commission, the State Historic Preservation Officer, and local sources on cultural resources and perform cultural resources analyses as specific project sites are identified in the implementation of the Water Management Plan Update.

2-2 CVWD respectfully disagrees that the project is subject to NEPA, because the project is not being carried out by a federal agency, has no federal funding, and requires no federal permits or approvals. When specific sites are identified for proposed project elements, the National Register of Historic Places and Sacred Lands File and other applicable information sources will be consulted for each element’s area of potential effect (APE). NEPA compliance for individual projects will be completed if any elements are proposed to be sited on federal land.

2-3 Additional comments are noted. CVWD cultural resources analyses respect the confidentiality of resources locations and mitigation measures routinely address accidentally discovered resources and discovery of human remains in compliance with applicable government codes.

SOUTHERN CALIFORNIA

ASSOCIATION of GOVERNMENTS

Main Office

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August 31, 2011

Ms. Patti Reyes
Coachella Valley Water District
P.O. Box 1058
Coachella, CA 92236
(760) 398-2651

RE: SCAG Comments on the Draft Environmental Impact Report for the Coachella Valley Water Management Plan 2010 Update [SCAG No. I20110089]

Dear Ms. Reyes:

Thank you for submitting the **Draft Environmental Impact Report for the Coachella Valley Water Management Plan 2010 Update [SCAG No. I20110089]** to the Southern California Association of Governments (SCAG) for review and comment. SCAG is the authorized regional agency for Inter-Governmental Review of Programs proposed for federal financial assistance and direct development activities, pursuant to Presidential Executive Order 12372 (replacing A-95 Review). Additionally, pursuant to Public Resources Code Section 21083(d) SCAG reviews Environmental Impacts Reports of projects of regional significance for consistency with regional plans per the California Environmental Quality Act (CEQA) Guidelines, Sections 15125(d) and 15206(a)(1). SCAG is also the designated Regional Transportation Planning Agency and as such is responsible for both preparation of the Regional Transportation Plan (RTP) and Federal Transportation Improvement Program (FTIP) under California Government Code Section 65080 and 65082. As the clearinghouse for regionally significant projects per Executive Order 12372, SCAG reviews the consistency of local plans, projects, and programs with regional plans. This activity is based on SCAG's responsibilities as a regional planning organization pursuant to state and federal laws and regulations. Guidance provided by these reviews is intended to assist local agencies and project sponsors to take actions that contribute to the attainment of regional goals and policies.

SCAG staff has reviewed this project and determined that the proposed project is regionally significant per California Environmental Quality Act Guidelines, Sections 15125 and/or 15206. The proposed Water Management Plan Update includes address change in water supply reliability and in the environment for the planning period of 2010 - 2045. The proposed project seeks to meet current and future study area water demands, manage overdraft, manage water quality and minimize environmental impacts.

We have evaluated this project based on the policies of SCAG's Regional Transportation Plan (RTP) and Compass Growth Vision Principles that may be applicable to your project. The RTP and Compass Growth Visioning Principles can be found on the SCAG web site at: http://scag.ca.gov/igr. The attached detailed comments are meant to provide guidance for considering the proposed project within the context of our regional goals and policies. We also encourage the use of the SCAG List of Mitigation Measures extracted from the RTP to aid with demonstrating consistency with regional plans and policies. Please send a copy of the Final Environmental Impact Report (FEIR)
3-1 ONLY to SCAG's main office in Los Angeles for our review. If you have any questions regarding the attached comments, please contact Pamela Lee at (213) 236-1895. Thank you.

Sincerely,

JACOB LIEB, Manager
Environmental and Assessment Services

COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT REPORT FOR THE COACHELLA VALLEY WATER MANAGEMENT PLAN 2010 UPDATE [SCAG NO. I20110089]

PROJECT LOCATION

The study area for the proposed project is defined as the Coachella Valley floor and underlying groundwater basins, extending from north of the community of Whitewater on the northwest to the Salton Sea at the southeastern end and to the San Jacinto and Santa Rosa Mountains on the west. Encompassing an area of 1.2 million acres, the Coachella Valley floor is surrounded by the San Bernardino, San Jacinto, and Santa Rosa Mountains.

PROJECT DESCRIPTION

The Coachella Valley Water District (CVWD) provides water, wastewater and flood control services in the Coachella Valley. The CVWD has prepared an Update to the 2002 Coachella Valley Water Management Plan to address changes in water supply reliability and in the environment since publication of the 2002 Plan. The planning period is 2010 – 2045 and seeks to meet current and future study area water demands, manage overdraft, manage water quality and minimize environmental impacts.

The 2010 Water Management Plan (WMP) Update identifies ways and means of meeting future water needs through incorporating a flexible approach to meeting future needs through combinations of plan elements. Summary of the 2010 WMP Update elements are listed below:

- **Water conservation.** Urban, agricultural and golf. Example urban measures are water efficient plumbing and landscape water use audit programs.
- **Additional water sources.** Increasing surface supplies for the Valley from outside sources, exchanges, dry-year purchases, water development projects, stormwater capture and desalination.
- **Source Substitution**. Providing recycled water or Canal water or other sources to additional urban, golf and agricultural users to reduce groundwater pumping.
- **Groundwater recharge.** Constructing and operating recharge basins and facilities to augment stored groundwater and increase recharge.
- **Monitoring and data management.** Monitoring and evaluation of subsidence and groundwater levels and quality to provide the information needed to manage the Valley's groundwater resources.

CONSISTENCY WITH REGIONAL TRANSPORTATION PLAN

Regional Growth Forecasts

The Draft Environmental Impact Report (DEIR) should reflect the most recently adopted SCAG forecasts, which are the 2008 RTP (May 2008) Population, Household and Employment forecasts. The forecasts for your region, subregion, and city are as follows:

Adopted SCAG Regionwide Forecasts[1]

	2010	2015	2020	2025	2030	2035
Population	19,418,344	20,465,830	21,468,948	22,395,121	23,255,377	24,057,286
Households	6,086,986	6,474,074	6,840,328	7,156,645	7,449,484	7,710,722
Employment	8,349,453	8,811,406	9,183,029	9,546,773	9,913,376	10,287,125

Adopted Gateway Cities CVAG Subregion Forecasts[1]

	2010	2015	2020	2025	2030	2035
Population	507,318	590,368	712,462	827,009	929,522	1,045,814
Households	174,485	202,268	241,275	281,289	317,209	354552
Employment	196,475	220,121	244,519	267,606	289,564	315289

Adopted Riverside County Forecasts[1]

	2010	2015	2020	2025	2030	2035
Population	617,241	710,478	854,662	988,192	1,104,571	1,243,632
Households	195,391	225,127	274,912	318,088	357,579	401,356
Employment	144,184	181,733	220,862	260,399	300,196	337,791

1. The 2008 RTP growth forecast at the regional, subregional, and city level was adopted by the Regional Council in May 2008.

SCAG Staff Comments:

Page 8-4 indicates that the DEIR population, household and employment analyses were based on 2008 RTP Regional Growth Forecasts.

The **2008 Regional Transportation Plan (RTP)** also has goals and policies that are pertinent to this proposed project. This RTP links the goal of sustaining mobility with the goals of fostering economic development, enhancing the environment, reducing energy consumption, promoting transportation-friendly development patterns, and encouraging fair and equitable access to residents affected by socio-economic, geographic and commercial limitations. The RTP continues to support all applicable federal and state laws in implementing the proposed project. Among the relevant goals and policies of the RTP are the following:

Regional Transportation Plan Goals:

RTP G1 *Maximize mobility and accessibility for all people and goods in the region.*
RTP G2 *Ensure travel safety and reliability for all people and goods in the region.*
RTP G3 *Preserve and ensure a sustainable regional transportation system.*
RTP G4 *Maximize the productivity of our transportation system.*
RTP G5 *Protect the environment, improve air quality and promote energy efficiency.*
RTP G6 *Encourage land use and growth patterns that complement our transportation investments.*
RTP G7 *Maximize the security of our transportation system through improved system monitoring, rapid recovery planning, and coordination with other security agencies.*

SCAG Staff Comments:

Where applicable, SCAG staff finds that the proposed project partially meets consistency with Regional Transportation Plan Goals. RTP Goals G1, G2, G3, G4, and G7 are not applicable in that the proposed project is not a transportation project.

SCAG staff finds that the proposed project generally meets consistency with RTP G5. Per page 8-40 CVWD encourages energy efficiency by providing customers incentives through its Energy Rewards Rebate Program offered for qualifying energy efficient appliances and building improvements and maximizing energy efficiency of large equipment within CVWD's operations.

3-2 SCAG staff cannot determine consistency with RTP G6 based on the information provided in the DEIR.

COMPASS GROWTH VISIONING

The fundamental goal of the **Compass Growth Visioning** effort is to make the SCAG region a better place to live, work and play for all residents regardless of race, ethnicity or income class. Thus, decisions regarding growth, transportation, land use, and economic development should be made to promote and sustain for future generations the region's mobility, livability and prosperity. The following "Regional Growth Principles" are proposed to provide a framework for local and regional decision making that improves the quality of life for all SCAG residents. Each principle is followed by a specific set of strategies intended to achieve this goal.

Principle 1: Improve mobility for all residents.

GV P1.1 *Encourage transportation investments and land use decisions that are mutually supportive.*
GV P1.2 *Locate new housing near existing jobs and new jobs near existing housing.*
GV P1.3 *Encourage transit-oriented development.*
GV P1.4 *Promote a variety of travel choices*

SCAG Staff Comments:

SCAG staff finds that the proposed project partially meets consistency with Principle 1. Principles GV P1.2, GV P1.3 or GV P1.4 are not applicable in that the proposed project has no jurisdiction regarding the development of housing and jobs or transit.

3-3 SCAG staff cannot determine consistency with GV P1.1 based on the information provided in the DEIR.

Principle 2: Foster livability in all communities.

GV P2.1 *Promote infill development and redevelopment to revitalize existing communities.*
GV P2.2 *Promote developments, which provide a mix of uses.*
GV P2.3 *Promote "people scaled," walkable communities.*
GV P2.4 *Support the preservation of stable, single-family neighborhoods.*

SCAG Staff Comments:

SCAG staff finds that the proposed project meets consistency with Principle 2 in that the proposed project is not applicable. The CVWD does not have jurisdiction over regional or local land use or development patterns.

Principle 3: Enable prosperity for all people.

GV P3.1 *Provide, in each community, a variety of housing types to meet the housing needs of all income levels.*
GV P3.2 *Support educational opportunities that promote balanced growth.*

GV P3.3 *Ensure environmental justice regardless of race, ethnicity or income class.*
GV P3.4 *Support local and state fiscal policies that encourage balanced growth*
GV P3.5 *Encourage civic engagement.*

SCAG Staff Comments:

SCAG staff finds that the proposed project meets consistency with Principle 3 where applicable. Principles GV P3.1, GV P3.4 are not applicable in that the proposed project and lead agency have no authority over regional or local land use or development patterns.

SCAG staff finds the proposed project meets consistency with GV P3.2. Per pages 3-9 – 3-10, CVWD has ongoing public education and training efforts to promote water conservation, water recycling and water management.

3 -4 SCAG staff cannot determine consistency with GV P3.3 based on the information provided in the DEIR.

In regards to GV P3.4, the proposed project meets consistency. CVWD is actively involved in civic organizations and has held several public meetings regarding the 2010 WBP Update and SPEIR (Page 1-7).

Principle 4: Promote sustainability for future generations.

GV P4.1 *Preserve rural, agricultural, recreational, and environmentally sensitive areas*
GV P4.2 *Focus development in urban centers and existing cities.*
GV P4.3 *Develop strategies to accommodate growth that uses resources efficiently, eliminate pollution and significantly reduce waste.*
GV P4.4 *Utilize "green" development techniques*

SCAG Staff Comments:

Where applicable, SCAG staff finds that the project is consistent with Principle 4. GV P4.1 is not applicable in that the proposed project is not located in a rural, agricultural, recreational, or environmentally sensitive area.

The proposed project meets consistency with GV P4.2, as it is located within the jurisdictions of the cities of Palm Springs, Cathedral City, Rancho Mirage, Indian Wells, Palm Desert, Coachella, Indio and La Quinta in proximity to already developed areas. (Page 1-4)

In regards to GV P4.3 and GV P4.4, the proposed project will establish sustainability policies such as water and energy conservation through rate and curtailment programs as well as use of cleaner technologies. Also, CVWD headquarters will meet LEED Gold criteria to further promote 'energy savings, water efficiency, CO_2 emissions reduction, and stewardship of resources and sensitivity to their impacts. (Page 8-40)

CONCLUSION

3-5 Where applicable, the proposed project generally meets consistency with SCAG Regional Transportation Plan Goals and also meets consistency with Compass Growth Visioning Principles.

3-6 All feasible measures needed to mitigate any potentially negative regional impacts associated with the proposed project should be implemented and monitored, as required by CEQA. We recommend that you review the SCAG List of Mitigation Measures for additional guidance, and encourage you to follow them,

where applicable to your project. The SCAG List of Mitigation Measures may be found here:
http://www.scag.ca.gov/igr/documents/SCAG_IGRMMRP_2008.pdf

When a project is of statewide, regional, or area wide significance, transportation information generated by a required monitoring or reporting program shall be submitted to SCAG as such information becomes reasonably available, in accordance with CEQA, Public Resource Code Section 21081.7, and CEQA Guidelines Section 15097 (g).

3. Response to: Jacob Lieb, Manager, Environmental and Assessment Services Southern California Association of Governments

3-1 CVWD will send a copy of the Final SPEIR to SCAG's main office in Los Angeles, as requested.

3-2 RTP G6 was not included in the Draft SPEIR, but will be addressed in the Final SPEIR additions and corrections section as an addition to Table 8-2. RTP G6 is "Encourage land use and growth patterns that complement our transportation investments." Under the Statement of Consistency with Coachella Valley 2010 Water Management Plan Update, the response is: "Not Applicable: CVWD has no authority over or responsibility for transportation systems or for land use and growth planning. Land use and growth planning are the responsibility of the county of Riverside and the Coachella Valley municipalities" Therefore, this addition involves no new significant impacts or mitigation measures.

3-3 GV P1.1 is addressed in the Draft SPEIR in Table 2, bottom of page 8-17.

3-4 GV P3.3 is included in the Draft SPEIR Table 8-2. The response will be amended in the Final SPEIR additions and corrections section as an addition to Table 8-2 to add that "CVWD facilities siting considers water, wastewater and flood control service requirements, regardless of race, ethnicity or income class." Therefore, this addition involves no new significant impacts or mitigation measures.

3-5 The general consistency of the proposed Project with SCAG RTP goals and consistency with Compass Growth Visioning Principles is noted.

3-6 The citation of SCAG recommended mitigation measures is noted, as is the requirement of transportation information generated by a required monitoring or reporting program. Traffic will be considered in the construction and operation of individual project elements; no areawide transportation analysis is needed for the water management plan project.

The MMRP for the proposed Project therefore shall state: "Transportation information that results from a project-specific MMRP shall be submitted to SCAG periodically as results become reasonably available, over the course of project construction and operation, in accordance with CEQA, Public Resources Code Section 21081.7, and CEQA Guidelines Section 15097(g). Where transportation impacts are less than significant, mitigation of transportation impacts will not be provided in the MMRP. Tiered CEQA documents shall consider elements of the MMRP, Section 7 Table 1, in the SCAG 2008 RTP Final PEIR."

AGUA CALIENTE BAND OF CAHUILLA INDIANS

PLANNING & DEVELOPMENT DEPARTMENT

CONSTRUCTION DIVISION • ECONOMIC DEVELOPMENT DIVISION

PLANNING & NATURAL RESOURCES DIVISION • TRIBAL HISTORIC PRESERVATION OFFICE

September 20, 2011

Ms. Patti Reyes
Coachella Valley Water District
P.O. Box 1058
Coachella, CA92236

RE: 2010 Water Management Plan Update Draft Subsequent Program EIR

Dear Ms. Reyes:

The Agua Caliente Band of Cahuilla Indians (Tribe) has reviewed the Subsequent Program EIR (SPEIR) for the 2010 Water Management Plan Update (WMP) and offers comments that we hope will be helpful to CVWD in ensuring that the SPEIR and 2010 WMP Update are documents that provide an accurate analysis of environmental impacts and provide meaningful strategies to preserve and protect water resources in the Valley. For purposes of our review of the SPEIR, please also refer to the Tribe's letter commenting on the Draft WMP dated January 31, 2011.

The SPEIR states the purpose of the 2010 Water Management Plan Update as:
"The original and ongoing purpose of the project is to address the state of overdraft in the Coachella Valley groundwater basin, and thereby reduce potentially significant adverse effects of overdraft:

- *groundwater storage reduction,*
- *decline in groundwater levels,*
- *land subsidence, and*
- *degradation in groundwater quality."*

As with the Draft WMP, the Tribe generally does not believe that the District in the SPEIR has provided a credible analysis of the effects of continued overdrafting of the aquifer, and of the assessment of long term changes that need to be made to water consumption and usage in the Valley to arrest these downward trends. The Tribe recognizes that the District has made some forward strides, but the simple fact is that much more needs to be done. Future decades will include increase pressures for water use and only amplify the necessity for more significant measures, The need for more change in consumptive patterns will only be hastened and made more elusive, as the dependability of supplies from either State Water Project or Colorado River sources face additional uncertainty in the coming years.

It is important that we work together to address these challenges and it must start with candid discussions based on sensible projections. It is in this cooperative spirit that the Tribe provides the following more detailed comments and our specific concerns:

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760/699/6800 • AGUACALIENTE-NSN.GOV

4-1 **A. The Tribe disagrees with statements made in the document that the WMP has no impact on Indian Trust Asset land ownership and use.**

On Page 1-28 the statement is made that there is "*No impact on ITA land ownership or use.*" Later in the document on Page 8-60 it is noted that "*The CVWD considers that the Proposed Project would have a significant impact on Indian Trust Assets if it substantially interfered with the beneficial use or ownership of ITAs in the Coachella Valley.*"

It is the Tribe's position that continued water mining that significantly reduces water supply to Indian Trust Assets and that degrades water quality IS a significant impact in that such actions restrict the ability of Tribal and allottee land holders to establish new beneficial uses on their trust land. Water quality degradation directly affects the ability of the Tribe and allottees to fully use trust land that is directly impacted by reduced water supply and degraded water quality, regardless of whether that water meets any "*recognized health-based water quality standard.*" Candidly, we do not see how one could conclude otherwise. Of course, poor quality water and water that costs more to pump because of overdraft directly affect the economic value of ITA.

P8-60: "*The Riverside County Superior Court entered a decree, which determined the rights of the various claimants, on December 9, 1938. (In the Matter of the Determination of the Relative Rights, Based upon Prior Appropriation, of the Various Claimants to the Waters of the Whitewater River and its Tributaries, in San Bernardino and Riverside Counties, California (Super. Court. Riverside County, 1938, Case No. 18035). The decree stipulates that up to 4.8 cfs of surface flow diverted from Tahquitz Creek through the Agua Caliente Ditch and 6 cfs from Andreas Creek via the Andreas Creek Pipeline can be used on the Agua Caliente Indian Reservation for domestic, stock watering, power development and irrigation purposes. The claims to groundwater rights were not adjudicated in the 1938 Judgment.*"

This statement is partly accurate, but greatly understates the Tribe's senior and continuing ownership interest in groundwater underlying its Reservation lands. The United States asserted, as trustee for the Tribe, substantial claims to groundwater underlying the Agua Caliente Reservation, for multiple uses. Although the Tribe's claims were not adjudicated in 1938, the court having determined that it lacked jurisdiction to adjudicate *any* groundwater claims in the basin, the Tribe nonetheless holds groundwater rights under federal law. The Tribe (and the United States) asserts a continuing ownership interest in this resource, a protectable interest, despite these rights not yet having been quantified and decreed. These additional principles should be added to the SPEIR.

P6-3: "*Native American tribes assert unquantified reserved water rights pursuant to federal law and the Winters doctrine, which refers to the U. S. Supreme Court decision in the case. Two landmark U.S. Supreme Court cases, Winters v. U.S. (1908) and U.S. v. Rio Grande Dam & Irrigation Co.(1899), established several key principles: 1) federally reserved lands have a right to use sufficient water to fulfill the "primary purpose" of the reservation, and 2) these water rights cannot be destroyed by state water law or by water users acting in accordance with state law (Parr & Parr, 2009).*"

The Tribe also asserts that federal reserved water rights include rights to groundwater, and that these rights are senior in priority to water rights established under state law, inasmuch as they date to aboriginal usage and occupancy, as well as to the date of the creation of the

Reservation. Courts have squarely held that the federally-reserved water rights of a tribe (and derivatively allottees) under the Winters doctrine extend to groundwater, as well as surface water. See, e.g., U.S. v. Washington, 375 F.Supp. 2d 1050, 1068, n. 8 (W.D. Wash., 2005). These additional principles should be added to the SPEIR.

A statement is made at the bottom of page 8-63 regarding future water levels:
"Implementation of the present Proposed Project will elevate groundwater levels beneath certain ITA lands. The projected changes in groundwater levels throughout the Coachella Valley between 2009 and 2045 are shown in Figure 8-3. Groundwater levels are projected to increase as much as 100 feet in the deep aquifer under ITA lands. In the West Valley, groundwater levels beneath lands of the Aqua Caliente are projected to rise about 20 to 50 feet by 2045".

The Proposed Project relies on imported SWP and Colorado River water to elevate groundwater levels. Given the continuing drought that affects the Colorado River Basin and given the latest challenge to the QSA, it is self-evident that such projection of future water levels is based on overly optimistic reliability assumptions. The Tribe disagrees with the implied assumption that the QSA or a functional equivalent will be in place in the future, thus assuring a steady flow of Colorado River water. With respect to SWP water, on page 4-29 of the 2010 WMP Update, a statement is made that Bay-Delta planning activities will restore SWP deliveries to 77% of Table A amounts. The WMP assumes that the Valley will receive, on average, 50% of its SWP allocation[1]. This assumption on which the Proposed Project is built is also overly optimistic. In the future, it seems that with ongoing issues surrounding the Bay-Delta, additional SWP water supplies will be reduced at best and completely eliminated at worst. Accordingly, it is unrealistic and inappropriate to state with such apparent certainty that the groundwater levels will in fact improve when that is far from certain and indeed conditions may degrade. The coming decades may see further declines in the groundwater levels. These are serious environmental impacts that need to be accurately characterized in the SPEIR, but which currently are not.

4-2 **B. The Tribe disagrees with the characterization of a slower rate of basin overdraft as a "Beneficial Effect."**

The continuing overdraft has been facilitated by what appears to be very limited monitoring and assessment of the aquifer. As in the 2002 WMP, on page 3-23 of the SPEIR, Groundwater level/quality monitoring and subsidence monitoring are listed as "*Near Term Projects to Meet Water Management Needs.*" Further, on page 3-22, seven new projects are noted as "*should be implemented*".

The Tribe continues to be gravely concerned about CVWD and DWA's lack of progress in creating a timely, transparent and relevant monitoring program. These Agencies have mined water in the Coachella Valley for 74 years and have done so, it appears, without a robust data/monitoring program to enable groundwater resources responsibly. It is the Tribe's position that the lack of a comprehensive groundwater monitoring plan and a lack of a centralized groundwater database are actions that have resulted in environmental impacts as they speak directly to the Agencies' use of a limited water resource. As it did in 2002, the Tribe continues to strongly encourage the Agencies to make data and monitoring its highest priority.

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[1] WMP p. 4-19

Table 1-2 on Page 1-25 [Table 1-2]: A decrease in overdraft/water levels changing at a slower rate than current conditions is considered a *Beneficial Effect*. The Tribe disagrees with this characterization and only views *complete* elimination of the overdraft as a true beneficial effect. While the Tribe lauds the Agencies' efforts to identify and deliver outside sources of water, overdraft of the aquifer is a recognized environmental impact and it is widely held that these water imports alone have never been enough to fully replace the high quality water being mined from the aquifer.

The SPEIR on Page 5-42 notes: "*Implementation of the 2010 WMP Update would control and eliminate long-term groundwater overdraft, resulting in recovery of groundwater levels in the basin.*" It is not clear as to where in the document there are facts to support this claim. When would this recovery occur? Would it improve both the West and East Valley or just one? Please identify the specific empirical evidence and authorities used to support this statement.

On Page 6-11 this statement is made: "*Basin overdraft, however, has reversed the direction of the subsurface flow in some portions of the basin.*" Please explain how this significant impact was evaluated and identified as part of a "Beneficial Effect". Does this affect the West Valley? The lack of publicly available data combined with this statement creates the impression that the true impacts of groundwater mining are in fact a detrimental impact.

On Page 6-7 statements about the size of the aquifer are made: "*In 1964, the DWR estimated that the Coachella Valley groundwater basin contained a total of approximately 39.2 million acre-feet (AF) of water in the first 1,000 feet below the ground surface; much of this water originated as runoff from the adjacent mountains. Of this amount, approximately 28.8 million AF of water was stored in the Whitewater River subbasin. However, the amount of water in the subbasin has decreased over the years due to pumping to serve urban, rural and agricultural development in the Coachella Valley at a rate faster than its rate of recharge.*" Has CVWD/DWA conducted more recent studies (in 48 years) of the size and character of the groundwater basin? If so, the Tribe requests the Agencies make all data available to the public. If not, then it appears that the Agencies have been mining groundwater without sufficient data to determine actual impacts to the aquifer—mining with substantial impacts to the aquifer.

The Tribe is troubled by comments on Page 6-39 regarding insufficient infrastructure: "*A comparison was made between anticipated groundwater elevation in 2015 and 2035 for the Proposed Project and the 2002 WMP and PEIR. This comparison indicated that groundwater elevations from about Thermal to the Whitewater Recharge Facility would be between 5 and 110 ft lower with the 2010 WMP Update than with the 2002 WMP. This decline is a result of delayed implementation of the MVP and Levy facility projects, coupled with reduced SWP Exchange water availability as a result of drought and delivery issues in the Delta.*" Please explain why, with the assumed influx of fees from developers during the recent economic upswing/housing boom, these projects weren't implemented in a timely fashion. With some of the most rock-bottom water rates in Southern California and the ability to reasonably generate revenue to cover these costs, it seems short-sighted that they weren't implemented then.

4-3 **C. The Tribe believes that overdrafting the aquifer IS a growth inducing impact and that CVWD has a direct impact over future development in the Coachella Valley.**

As noted on Page 1-36: "*Substantial growth is projected in the Valley and can be accommodated by the Proposed Project through 2045.*" This statement is simply false and we fear demonstrates an alarmingly perilous perspective. Ongoing mining of the aquifer to accommodate future growth is not sustainable. Continuing to overdraft the aquifer to support projected growth with only vague long-term ideas to stop the overdraft is a growth inducing action. CVWD has the ability to implement stronger conservation ordinances that directly reduce the impact on water resources.

As noted on Page 3-4: "*In the absence of this ordinance and other on-going conservation measures, water demands in the Valley would be nearly 1,040,000 AFY by 2045.*" And on Page 3-11: "*Projections indicate that continued implementation of these measures in conjunction with the State's 2010 CALGREEN Building Code requirements will result in per capita water use reduction of nearly 40 percent compared to the baseline per capita use defined in SBx7-7.*"

How much more water could be conserved through an even stronger ordinance?

4-4 **D. The Tribe is concerned with how the document characterizes the reduction in groundwater quality as a potentially significant impact but offers no feasible solution and notes that a Statement of Overriding Considerations will likely be adopted by CVWD.**

In several places in the SPEIR the issue of feasibility of various projects and mitigation measures is mentioned. For example:

Page 1-26: Net annual salt inputs increase in West Valley, potentially significant, "*No feasible measures are currently available to reduce TDA in recharge water.*"

Page 5-24: "*In addition, for purposes of this project, CVWD considers that a significant impact would occur if the Proposed Project resulted in:*

- *Diversion of additional water from the Colorado River that could not be provided through the existing infrastructure and operational practices of the Coachella Canal.*"

Page 6-55: "*By 2020, implementation of the 2010 WMP would increase the average West Valley TDS increment to 8.6 mg/L/yr. This is a potentially significant interim impact for the West Valley. By 2045, the West Valley TDS increment would increase to 9.5 mg/L/yr…Therefore, the impact is potentially significant in the West Valley.*"

P6-57: "*Since the salinity (TDS) of SWP Exchange water is expected to average about 630 mg/L over the Proposed Project planning period, it is anticipated that groundwater within the area influenced by recharge activities could reach this level of salinity. This is a potentially significant impact.*"

P6-61: "*Although the groundwater salinity is expected to increase, no designated beneficial uses of groundwater would be compromised; that is, the groundwater would continue to meet quality requirements for agricultural, industrial and municipal uses, the Basin Plan identified designated beneficial uses for Valley groundwater. The Basin Plan identifies no specific numerical groundwater quality objectives for Coachella Valley groundwater basins. Much agriculture and many golf courses in the Coachella Valley already use and have used Colorado*

River water successfully as their sole source for irrigation water. With respect to municipal use, there are no primary or health-based standards for total dissolved solids or salinity in drinking water (DPH, 2008)."

Page 1-44: "*1.15 SIGNIFICANT, IRREVERSIBLE ENVIRONMENTAL CHANGES WHICH WOULD BE CAUSED BY THE PROPOSED PROJECT SHOULD IT BE IMPLEMENTED*
Local degradation of groundwater quality near existing and proposed recharge basins from recharge of Colorado River water is considered a significant irreversible environmental change. In the absence of this recharge, however, the infiltration of agricultural drainage water and sea water intrusion would have greater, significant irreversible impacts on groundwater quality."

The Tribe raised water quality concerns in 2002 and was ignored. In the Ninth Circuit, it is clear that a tribe's federally-reserved water rights extend to water quality, not only to water quantity. See U.S. v. Gila Valley Irrigation District., 920 F. Supp. 1444, 1448 (D. Ariz., 1996). It is troubling to see that water quality degradation has continued and is still considered a significant impact. It appears that CVWD has, as it did in 2002, opted to define feasibility based on its willingness to forego spending money to treat the Colorado River water it brings in to the Valley to replace high quality groundwater that it mines unabated. The financial cost of new facilities to treat poor quality Colorado River water is an important part of a rational, long-term solution but should not be used to justify a Statement of Overriding Considerations under CEQA.

The Tribe, in its 2002 letter, presented alternatives to the 2002 WMP and estimates of the cost of water. The three (3) alternatives were:

- construction of a pipeline to bring SWP water directly to the Valley
- build desalinization facilities to treat canal water
- dual use of the Colorado River Aqueduct to bring SWP water to the Valley

In the nine (9) years since the 2002 WMP was adopted by CVWD, not one of these alternatives appear to have been adequately studied so as to rule out their feasibility. The justifications presented in the 2010 WMP for why the first two options won't work are based solely on financial considerations. The third alternative suggested by the Tribe in its 2002 letter has, as far as we are aware, been ignored.

4-5 **E. CVWD continues to present conflicting information about the feasibility of bringing SWP water to the Valley and continues to mischaracterize the quality of SWP water.**

At several points in the document conflicting statements are made regarding the feasibility of a direct pipeline to the Valley for State Water Project water:

Page 1-41: 1.10.3 Alternatives Considered for Reducing Groundwater Quality Impacts
"A recent study of direct importation for basin recharge of lower-salinity SWP water, the State Water Project Extension Feasibility Analysis, remains in draft form and its feasibility is not determined. This approach also has significant environmental impacts and significant costs in addition to those of the Proposed Project. Therefore, it is not considered to be a viable alternative."

In Section 6.5.4.1 it states: "*the possibility of a future SWP extension into the Coachella Valley is being examined again…but its technical, financial, institutional and environmental feasibility are still highly uncertain and it is not part of the 2010 WMP Update considerations.*"

Please clarify as to whether any feasibility analysis has been completed by CVWD, or any other entity. If an analysis has not been completed, then how can its viability already be determined? The Tribe would like a complete analysis of this project available for public review in 2012. In our 2002 letter, the Tribe presented an option for constructing a new pipeline to bring SWP water to the Valley. In that letter, we suggest a route for the pipeline that would minimize impacts and result in costs to CVWD of $0.001 per gallon. Without a robust technical study of this concept, how can CVWD dismiss it as not a viable option? It is troubling that such an analysis has not been undertaken over the last 9 years when the Tribe first proposed this concept.

4-6 **F. Mitigation Measures**

Mitigation Measure ITA-1 requires that CVWD or DWA work with the Tribe to provide domestic water service to the Reservation should water quality levels exceed "*recognized health-based water quality standards*". The Tribe prefers that both agencies increase their vigilance in monitoring water quality across the Valley via a much improved monitoring program (see previous comments) instead of falling back on a mitigation measure that would force tribes into expensive connections to the Agencies' legacy systems.

Conclusion

This process offers us an opportunity to work together to address these long-standing issues which will be vital to our collective future. There are many unanswered questions and there is much more that we have to do to responsibly manage this critical resource. Agua Caliente urges both CVWD and DWA to join with us in a conversation to ensure that we take such necessary and affirmative steps to preserve and wisely use our water resources.

Thank you for the opportunity to comment on the SPEIR. If you have any questions, I can be reached at 760-699-6800.

Very truly yours,

Thomas J. Davis, AICP
Chief Planning & Development Officer
AGUA CALIENTE BAND
OF CAHUILLA INDIANS

C: Tribal Council

4. Response to: Thomas J. Davis, Chief Planning and Development Officer, Agua Caliente Band of Cahuilla Indians

4-1 A. "The Tribe disagrees with statements made in the document that the WMP has no impact on Indian Trust Asset land ownership and use."

Impacts to ITA

The comment letter contends that continued water "mining" that significantly reduces water supply to Indian Trust Assets and that degrades water quality is a significant impact in that such actions restrict the ability of tribal and allottee land holders to establish new beneficial uses on their trust land. It is assumed that the term "mining" as used in the comment means the continued long-term withdrawal of groundwater in excess of natural and artificial recharge. CVWD agrees that continued "mining" of the groundwater basin is undesirable. The WMP goal is to eliminate long-term overdraft, and not to continue "mining" the basin, and the SPEIR demonstrates that long-term water levels will increase (SPEIR section 6.4.2, pages 6-36 to 6-50). However, that does not mean there will not be periods when extraction from the basin temporarily exceeds natural and artificial recharge. Water levels are expected to rise in the long-term, and periods of increasing and decreasing water levels will occur as the result of hydrologic variation in the supplies used to recharge the basin. CVWD and DWA strive to recharge as much water as possible when it is available with full knowledge that there will be periods when supplies are reduced due to drought. Thus, the 2002 WMP and the 2010 WMP Update identify actions to be taken over the next 35 years to halt overdraft and manage the basin in a sustainable manner. CVWD and DWA have made significant investments to acquire additional water supplies over the past eight years that put the Valley on a path toward sustainability. Given that long-term groundwater levels will increase under the 2010 WMP Update, CVWD expects there would be an improvement to Indian Trust Assets' water supply.

With regard to impacts to Indian Trust Assets due to increased salinity/TDS from Colorado River water being recharged into the Basin, it should first be noted that the Tribe's letter does not identify which current or anticipated beneficial uses of groundwater the Tribe believes are or may be adversely affected by the quality of the recharge water. This water meets water quality standards for municipal, agricultural, and industrial uses, and primary health-based standards for drinking water (SPEIR, at page 6-62). In fact, many cities in the Southwest, including Las Vegas, Phoenix, Tucson, and the Imperial Valley cities use Colorado River water as a major portion if not their sole source of water supply.

With reference to mitigation measure ITA-1, which states that violations of health-based standards due to the 2010 WMP Update will require the District to either provide connections its water distribution system or providing appropriate well-head treatment (SPEIR, at 8-69), the SPEIR conservatively describes this decrease in water quality as being a significant and unavoidable impact, it will be still be fit for human consumption according to federal and state standards specifically adopted to protect human health. Given that the quality of this water is suitable for human consumption, there is no basis for the commenter's statement that water quality degradation from the 2010 WMP Update will affect the ability of the Tribe and its allottees to "fully" use trust land or affect its ownership. In addition, the projected increase in groundwater levels resulting from Plan implementation will result in lower, not higher, pumping costs compared to current conditions.

Because of the nature of the basin, with water use exceeding recharge, salinity will increase basin wide over time, even if no additional Canal water is recharged, because of ongoing water uses and evapotranspiration. Therefore, an increase in salinity in tribal wells (and all others in the Valley) will occur in any case. With recharge, the rate of increase in salinity would occur at a slightly faster rate near recharge facilities. Increased salinity associated with recharge is considered in the SPEIR to be a significant impact on water quality, but it does not interfere with ITA water use or ownership.

Tribal Water Rights

The commenter makes several statements as to the nature of the Tribe's water rights as per the federal *Winters* doctrine and also the effect of the 1938 Judgment made by the Riverside County Superior Court in the adjudication of water rights in this area. The SPEIR acknowledges, without response, that the Tribe and the United States as Trustee for the Tribe have asserted certain water rights claims. The commenter's comments on these subjects are noted; the 2010 Water Management Plan Update and the SPEIR do not address water rights. Nothing in the 2010 WMP Update is intended to interfere with the legal status of the Tribe's water rights or disturb the order of priority of water rights holders within the Basin. These are legal matters and are not properly the focus of this SPEIR. Beyond such acknowledgement, the District believes it is inappropriate to address such claims in a CEQA document. Therefore, it is sufficient to note that the SPEIR concludes that health-based water quality standards would continue to be observed and, as outlined above, the Tribe will still be able to use its water rights to supply beneficial uses on trust lands.

Colorado River and the QSA

The comment letter asserts that given the continuing drought that affects the Colorado River Basin and the challenge to the QSA, the WMP projection of future water supplies is overly optimistic. The Tribe disagrees that the QSA or functional equivalent will be in place in the future.

The 2010 WMP Update's assumptions are well supported. First, as stated on page 5-18 *ff* of the Draft SPEIR, the Colorado River is managed and operated in accordance with the *Law of the*

River. California's Colorado River allocation is 4.4 million acre-ft/yr (AFY). Under the current priority system and in accordance with the 1968 Colorado River Basin Project Act (82 Stat. 885 *ff*), in years when there is insufficient Colorado River water to meet the needs of the Lower Basin States (California, Nevada and Arizona), diversions for the Central Arizona Project are to be reduced sufficiently to deliver 4.4 million AFY to the water rights holders, contractors and reservations in California. In addition, as a result of its higher priority, CVWD would not experience a reduction in deliveries until Metropolitan Water District of Southern California (Metropolitan) deliveries (550,000 AFY) are eliminated. Thus, in the very unlikely situation in which the entire QSA effort collapses, CVWD will continue to receive a large share of California's 4.4 million AFY allotment. The U.S. Bureau of Reclamation's interim guidelines for shortage sharing provide additional protection through at least 2026.

Second, progress is continually being made with regard to the QSA. Oral arguments for the appeal hearing on Judge Candee's QSA ruling (Superior Court of California, 2010) were heard on November 21, 2011; a decision is possible by early 2012. CVWD expects that Judge Candee's ruling will be overturned and has been actively working with the other QSA signatories to resolve the issues associated with the State's financial obligations for QSA mitigation costs. Even if the QSA is not reinstated in its current form, California must continue to limit its Colorado River water use to 4.4 million AFY. CVWD would continue to receive Colorado River water under the existing agreements in place before the adoption of the QSA in 2003. In the absence of the QSA, the amount of Colorado River water received would again depend on priority, rather than be a defined quantity, but CVWD, once again, will continue to receive water under such a worst case scenario. If the amount is less than the lowest level of 385,000 AFY planned for in the 2010 WMP Update, the plan would be modified.

While the Tribe may disagree with CVWD's assumptions regarding whether the QSA or a functional equivalent will be in place in the future, the analysis of future groundwater levels is used to estimate the amount of recharge water, coupled with water conservation and other water management elements, that will be required to meet the projected future water demands while eliminating long-term overdraft. The intent of the WMP Update is to provide a flexible approach that can adapt to changing future development and water supply conditions. The evidence does not support that any of these contingencies will occur, but if SWP and Colorado River water supplies are less available or reliable in the future than assumed in this plan, CVWD and DWA have the ability under the plan to either: 1) implement additional water conservation measures to reduce demands and pumping, or 2) acquire additional water supplies from other sources as outlined in the WMP Update. If future water demands are less than projected, then less recharge water will be needed to balance the basin and stabilize or recover water levels. Future plans and their elements will be subject to full CEQA analysis and review at the time they are proposed.

SWP Reliability

The comment letter incorrectly states the planning assumptions for SWP reliability used in the Plan. On page 4-29, the Draft WMP states:

There currently are no published data or information regarding the effect that the BDCP and DHCCP will have on SWP delivery reliability. Consequently, *it is assumed for planning purposes that*, *if successful*, [emphasis added] these programs will restore SWP average delivery reliability to the pre-Wanger decision levels of 77 percent of Table A Amounts. This assumption is consistent with planning assumptions being made by Metropolitan (Metropolitan, 2010a and 2010b). The WMP Update evaluates *both low (50 percent) and high (77 percent) reliability* [emphasis added] in determining future water needs for the Valley.

The potential future reliability of SWP deliveries <u>if</u> the BDCP is successful is assumed, pending more detailed analysis by DWR. The WMP Update does not rely on this assumption alone but evaluates a range of additional imported water that will need to be acquired depending on the Delta outcome. If this additional water cannot be acquired from SWP sources, then CVWD and DWA will need to pursue other options, possibly including desalination of ocean water and subsequent exchange. Such a significant change in conditions would likely trigger an update to the WMP and additional CEQA compliance.

A future reliability factor of 50 percent of SWP Table A Amounts, as a long term average, is used in the WMP Update if the BDCP is not successful. This factor is 17 percent *more conservative* than the SWP reliability of 60 percent of Table A Amounts published in DWR's Final 2009 SWP Delivery Reliability Report. The District disagrees with the Tribe's assertion that future SWP deliveries will be further reduced to some undefined level or eliminated at worst, since these conditions are considered highly unlikely by the DWR, the operator of the SWP.

If, at a future time, either or both imported sources' water deliveries were expected to decrease to significantly below currently anticipated levels, CVWD would revise the WMP accordingly and change the mix of elements to reflect the new reality. Again, the new WMP and its elements would be subject to full CEQA analysis and review at that time.

4-2 "B. The Tribe disagrees with the characterization of a slower rate of basin overdraft as a 'Beneficial Effect.'"

The District respectfully asserts that reduction, as well as elimination, of an existing on-going adverse condition is a beneficial effect. Additionally, the District believes that the term "mining" is misleading, since it suggests that water is withdrawn without any view toward its replacement, which is not the case in the WMP Update. Replacing all water pumped to date in excess of recharge is not a goal of the WMP and is not required under CEQA, which considers existing conditions as its analytical baseline. CVWD has never implied that historical imports were sufficient to eliminate overdraft or that all historically pumped water would be replaced. The WMP Update relies on a combination of water conservation, new water supply development, sources substitution and groundwater recharge to reduce/eliminate existing and future overdraft (SPEIR Section 1.3 Project Goals and Objectives and Section 1.6 Project Description). The objective of the WMP Update is to address an existing condition, which is the statutory baseline for CEQA analysis, not to replace water pumped in the past.

The comment states that overdraft has been facilitated by limited monitoring and assessment of the aquifer. With respect to the request for "creation of a timely, transparent and relevant monitoring program," to document groundwater conditions in the basin, the District has had an extensive groundwater monitoring program in place for more than 60 years. The District's program currently monitors more than 500 wells at least three times per year. It was the results of CVWD's basin-wide, on-going well monitoring that clearly identified a serious decline in groundwater levels in the West and East Valleys before 1993, which spurred the preparation of the first WMP. CVWD groundwater monitoring data are published in the CVWD Annual Engineer's Report prepared in conjunction with the Replenishment Assessment Charge (RAC). CVWD publishes hydrographs for two example wells in the West Valley and 14 wells in the East Valley (CVWD, 2010a, and 2010b). Data for a minimum of 10 additional West Valley wells will be presented in future reports. The District also will be participating in the state's California Statewide Groundwater Elevation Monitoring (CASGEM) program (DWR, 2011), submitting groundwater elevation data for 45 wells twice per year starting in January 2012. Other Valley water agencies are also participating in this program. CASGEM data will be available to the public. The District agrees that development of a comprehensive groundwater level database for the Coachella Valley, which would be comprised of all available monitoring data, including on tribal wells, would be beneficial for providing a more complete picture of groundwater conditions. A monitoring program is an element of the Proposed Project (WMP section 6.8.4, page 6-42) and is so identified in the SPEIR (section 1.6.2, page 1-8; Table 1-1, page 1-12; section 3.3.1.1, page 3-22; and Table 3-3 page 3-30 and 3-31). Each water supplier is responsible for data collection from its wells, including groundwater quality information. In addition, the Coachella Valley Integrated Regional Water Management Plan (IRWMP) (CVWRMG, 2010, Section 9) proposed development of a Data Management System (DMS) for groundwater data, "as appropriate and publicly available," from public and private water purveyors.

The recovery of groundwater levels resulting from Plan implementation, as indicated on SPEIR page 5-42, is described in detail in SPEIR Section 6.4.2 (page 6-36 *ff*). Projected elimination of overdraft in the 2002 WMP and in the 2010 WMP Update is based on application of the peer-reviewed Coachella Valley groundwater model developed for the 2002 WMP by Dr. Graham

Fogg (see SPEIR Section 6.2.4 and Appendix D). The model was revisited and then re-run for the present WMP Update to reflect current and anticipated future planning conditions in the basin. The model input data were based on groundwater production records, well monitoring data and existing documents on Valley hydrogeology. Hydrographs showing historical monitoring and model simulation results for nine representative wells are presented on Figure 6-14. Evaluation of basin size, capacity and hydrostratigraphy was part of the original groundwater model development and was based on previous basin documentation and past and current well data. As discussed in SPEIR Section 6.2.4 and Appendix D, the model developed for the 2002 WMP produced excellent agreement between measured and simulated groundwater levels and drain flow for the data period 1936–1996, upon which it was based and which was used for calibration. The model was found to be accurate for groundwater elevations to within plus or minus 20 feet. For the present WMP Update, the 1997-2009 period was used as a verification period. When rerun and compared to recent data for preparation of the WMP Update, the model was generally found to follow historic groundwater levels within the same range. Based on existing well monitoring data, basin wells already have shown a recovery in water elevations; artesian conditions already have been restored in portions of the East Valley (SPEIR Figure 6-14 page 6-43 and Figure 6-16, page 6-51).

The Tribe's comment misconstrues the reversal of deep aquifer flow away from instead of towards the Salton Sea as being an impact of the Proposed Project. As part of the Environmental Setting, Page 6-11 of the SPEIR states: "Historically, some groundwater migrated out of the Lower aquifer, flowing into the area beneath the Salton Sea. Basin overdraft, however, has reversed the direction of the subsurface flow in some portions of the basin." The deep aquifer flow reversal occurring near the Salton Sea is described as part of the existing conditions, caused by existing overdraft. It is not an impact of either the 2002 WMP or the current WMP Update. The flow reversal is limited to a small portion of the East Valley near the Salton Sea and does not affect the West Valley. Again, the District does not "mine" the groundwater basin; as discussed above, the objectives of the WMP and WMP Update are to reduce/eliminate existing and projected overdraft of the basin.

DWR Bulletin 108 (1964) remains the most comprehensive study of basinwide hydrogeologic characteristics to date. CVWD keeps track of the overdraft annually in the Engineers' Report and water levels are measured three times per year to track the rate and location of groundwater level changes. The District also plans to work through the IRWMP process to develop a shared groundwater database with the other four public water agencies in the Valley and other stakeholders who choose to participate. The District encourages the tribes to participate and share their data as well.

The comment letter questions the progress of implementation of WMP elements and the use of developer fees to fund these projects. Since 2002, the District has implemented many elements of the 2002 WMP, which included water conservation, acquisition of new water supplies, Phase 1 of the Mid-Valley Pipeline and the Martinez Canyon and Thomas E. Levy groundwater replenishment facilities. WMP Update Table 2-2, Status of the 2002 Water Management Plan Implementation, presents the extensive progress made to implement the WMP since 2002. Since 2002, CVWD and DWA have invested more than $240 million in water acquisitions, conservation, construction of new facilities and monitoring to reduce overdraft and manage the basin. The following provides a summary of these major investments by program element:

Program Element	Status	Expenditure Since 2002
Water Conservation – Agriculture, domestic and golf	On-going	$14,500,000
Water Supply Development		
Quantification Settlement Agreement	On-going	$36,000,000
SWP Table A Acquisition	Completed	$88,800,000
Source Substitution		
Mid-Valley Pipeline Phase 1	Completed	$44,700,000
Groundwater Recharge		
Thomas E. Levy Recharge Facility	Completed	$44,400,000
Martinez Canyon Pilot Recharge Facility	Completed	$7,700,000
Surface and Groundwater Monitoring	On-going	$6,800,000
Total Expenditures		$242,900,000

Because of the significant financial and technical resources required to implement these projects, CVWD has not been able to implement them as rapidly as desired. Nevertheless, the District is committed to implementing the WMP Update and its elements over the planning period to achieve the Proposed Project’s stated goals and objectives.

The Tribe’s comment suggests that developer fees and water rates should be used to fund WMP projects. Since 1978, with the passing of Proposition 13, capital construction costs for new domestic water facilities have been borne by developers through the District’s Water System Backup Facilities Charge (WSBFC). The WSBFC was created as a funding mechanism for the construction of backup water facilities. A component of WSBFC, the “Supplemental Water Supply Charge” or SWSC was created as a funding mechanism for the purchase of rights for supplemental water supplies to ensure domestic water availability for new development projects. Typically, developers of new projects will construct the on-site pipelines and deed ownership to the District for future operation and maintenance. The District will subsequently build the necessary off-site “back-up” facilities, such as wells, treatment facilities, booster stations, reservoirs and large diameter transmission mains, which are funded by the developer through the WSBFC. In addition, the purchase of long-term water supplies needed to provide domestic water to a new project is also funded through the SWSC component of the WSBFC. This component is based on the District's inflation-adjusted cost of acquiring new imported water supplies and considers the expected reliability of those supplies. The WSBFC is assessed on all new development and redevelopment projects within the District's service area. A similar charge generates capital funds for construction of new wastewater collection and treatment facilities required to support new development.

The use of developer fees is restricted by the 1987 Mitigation Fee Act (Government Code §§ 66000-66025). This act requires public agencies to: 1) establish a nexus between a development project and the public improvement to be financed by the fee, 2) segregate the fee revenue to avoid comingling of capital fees and general funds, 3) make findings regarding the on-going need for any fees not expended or committed within five years of collection, and 4) refund any fees for which the above findings cannot be made. CVWD must apply any developer fees whether for water acquisition or construction of water, sewer or flood control facilities to the appropriate fund and cannot use those funds for any other purpose. CVWD has used a portion of the developer fees for the purchase of additional SWP Table A Amounts. However, other WMP projects such as the Mid-Valley Pipeline and the Thomas E. Levy Recharge Facility must be funded by the District's Reserves. The cost of these projects is recovered over time through water sales to the project customer or through the District's RAC. With regard to the use of water rates to fund WMP programs, California Proposition 218 (passed in 1996) restricts the District from establishing water rates that do not reflect the cost of service. In addition, Proposition 218 requires that any proposed increase in water rates be subject to public vote. CVWD expects to implement new water conservation programs in the future and the cost of those programs would be funded by water rates when those programs are implemented. However, the District is not able to arbitrarily increase water rates simply to encourage water conservation.

The District's record demonstrates that it has made significant strides in a number of areas with a definite and realistic goal of overcoming overdraft, both of which are beneficial effects. The District respectfully disagrees with the Tribe's comment and believes that the SPEIR adequately addresses these issues. The District maintains that implementation of the WMP Update will have beneficial effects on the Coachella Valley.

4-3 "C. The Tribe believes that overdrafting the aquifer IS a growth inducing impact and that CVWD has a direct impact over future development in the Coachella Valley."

The District respectfully disagrees that overdrafting the aquifer is growth inducing. On the contrary, overdrafting the aquifer is ultimately a growth-limiting effect. In addition, ongoing "mining" of the aquifer is not what is proposed, since the principal focus of the WMP is to overcome overdraft by replacing water that is withdrawn or by reducing withdrawal. The WMP is by nature growth-accommodating, rather than growth-inducing, since approval of growth in the Coachella Valley is under the authority of Riverside County and the Valley cities. CVWD does not have direct control over future development. The District expects that development will continue to be approved by these agencies and will occur. Should growth occur at a different pace than projected in the WMP Update and SPEIR, the Plan has the flexibility to adapt to those changing conditions while still meeting the objective of water supply sustainability. The District would only pump that amount of water that is actually needed at one time, and hence District groundwater production is governed by growth that is directed by other forces and in fact already exists at the time water is pumped.

The District respectfully disagrees that the WMP contains "vague, long-term ideas." Specifically defined elements of the WMP include conservation (which is ongoing, including the passing of a Landscape Ordinance and implementation of tiered water budget-based domestic water rates), desalination of drain water (for which the District has completed a pilot project), ongoing implementation of water recycling, specifically identified recharge projects, and past and ongoing specific water transfers, etc. (see SPEIR Section 3 Project Description). The WMP Update is a 35-year plan, which must be evaluated programmatically, as allowed and encouraged under CEQA for long-term areawide plans. Additional CEQA compliance will be prepared, and will tier off the WMP Update SPEIR, as sites for individual plan elements are identified. The WMP Update and SPEIR present a short term and a long-term implementation plan with a schedule for completion of the Plan elements (SPEIR Table 3-3 and pages 3-33 and 3-34). The Plan will be updated periodically as the environment or the Plan change.

The Tribe questions the degree of water conservation achieved and proposed in the WMP Update. The degree of conservation proposed in the WMP Update is based on meeting the statewide "20 by 2020" requirements for existing customers and to implement the requirements of the state 2010 CALGREEN Building Code and the District's Landscape Ordinance for new development as a minimum. In addition, CVWD would continue to invest in conservation measures to achieve greater savings than the state-mandated minimums. Based on analyses performed for the WMP Update, CVWD estimates that per capita water use in 2045 will be nearly 40 percent less than current usage levels (see WMP Update, pg 6-7). The acceptable degree of conservation may change in the future; the Plan is adaptable to changing conditions. For example, recent large developments (e.g. Travertine Point and Kohl Ranch), when completed, will more than meet current state "20 by 2020" conservation goals. The District believes that the degree of conservation proposed, implemented together with the other elements of the WMP Update, presents a long term sustainable plan (see SPEIR section 3.1.5.1).

While additional conservation could theoretically be implemented that would further reduce water demands, such conservation would require more fundamental changes in the culture and economy of the Coachella Valley. Whether additional conservation could potentially avoid all water importation cannot be determined at this time, and would depend on how conservation is implemented in all sectors and by all users. Should CVWD and DWA not be able to obtain additional supplies to meet demands, a decision may need to be made regarding future growth in the Valley.

Therefore, the District is working, through implementation of the 2002 WMP and the 2010 WMP Update, to accommodate growth projected by others and to manage responsibly the water resources in the Coachella Valley.

4-4 "D. The Tribe is concerned with how the document characterizes the reduction in groundwater quality as a potentially significant impact but offers no feasible solution and notes that a Statement of Overriding Considerations will likely be adopted by CVWD"

With regard to impacts on the Tribe's water rights, please see the discussion under Response to Comment 4-1, *supra*.

The SPEIR does conclude that the 2010 WMP Update would result in a significant impact with regard to water quality related to Indian Trust Assets, due to increased groundwater salinity from the water to be recharged under the 2010 WMP Update. The impetus for this significance conclusion was the fact that salinity would increase over existing conditions; however, it should be noted that the levels predicted under the 2010 WMP Update still meet health-based water quality standards and thus are available for beneficial use by the Tribe and for all other users in the Coachella Valley.

The letter goes on to state that "The financial cost of new facilities to treat poor quality Colorado River water is an important part of a rational, long-term solution but should not be used to justify a Statement of Overriding Considerations under CEQA." The District refers to State CEQA Guidelines Section 15093 Statement of Overriding Considerations, which requires the CEQA lead agency to balance economic, legal, social, technological and other benefits against unavoidable environmental risks in considering whether to approve a project. "If the specific economic, legal, social, technological or other benefits, including region-wide or statewide environmental benefits, of a proposed project outweigh the unavoidable adverse environmental effect, the adverse environmental effects may be considered 'acceptable.' "

The relevance of the letter's reference to page 5-24 is not clear. The referenced statement is a CEQA-required significance criterion that is used to determine whether a significant impact would occur relative to changes in Coachella Canal flows and has no bearing on groundwater quality.

The commenter's statement that the infeasibility of treating Colorado River water is used to justify the Statement of Overriding Considerations is not correct. Infeasibility does not play a role in justifying the approval of a project in spite of its significant and unavoidable impacts; rather, it is the project's benefits that are balanced against its significant and unavoidable impacts when a lead agency adopts a Statement of Overriding Considerations. The concept of mitigation or alternatives to the project being "infeasible" goes towards establishing that a significant impact of the project is in fact "unavoidable" (in other words, there is not sufficient feasible mitigation available to reduce the impact to less than significant). Only when this is established is the weighing of benefits against significant and unavoidable impacts in a Statement of Overriding Considerations necessary.

The commenter states that it is concerned that various means of avoiding the groundwater quality impact discussed above were not "adequately studied so as to rule out their feasibility," and specifically identifies the use of a new aqueduct to directly provide SWP water to the District, the construction of desalination facilities to treat canal water, and the "dual use" of the Colorado River Aqueduct to bring SWP water to the District. This is not correct. As discussed in SPEIR Section 6.5.4, the District investigated but found no financially feasible solutions to the salinity issue at this time. Section 10 of the SPEIR evaluates alternatives considered to reduce salinity impacts of recharge: the SWP Extension (Section 10.4.1) and Canal water desalination (10.4.2). These alternatives are revisited below.

SWP Extension to the Coachella Valley

The first alternative evaluated was construction of the SWP Extension. CVWD, DWA, Metropolitan, San Gorgonio Pass Water Agency and Mojave Water Agency commissioned a feasibility study of extending the SWP to the Coachella Valley in 2006 (GEI, *et al*., 2011). The SWP Extension feasibility study initially evaluated four potential conveyance alignments: 1) a Lucerne Valley alignment originating on the East Branch of the California Aqueduct near Hesperia and running through Yucca Valley, 2) a North Pass alignment originating at the SWP Devil Canyon Afterbay in San Bernardino and paralleling Interstate 10, 3) a South Pass alignment originating at Lake Perris and paralleling State Route 60 and Interstate 10, and 4) a San Jacinto alignment originating at Lake Perris and tunneling through the San Jacinto Mountains. Following completion of the initial evaluation in 2007, two potential alignments were selected for more detailed evaluation — a 90-mile-long Lucerne Valley alignment and a 40-mile-long Modified North Pass alignment that utilized Metropolitan's Inland Feeder. For each alignment, two different project sizes were considered: a small project entailing delivery capacity for CVWD and DWA only with water delivery over 11 months per year and a large project including capacity for CVWD, DWA and other contractors along the alignment with water delivery over 9 months per year. The alignments were evaluated equally and neither alignment was selected as the proposed project.

Environmental constraints for both alignments were found to be numerous and substantive (for example, it is not certain that a Morongo Canyon alignment reach would be permitted, even if tunneled). A full EIR and NEPA EIS will be required for the project and neither process has commenced; in addition, a federal lead agency has not been identified.

The total capital cost of the Lucerne Valley project was estimated to range from $900 million to $1.2 billion for the small project and $1.1 to $1.4 billion for the large project in 2009 dollars, with a $7.5 million per year (2009 dollars) operation and maintenance (O&M) cost. The capital cost allocation to CVWD and DWA was estimated at $1.06 billion for the small project and $1.2 billion for the large project using the mid-point of the capital cost estimates. Annual O&M costs including expected power generation revenue ranged from -$0.4 million for the small project to $7.5 million for the large project. For the Modified North Pass alignment, the estimated total capital cost in 2009 dollars was $774 to $981 million for the small project and $881 million to $1.13 billion for the large project. Annual O&M costs of $26.2 million for the small project and $19.1 million for the large project. The CVWD and DWA construction cost share of the Modified North Pass alignment was estimated at $878 million for the small project and $897 million for the large project using the mid-point of the capital cost estimates.

Cost allocation is frequently performed on the basis of proportionate capacity in each pipeline reach. For the Lucerne Valley alignment, the cost allocated to CVWD and DWA was estimated to range from $77 million to $89 million per year. For the Modified North Pass alignment, the cost allocated to CVWD and DWA was estimated to range from $77 million to $87 million per year. CVWD's share of this cost would range from $55 million to $64 million per year, while DWA's share would be 22 million to $26 million per year.

To put these costs in perspective, for 2010, CVWD's total annual income was $208 million of which $79.2 million was derived from water sales and $18.2 million from replenishment assessment income. Property taxes generated $64.1 million. In comparison, DWA's total annual income was about $50 million. Since the cost of implementing the SWP Extension could only be placed on water users or property tax payers, the project could require some combination of a 70-80 percent water rate increase, a 100-130 percent property tax increase or a 300-350 percent replenishment assessment increase. It is likely that similar increases would be experienced by DWA. Therefore, the cost to implement either SWP Extension alignment would pose a substantial financial burden on CVWD, DWA and their customers. Given the current economic conditions of the Coachella Valley, it seems unlikely that the citizens would support such a substantial investment at this time. For example, a typical golf course using 1,000 AFY of water would see its replenishment assessment increase from about $112,000 a year to $432,000 a year.

The viability of the Modified North Pass alignment also depends on Metropolitan allowing use and purchase of available Inland Feeder capacity; no commitment has been made to date. A number of additional issues affecting the project feasibility remain unresolved.

- Reliability of the SWP conservation facilities is an unresolved constraint to the SWP Extension project. SWP Conservation Facilities are basically those facilities that generate the yield of the SWP, and include Lake Oroville, San Luis Reservoir, and a portion of the California Aqueduct from the Delta to San Luis Reservoir. Prior to construction of improvements to the East Branch and the SWP Extension, the reliability of the SWP conservation facilities will need to have been improved to a level similar to that project in the 2005 SWP Delivery Reliability report to justify such an investment.
- Capacity in the California Aqueduct north of the bifurcation into the East Branch and West Branch is a potential constraint to the SWP Extension.
- The Pearblossom Pumping Plant on the East Branch of the California Aqueduct has less capacity than required to supply the SWP Extension project along with other contractors' needs.
- The capacity of the Inland Feeder may not be adequate to make deliveries to the Modified North Pass Alignment as well as meet Metropolitan's needs. Further analysis is needed to determine the anticipated available capacity in future years.
- The governance structure for the design, construction and operation of the project has not yet been determined. Such a structure is necessary to secure bond funding for the project.
- Feasibility will also be affected by the results of future stakeholder and public agency outreach.
- Participation of the project partners will depend on whether their individual needs for supplemental water can be met by the proposed project, which depends on which alignment ultimately is selected.

The SWP Extension feasibility report is in final draft form and is expected to remain in that form for the foreseeable future. The SWP Extension project is currently on hold pending resolution of the feasibility constraints identified above, resolution of the Bay Delta Conservation Plan and the potentially participating agencies' ability to finance the project. Based on the significant cost impact of the project, the SWP Extension is considered financially infeasible at this time. In SPEIR Section 3.3, it is identified as an element for possible inclusion in future updates to the WMP.

Desalination of Colorado River Water

The second alternative, desalination of Canal or SWP Exchange water prior to recharge, was evaluated in the WMP Update and found to have potentially significant impacts in addition to impacts of the WMP Update, particularly potential biological and cultural resources effects, energy demand, greenhouse gas emissions and brine disposal by methods to be determined. In addition, while the treatment process is technically feasible, the feasibility of brine disposal methods has not been sufficiently evaluated and presents a potentially significant environmental and permitting constraint. Moreover, the issue is not just willingness to spend money. No alternative will be built if the lead agency and the rate payers cannot afford it, if it is economically infeasible and if it has unacceptable impacts on the service area.

CVWD performed a reconnaissance-level evaluation of desalinating Canal water prior to recharge at the Whitewater facility and at the three East Valley facilities – Levy, Martinez and Indio. To bracket the desalination options at Whitewater, two options were considered, one where the capacity is limited to the average recharge (90,000 AFY capacity) with any additional water bypassed without treatment and one where all recharge water is desalinated (180,000 AFY capacity). Both of these options assume location of a treatment facility near Metropolitan's CRA to minimize the impact of TDS on the groundwater basin between the CRA and recharge facility. The East Valley facilities were assumed to operate at a continuous recharge rate as indicated in the WMP Update. Using costs from a CVWD-funded investigation of Colorado River water treatment (Malcolm Pirnie, 2008a), the cost of treatment was estimated as presented in the Table below to achieve: 1) a 500 mg/L TDS target based on the California recommended secondary drinking water standard for TDS and 2) a 250 mg/L TDS target based on the general water quality of the Lower aquifer. The costs of desalination treatment are also compared with the cost of the SWP Extension and several combination options involving both the SWP Extension and treatment of recharge water in the East Valley.

Previous estimates of treatment costs have excluded the cost of brine disposal. Brine flows from recharge water desalination are estimated to range from 7.4 mgd to 55 mgd, depending on the TDS target and the treatment capacity. Although the Malcolm-Pirnie studies evaluated a wide variety of potential brine disposal options, discharge to wetlands near the Salton Sea showed the most promised. Previous studies have also did not include the cost to obtain replacement water to offset the amount of water lost to brine disposal. This evaluation includes these additional costs.

This evaluation shows that the cost to construct treatment at Whitewater could range from $68 million for the smaller facility with a 500 mg/L target to $508 million for the larger facility with a 250 mg/L target. These costs are exclusive of brine conveyance and disposal. Total annual costs including amortized capital, O&M and replacement water costs would range from $15 million to $71.4 million per year depending on the TDS target and the design capacity.

In addition, CVWD evaluated the cost to treat Colorado River water prior to recharge at the Thomas E. Levy Groundwater Replenishment Facility near La Quinta and the proposed recharge facilities at Martinez and Indio. As with the Whitewater options, two TDS targets were considered: 500 mg/L and 250 mg/L. The capital cost (also exclusive of brine conveyance and disposal) would be $117 million to achieve the 500 mg/L target, while the capital cost to achieve the 250 mg/L target would be $237 million. Amortized capital, O&M and replacement water costs are estimated to be $22.6 million and $47.9 million per year, respectively, for the two water quality targets.

To estimate an order of magnitude cost for brine conveyance and disposal, it is assumed that a brine line could be constructed roughly parallel to the Whitewater River channel from Whitewater to the Salton Sea, with branches to collect brine from Indio and Martinez as shown on the attached figure. Such a brine line system would be more than 66 miles long with diameters ranging from 12 to 30 inches for the smallest option and from 12 to 54 inches for the largest option. Based on current pipeline installation costs (assuming use of high density polyethylene pipe-HDPE), the brine line construction could add $158 million to more than $288 million to the capital cost of a recharge water desalination program. Assuming 1 percent per year for O&M, the annual cost of the brine line would be $1.4 million to $2.2 million per year. The capital cost of a separate brine line to serve East Valley recharge desalters would add $67 million to $79 million to the program cost. Whether discharge of brine to the Salton Sea via wetlands would be permitted is uncertain at this time. Previous evaluations of lined evaporation ponds and zero liquid discharge approaches show comparable or higher costs than those presented here (Malcolm Pirnie, 2008b).

Comparison of Desalination and SWP Importation Options

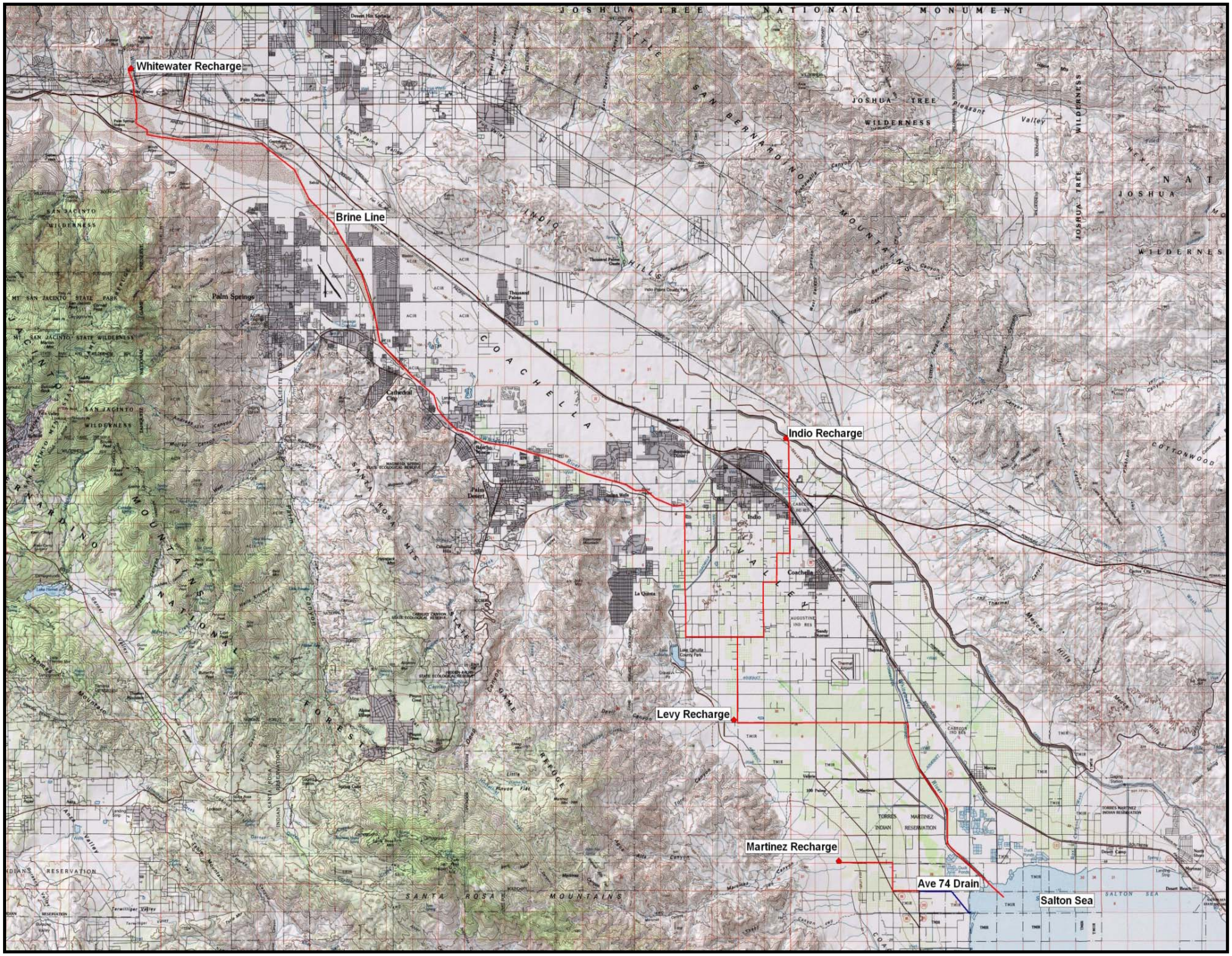
Location	TDS Target-mg/L	Avg Annual Delivery-AFY	Plant Capacity-mgd	Capital Cost	O&M Cost-$/yr	Total Annual Cost $/yr	Average Groundwater Production-AFY	Average RAC Impact - $/AF	Existing Avg RAC $/AF	Percent RAC Increase
Desalination-1										
Whitewater River	500	85,000	22.6	$ 68,000,000	$ 8,100,000	$ 15,000,000				
Levy	500	40,000	20.3	$ 62,000,000	$ 6,100,000	$ 12,200,000				
Martinez	500	20,000	10.1	$ 35,000,000	$ 3,300,000	$ 6,700,000				
Indio	500	10,000	5.1	$ 20,000,000	$ 1,800,000	$ 3,700,000				
Brine System				$ 158,000,000	$ 1,600,000	$ 13,300,000				
Total				$ 343,000,000	$ 20,900,000	$ 50,900,000	257,000	$198	$90	220%
Desalination-2										
Whitewater River	500	100,000	173.2	$ 376,000,000	$ 7,800,000	$ 37,500,000				
Levy	500	40,000	20.3	$ 62,000,000	$ 6,100,000	$ 12,200,000				
Martinez	500	20,000	10.1	$ 35,000,000	$ 3,300,000	$ 6,700,000				
Indio	500	10,000	5.1	$ 20,000,000	$ 1,800,000	$ 3,700,000				
Brine System				$ 197,000,000	$ 2,000,000	$ 16,500,000				
Total				$ 690,000,000	$ 21,000,000	$ 76,600,000	257,000	$298	$90	332%
Desalination-3										
Whitewater River	250	85,000	62.9	$ 192,000,000	$ 26,100,000	$ 45,400,000				
Levy	250	40,000	39.3	$ 128,000,000	$ 14,200,000	$ 26,300,000				
Martinez	250	20,000	19.7	$ 70,000,000	$ 7,500,000	$ 14,000,000				
Indio	250	10,000	9.8	$ 39,000,000	$ 4,000,000	$ 7,600,000				
Brine System				$ 230,000,000	$ 2,200,000	$ 19,200,000				
Total				$ 659,000,000	$ 54,000,000	$ 112,500,000	257,000	$438	$90	487%
Desalination-4										
Whitewater River	250	100,000	194.6	$ 508,000,000	$ 28,100,000	$ 71,400,000				
Levy	250	40,000	39.3	$ 128,000,000	$ 14,200,000	$ 26,300,000				
Martinez	250	20,000	19.7	$ 70,000,000	$ 7,500,000	$ 14,000,000				
Indio	250	10,000	9.8	$ 39,000,000	$ 4,000,000	$ 7,600,000				
Brine System				$ 288,000,000	$ 2,700,000	$ 23,800,000				
Total				$1,033,000,000	$ 56,500,000	$ 143,100,000	257,000	$557	$90	620%
SWP Extension Only										
SWP Extension	330	100,000		$ 817,000,000	$ 12,000,000	$ 71,300,000	165,000			
Total				$ 817,000,000	$ 12,000,000	$ 71,300,000	165,000	$432	$112	386%

Comparison of Desalination and SWP Importation Options (continued)

Location	TDS Target-mg/L	Avg Annual Delivery-AFY	Plant Capacity-mgd	Capital Cost	O&M Cost-$/yr	Total Annual Cost $/yr	Average Groundwater Production AFY	Average RAC Impact - $/AF	Existing Avg RAC $/AF	Percent RAC Increase
SWP Extension and Desalination-1										
SWP Extension	330	100,000		$ 817,000,000	$ 12,000,000	$ 71,300,000				
Levy	500	40,000	20.3	$ 62,000,000	$ 6,100,000	$ 12,200,000				
Martinez	500	20,000	10.1	$ 35,000,000	$ 3,300,000	$ 6,700,000				
Indio	500	10,000	5.1	$ 20,000,000	$ 1,800,000	$ 3,700,000				
Brine System				$ 67,000,000	$ 800,000	$ 5,900,000				
Total				$1,001,000,000	$ 24,000,000	$ 99,800,000	257,000	$388	$90	432%
SWP Extension and Desalination-2										
SWP Extension	330	100,000		$ 817,000,000	$ 12,000,000	$ 71,300,000				
Levy	250	40,000	39.3	$ 128,000,000	$ 14,200,000	$ 26,300,000				
Martinez	250	20,000	19.7	$ 70,000,000	$ 7,500,000	$ 14,000,000				
Indio	250	10,000	9.8	$ 39,000,000	$ 4,000,000	$ 7,600,000				
Brine System				$ 79,000,000	$ 800,000	$ 6,700,000				
Total				$1,133,000,000	$ 38,500,000	$ 125,900,000	257,000	$490	$90	545%

Basis of Estimates:

- Size of desalination facilities based on average recharge water deliveries with a 20% peaking factor. Capacity based on mass-balance of treated and bypassed water to achieve desired TDS target. Average CRA TDS = 640 mg/L, average Canal water TDS = 767 mg/L per Reclamation projections (Reclamation, 2007).
- Capital and operations and maintenance (O&M) costs of desalination based on cost data from Malcolm-Pirnie, 2008a. Updated to 2010 cost levels using ENR construction cost index and sized based on treatment capacity
- SWP Extension costs based on lowest cost option – Modified North Pass Alignment, Small Project serving CVWD and DWA only as presented in Final Draft SWP Extension Project Development Report (GEI, et al., 2011). Assumes 93 percent of the cost is allocated to Whitewater River Subbasin and 7 percent to Mission Creek Subbasin.
- Brine system assumes construction of HDPE pipeline to convey brine flows by gravity from treatment sites located near each recharge facility to Salton Sea. Whitewater facility is assumed to be located near CRA turnout. Brine from Martinez facility is discharged to Avenue 74 drain.
- Capital costs are amortized at 6 percent for 30 yrs.
- Pipeline O&M costs are assumed to be 1 percent of construction costs.
- Total annual costs consist of amortized capital, O&M and replacement water for brine discharge at $300/AF.
- Average groundwater production is for period 2021 through 2045 based on WMP Update unpublished data files for Proposed Project. For the SWP Extension Only option, the average production is for the West Valley only.
- Average Replenishment Assessment Charge (RAC) Impact assumes all costs of SWP importation or desalination are recovered through increased RAC charges on pumping.
- Existing RAC charge is the production-weighted average of the 2011-12 RAC adopted by DWA for the West Valley ($82/AF); CVWD for the West Valley ($108/AF) and CVWD for the East Valley $31/AF.



Schematic of Potential Coachella Valley Brine System

Based on the foregoing analysis, the capital cost to treat Colorado River water prior to recharge including brine disposal could range from $343 million to achieve a 500 mg/L target while treating most but not all of the water at Whitewater to about $1.03 billion to achieve a 250 mg/L target treating all recharge water. The economic impact of implementing a desalination program is significant as shown in the table above. The smallest desalination program would more than triple the average replenishment assessment in the Valley, while the largest program would increase the average replenishment assessment by a factor more than seven times current charge. While the effect of such an increase on the customers of large water purveyors such as DWA and CVWD would be somewhat dampened by other costs, the impact on smaller producers like golf courses and farmers would be substantial and would likely result in a severe economic impacts. Therefore, in light of the high cost and the uncertainty associated with brine disposal permitting, desalination of recharge water is considered to be financially infeasible at the present time.

In addition, Section 8.1.4.2 of the 2010 WMP Update states that "an evaluation of the potential effects of Colorado River recharge will be conducted in conjunction with the salt/nutrient plan" to be submitted to the State Water Resources Control Board by 2014 to meet SWRCB Recycled Water Policy requirements. The Tribe, as well as CVWD, DWA, other Valley water agencies and stakeholders, will have an opportunity to participate in the preparation of that basin-wide plan on how salinity and nutrients should be managed and monitored.

Dual Use of Colorado River Aqueduct

The comment letter stated that CVWD had ignored a potential third alternative for delivering SWP water to the Valley and referred to its letter commenting on the 2002 PEIR. In that earlier letter, the Tribe put forth a third approach—the use of the Metropolitan Colorado River Aqueduct (CRA) to bring SWP water to the Coachella Valley. The 2002 comment letter and District's response appear in the 2002 final PEIR Section 13 – Comments and Responses in the Final PEIR and are attached. At the time the 2002 PEIR was being finalized, Metropolitan was approached with this suggestion and concluded that reversing the flow in the CRA was not feasible, given its own aqueduct operations and maintenance requirements and the fact that the aqueduct was designed for gravity, non-pressurized flow to the west.

CVWD has revisited this approach for this SPEIR and Metropolitan was contacted again as part of the responses to comments on the Draft SPEIR (Hasencamp, *et al*., pers. comm., 2011). The following presents an update to the 2002 response regarding dual use of the CRA to delivery SWP water to the Coachella Valley.

The commenter suggested dual use of the Metropolitan's Colorado River Aqueduct (CRA) for conveying SWP water to the Coachella Valley. Under this concept, a pipeline and pumping station would be constructed to convey SWP water from Lake Perris to the CRA near the western portal of the San Jacinto Tunnel. During periods when the CRA is not in use, SWP water would be pumped into the CRA to flow in the reverse direction to the Coachella Valley and delivered at the Whitewater turnout.

Evaluation of this option is based on several considerations. Based on discussion with Metropolitan engineers, the CRA is always in use for conveying Colorado River water to Southern California (except for short periods when maintenance is performed). The design flowrate of the CRA is 1,800 cubic feet per second (cfs) (about 1.3 million AFY) toward the west and typical full flow operation is at 1,605 cfs (Hasencamp, *et al*., pers. comm., 2011). Metropolitan is currently delivering approximately 1.25 million AFY of Colorado River water. Although Metropolitan's current firm deliveries from the Colorado River are about 660,000 AFY, Metropolitan is developing and implementing plans to maintain as close to full deliveries as possible. These projects include the water transfers under the QSA, Palo Verde land fallowing, several interstate and desert storage projects, recovery of Water stored in Lake Mead and use of surplus Colorado River water when available. During 2010, Metropolitan delivered 1,090,000 AFY of Colorado River water to its service area. Metropolitan's 2010 Regional Urban Water Management Plan indicates full utilization of the CRA for the next 25 years (Metropolitan, 2010). Although CRA deliveries to Metropolitan have been reduced in 2011 due to high SWP water availability, Metropolitan has continued to operate the aqueduct on a continuous basis except for maintenance shutdowns (Hasencamp, *et al*., pers. comm., 2011).

CVWD and DWA currently have a combined SWP Table A Amounts of 194,100 AFY. At DWR's current estimated SWP reliability of 60 percent of Table A, CVWD and DWA would expect to receive 116,460 AFY on average. To deliver an average annual SWP flow of 116,460 AFY (194,100 AFY maximum annual) to CVWD and DWA, several factors must be considered including the SWP contractual limitations, conveyance from the SWP to the CRA, ability to move water through the CRA and spreading ground capacity.

The SWP contract limits peak month flow to 1.32 times the average annual flow. This effectively limits CVWD's and DWA's maximum delivery from the SWP to 354 cfs (194,100 AFY × 1.32 ÷ 724 AFY/cfs). As shown in the table below, CVWD and DWA would require 166 days of CRA operation at this maximum contractual flowrate to receive their average annual deliveries. This would restrict Metropolitan's use of its own aqueduct to 199 days per year and limit deliveries to 710,000 AFY (57 percent of current). Delivery of the full Table A allocation to CVWD and DWA would require 277 days of operation, limiting Metropolitan to 89 days per year or 317,000 AFY (25 percent of current). Clearly, this approach would not be acceptable to Metropolitan as it would not provide sufficient time to deliver Metropolitan's Colorado River water needs.

Water Delivery Constraints based on SWP Contract

	CVWD and DWA Average SWP Delivery	CVWD and DWA Maximum SWP Delivery
CVWD and DWA SWP Capacity – cfs	354	354
CVWD and DWA Annual SWP Supply – AFY	116,460	194,100
Time to Deliver Average SWP supply – days per year	166	277
Remaining Time for Metropolitan Operation – days per year	199	89
Metropolitan Delivery design flow – cfs	1,800	1,800
Metropolitan Annual Delivery -AFY	710,000	317,000

If the SWP conveyance limitation could be waived and CVWD and DWA could deliver their full Table A Amount at the CRA maximum design capacity (1,800 cfs), 55 days of reverse operation would be required. This would limit Metropolitan's operation to 310 days per year and a maximum flow of 1,107,000 AFY, 89 percent of its intended operation.

The nearest locations to deliver SWP water to the CRA are from the SWP Santa Ana Valley Pipeline or from Metropolitan's Inland Feeder. The SWP Santa Ana Valley Pipeline (SAVP) was designed to convey 444 cfs from the Devil Canyon Afterbay in San Bernardino to Lake Perris. Water from the SAVP would be required to convey water to a pumping station that would lift water to the CRA. CVWD and DWA acquired 138 cfs of capacity rights in the Santa Ana Valley Pipeline under the terms of the 2003 Exchange Agreement with Metropolitan that transferred 100,000 AFY of SWP Table A Amount to CVWD and DWA. Metropolitan retained the remaining capacity in this pipeline. Thus, CVWD and DWA do not have sufficient capacity in the Santa Ana Valley Pipeline to meet their conveyance needs. In addition, the SAVP provides the sole source of water the Metropolitan's Mills Water Treatment Plant in Riverside, so reduction in SAVP water deliveries to supply CVWD and DWA would not be acceptable. Consequently, an additional conveyance facility must be considered.

Metropolitan completed construction of the Inland Feeder, which has a capacity of about 1,000 cfs. The Inland Feeder conveys SWP water from Devil Canyon Afterbay to Diamond Valley Lake and allows Metropolitan to make full use of its capacity in the East Branch of the California Aqueduct. CVWD and DWA do not have capacity rights in Inland Feeder. Metropolitan conducted an Inland Feeder capacity availability study for the SWP Extension to the Coachella Valley feasibility study. The capacity investigation indicated that unused Inland Feeder capacity may be available about 55 percent of the time, but the available capacity would exceed 300 cfs only 22 percent of the time. The average available capacity is estimated to be 172 cfs, which would deliver 124,500 AFY if available for an entire year. While this may be sufficient to deliver CVWD's and DWA's average SWP supply, it is unclear whether the timing of capacity availability would coincide with SWP water availability and whether there would be sufficient capacity when needed to deliver CVWD's and DWA's full Table A allocation. Even more significant is whether Metropolitan would even consider allowing CVWD and DWA to use that capacity given its own needs.

The next potential capacity limitation is the Whitewater Spreading Facility. This facility has a maximum recharge capacity of 300,000 acre-ft in a single year (based on operational experience in the mid-1980s) or a continuous flowrate of 415 cfs. This flowrate does not include any allowance for recharge basin maintenance. For short term periods, the spreading facility has been able to recharge up to 700 cfs, with flows averaging 560 cfs for four months. The following table summarizes water deliveries at Whitewater for the maximum annual flow and short-term sustained flow conditions and estimates the number of days remaining and the annual deliveries for Metropolitan. All of these delivery scenarios result in significant reductions to Metropolitan's CRA deliveries.

Water Delivery Constraints Based on Whitewater Spreading Facility

	CVWD and DWA Average SWP Delivery		CVWD and DWA Maximum SWP Delivery	
	Maximum Annual Flow	Short-term, sustained Flow	Maximum Annual Flow	Short-term, sustained Flow
Whitewater Spreading Facility Capacity – cfs	415	560	415	560
CVWD and DWA Annual SWP Supply – AFY	116,460	116,460	194,100	194,100
Days to Deliver Average SWP supply	142	105	235	175
Remaining Days for Metropolitan Operation	223	260	130	190
Metropolitan Delivery design flow – cfs	1,800	1,800	1,800	1,800
Metropolitan Annual Delivery -AFY	796,100	928,200	464,100	678,300

While expansion of the recharge basins may be possible, historical operation in the mid-1980s and for 2010-11 indicated that water levels would rise close to the ground surface at these high recharge rates. If the water levels reach the ground surface, recharge rates would decline significantly, reducing the recharge capacity. Thus, expansion may be limited by hydrogeologic constraints. In addition, environmental impacts from construction of new recharge basins, such as loss of dune sand replenishment for fringe-toed lizard habitat, may be difficult to resolve. All land surrounding the recharge basins has been designated as a conservation area by the Coachella Valley Multi-Species Habitat Conservation Plan. Expansion of the recharge facilities is not a covered activity, so a major plan amendment would be required to allow and expansion.

Finally, it is uncertain whether the existing CRA pipeline could structurally withstand the added pressure required for reverse flow. The CRA was designed in the 1930s for gravity, unpressurized flow. This means that the CRA was designed with a hydraulic gradeline that closely approximates the ground surface elevation. Little allowance was provided for pressurization. In addition, the San Jacinto Tunnel, which accounts about 14 miles of the distance to the Whitewater turnout, leaks significant amounts of water and may not have the structural integrity to handle the additional pressure (over 100 ft) required to force water to the Coachella Valley. Increased pressure would cause leakage from the tunnel into the surrounding mountains with unknown effects. Since it is the sole source of Colorado River water for the Southern California metropolitan area, shutting down the tunnel for extended periods of time to accomplish structural modifications would present significant operational problems for Metropolitan.

Based upon these considerations, there are significant technical and operation issues associated with this alternative. CVWD discussed this approach with the management of Metropolitan who indicated to CVWD that they would not consider such a proposal (Hasencamp, *et al*., pers. comm., 2011).

Note also, that the Plan seeks to minimize the additional importation of Colorado River water for recharge though increased conservation, maximizing local water use through desalination of drain water and through recycling. The District has already achieved an 18.4 percent reduction in per capita water use through conservation, and the CVWD Landscape Ordinance has reduced allowable landscape irrigation from 1.5 AFY/customer to 0.6 AFY/customer. In addition, the present Plan includes half the recharge at the proposed Martinez Canyon recharge facility planned in 2002. A small recharge facility is proposed in Indio, to be carried out by the city.

Therefore, after consideration of these three approaches, the District has concluded that there is no feasible mitigation for groundwater quality impacts (salinity) at this time.

4-5 "E. CVWD continues to present conflicting information about the feasibility of bringing SWP water to the Valley and continues to mischaracterize the quality of SWP water."

The District does not view the information on SPEIR page 1-41 and Section 6.5.4.1 as contradictory. CVWD and other water agencies conducted a feasibility analysis of bringing SWP water to the Valley is discussed in 4-4 above. A draft report was prepared in early 2011 (GEI, *et al*., 2011).

The Tribe's letter does not explain or provide evidence to support the statement that CVWD mischaracterizes the quality of SWP water. SWP Exchange water quality is discussed in SPEIR Sections 5.3.3.2 and 10.4.1. SWP water quality information presented is from the DWR, operator of the SWP and from Metropolitan Water District's monitoring at Silverwood Lake.

Therefore, the District does not view the information on the feasibility of the SWP extension to be contradictory. The statement concerning SWP quality characterization is noted but is not explained or supported.

4-6 "F. Mitigation Measures"

As above, the District agrees that an expanded monitoring and reporting program, one that also includes data from tribal wells, would be useful for gaining a more complete picture of the Valley water resources; it is part of the WMP Update implementation plan. Monitoring is an important first step toward identifying whether a problem exists, but in and of itself is not mitigation.

The tribes generally do not provide groundwater quality data. The Torres Martinez tribe has reported that they provide data to the state, but the District has not been able to locate it; the Twenty-nine Palms tribe sent some information to EPA STORET on one monitoring well and several surface water sites. The District does not monitor tribal wells. The District therefore assumes that tribal wells are monitored by the individual tribes in keeping with USEPA requirements and that exceedances of applicable water quality standards are reported. The existing mitigation measure does not and cannot require the tribes to connect to local water or wastewater agencies' systems. To date, some Coachella Valley tribes have indicated interest in connecting to existing water distribution systems and sewer systems, however; CVWD currently is working with them and the Indian Health Service to obtain grants and other monies to effect this infrastructure. It should also be remembered that mitigation measure ITA-1 suggests the installation of wellhead treatment facilities in case water quality exceeds primary health-based water quality standards.

Conclusion

As demonstrated in the past five years of WMP Update and SPEIR preparation and through multiple meetings with the Tribe, the District has always been willing to meet with the Tribe and discuss issues of mutual interest. The District agrees that there is much more to be done to manage Coachella Valley water resources and their uses. That is the intent of the 2010 WMP Update, which is a necessary first step and road map for these future actions. CVWD remains interested in coordination with the tribal councils and their staffs on issues of mutual benefit.

Attachment to WMP Update SPEIR Response to Comment No. 4 Agua Caliente Tribe of Cahuilla Indians

2002 Coachella Valley Water Management Plan Program EIR
Comment No. 15 Law Offices of Art Bunce, dated August 8, 2002
Subject: Agua Caliente Band of Cahuilla Indians' Comments for CVWD Water Management Plan – Water Quality Perspectives

2002 PEIR Comment No. 15-21, pages 8 and 9

<u>Option 3 – Dual Use of the Colorado River Aqueduct</u>

We recognize that criticizing a plan is easy but accomplishes little without a constructive alternative. We offer the following additional alternative that we believe may provide an even more cost effective means of bringing high quality SWP water into the Coachella Valley. We have neither the time nor the resources to evaluate this option in the rigorous manner it deserves, and therefore we request that it be thoroughly reviewed by CVWD in response to our comments.

The existing Colorado River Aqueduct crosses the Coachella Valley, bringing water from the Colorado River to Lake Matthews, south of Riverside, California. A pipeline that is an extension of the California Aqueduct System is under construction to carry SWP water to the new Domenigoni (East Side) Reservoir, and crosses the Colorado River Aqueduct in the vicinity of San Jacinto. Option 3 involves using the Colorado River Aqueduct to bring SWP water into the Coachella Valley by temporarily/periodically reversing the flow in the Colorado River Aqueduct between San Jacinto and the Whitewater River turnout. This would involve the following:

- Constructing a water transfer facility where the Colorado River Aqueduct and California Aqueduct pipeline cross, including a pumping plant and temporary water storage facility. The purpose of this facility would be to transfer water from the pipeline into the Colorado River Aqueduct, and provide the power needed to pump this water to the Whitewater River outlet of the Aqueduct. The Whitewater River turnout is at about the same elevation as the San Jacinto end of the pipeline, so the power costs should be minimal.

- Since the Aqueduct normally delivers water westward, operation of the Option would be intermittent, when the Aqueduct is not otherwise in use. Intermittent use would require higher flow rates than continuous use, and therefore the structure at the Whitewater River turnout of the Aqueduct would probably need to be enlarged to handle the increased rate of flow. The spreading grounds may also need to be enlarged.

- A pipeline to convey this water to the Low Valley should also be scoped–out.

The advantages of this option include:

1. Delivery of high quality SWP water to the Coachella Valley.

2. No new pipelines are necessary to convey the water into the Coachella Valley (though a new pipeline from Whitewater to the Lower Vale may be a cost-effective means of conveying high quality water to the Lower Valley).

Disadvantages of this optic include;

1. Some re-engineering of the Aqueduct and new pipeline would be needed.

2. The flow at the Whitewater River turnout would be increased and intermittent, and may require enlargement of these structures.

We do not have the means of evaluating the costs of this Option, but we believe it could be the least expensive and least disruptive of the options. This option should be rigorously evaluated.

Final PEIR Response to Comment 15-21

15-21 The commenter provided an interesting option for conveying SWP water to the Coachella Valley by dual use of the Metropolitan's Colorado River Aqueduct (CRA). Under this concept, a pipeline and pumping station would be constructed to convey SWP water from Lake Perris to the CRA near the western portal of the San Jacinto Tunnel. During periods when the CRA is not in use, SWP water would be pumped into the CRA to flow in the reverse direction to the Coachella Valley.

Evaluation of thi8s option is based on several considerations. The CRA is always in use for conveying Colorado River water to Southern California (except for short periods when maintenance is performed). The design flowrate of the CRA is 1,800 cfs (about 1.3 million acre-ft/yr) toward the west. Metropolitan is currently delivering approximately 1.25 million acre-ft/yr of Colorado River water. Although Metropolitan's current firm deliveries from the Colorado River is about 660,000 acre-ft/yr, Metropolitan is developing and implementing plans to maintain as close to full deliveries as possible. These projects include the water transfers under the QSA, Palo Verde land fallowing, several interstate and desert storage projects and surplus Colorado River water for the next 15 years.

To deliver an average annual SWP flow of 103,000 acre-ft/yr (174,200 acre-feet/yr maximum annual) to CVWD and DWA, several factors must be considered including the SWP contractual limitations and spreading ground capacity. The SWP contract limits peak month flow to 1.32 times the average annual flow. This effectively limits the maximum supply from the SWP to 318 cfs as described in Section I.1. At this maximum contractual flowrate, 164 days of operation would be required to make average annual deliveries. This would restrict Metropolitan's use of its own aqueduct to 201 days per year and limit deliveries of 718,000 acre-ft/yr (57 percent of current). Delivery of the maxi8mum amount of water to CVWD and DWA would limit Metropolitan to 89 days per year or 317,000 acre-ft/yr (25 percent of current). Clearly this approach would not be acceptable to Metropolitan.

If the SWP contractual peaking limitation can be waived, a higher flowrate may be possible. The next capacity limitation is the Whitewater Spreading Facility which has a maximum recharge capacity of 300,000 acre-ft in a single year (based on operation experience) or a continuous flowrate of 415 cfs. This flowrate does not include any allowance for recharge basin maintenance. Delivery of the average CVWD and DWA SWP recharge water supply at the maximum recharge rate of 415 cfs requires a 126 day operating period. Reversal of flow for this period of time would effectively limit Metropolitans' operations to 239 days per year. This would limit Metropolitan to a maximum annual delivery of 854,000 acre-ft/yr (43 percent of current). While expansion of the recharge basin may be possible, historical operation in the mid-1980s indicated that water levels would rise close to the ground surface at these high rates. Thus expansion may be limited by hydrogeologic constraints. In addition, environmental impacts from construction of new recharge basins, such as loss of dune sand replenishment for fringe-toed lizard habitat, may be difficult to resolve.

The SWP Santa Ana Pipeline was designed to convey 444 cfs from the Devil Canyon Afterbay in San Bernardino to Lake Perris. The capacity of this pipeline is insufficient to meet Metropolitan's needs in Riverside and San Diego counties. Metropolitan is currently constructing the Inland Feeder, which will have a capacity of 1,000 cfs when it is completed in 2007. The Inland Feeder will allow Metropolitan to make full use of its capacity in the East Branch of the California Aqueduct. CVWD and DWA do not have capacity rights in either of these pipelines and obtaining such capacity would be difficult.

Finally, the existing CRA pipeline probably cannot take the added pressure for reverse flow. The CRA was designed in the 1930s for falling hydraulic gradient. This means that the CRA was designed for a hydraulic gradient that closely approximates the ground surface elevation. Little allowance was provided for pressurization. In addition, the San Jacinto Tunnel, which accounts about 14 miles of the distance to the Whitewater turnout leaks significant amounts of water and may not have the structural integrity to handle the additional pressure (over 100 ft) required to force water to the Coachella Valley. Since it is the sole source of Colorado River water for Southern California, shutting down the tunnel for extended periods of time to accomplish structural modifications would present significant operational problems for Metropolitan.

Based upon these considerations, there are significant technical and operation issues associated with this alternative. Discussion of this approach with the management of Metropolitan has indicated to CVWD that they would not consider such a proposal.

STATE OF CALIFORNIA

Governor's Office of Planning and Research

State Clearinghouse and Planning Unit

Edmund G. Brown Jr.
Governor

Ken Alex
Director

REC'D SEP 22 2011 CVWD

September 20, 2011

ORIG/EML: P REYES
EML: L STOWE
M JOHNSON
S BIGLEY
J BARRETT
FILE: 0643.511
G. Gil

Patti Reyes
Coachella Valley Water District
85-955 Avenue 52
Coachella, CA 92236

Subject: Coachella Valley Water Management Plan 2010 Update
SCH#: 2007091099

Dear Patti Reyes:

The State Clearinghouse submitted the above named Draft EIR to selected state agencies for review. On the enclosed Document Details Report please note that the Clearinghouse has listed the state agencies that reviewed your document. The review period closed on September 19, 2011, and the comments from the responding agency (ies) is (are) enclosed. If this comment package is not in order, please notify the State Clearinghouse immediately. Please refer to the project's ten-digit State Clearinghouse number in future correspondence so that we may respond promptly.

Please note that Section 21104(c) of the California Public Resources Code states that:

> "A responsible or other public agency shall only make substantive comments regarding those activities involved in a project which are within an area of expertise of the agency or which are required to be carried out or approved by the agency. Those comments shall be supported by specific documentation."

These comments are forwarded for use in preparing your final environmental document. Should you need more information or clarification of the enclosed comments, we recommend that you contact the commenting agency directly.

This letter acknowledges that you have complied with the State Clearinghouse review requirements for draft environmental documents, pursuant to the California Environmental Quality Act. Please contact the State Clearinghouse at (916) 445-0613 if you have any questions regarding the environmental review process.

Sincerely,

Scott Morgan

Scott Morgan
Director, State Clearinghouse

Enclosures
cc: Resources Agency

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Document Details Report
State Clearinghouse Data Base

SCH# 2007091099
Project Title Coachella Valley Water Management Plan 2010 Update
Lead Agency Coachella Valley Water District

Type EIR Draft EIR

Description The proposed project is an update to the Coachella Valley Water Management Plan prepared in 2002 and seeks to meet current and future study area water demands through 2045, manage overdraft, manage water quality, and minimize environmental impacts. Proposed Project elements are water conservation, acquisition of imported supplies, increased recycled water use, drain water desalination, groundwater recharge, and source substitution.

Lead Agency Contact

Name Patti Reyes
Agency Coachella Valley Water District
Phone (760) 398-2651 ext 2270 ***Fax***
email
Address 85-955 Avenue 52
City Coachella ***State*** CA ***Zip*** 92236

Project Location

County Riverside, Imperial, San Diego
City
Region
Lat / Long
Cross Streets Various
Parcel No. Various
Township Variou ***Range*** ***Section*** ***Base*** SBB&M

Proximity to:

Highways I-10, Hwy 11, Hwy 74
Airports Palm Springs, Thermal, Bermuda
Railways UPRR
Waterways Whitewater River, Coachella Valley Stormwater Channel
Schools Various
Land Use LU: Urban, Agricultural, Golf Course
Z: Various
GPLU: Various

Project Issues Agricultural Land; Air Quality; Archaeologic-Historic; Drainage/Absorption; Flood Plain/Flooding; Geologic/Seismic; Noise; Population/Housing Balance; Public Services; Septic System; Vegetation; Water Quality; Water Supply; Wetland/Riparian; Wildlife; Growth Inducing; Landuse; Cumulative Effects

Reviewing Agencies Resources Agency; Colorado River Board; Department of Fish and Game, Region 5; Department of Fish and Game, Region 6; Department of Parks and Recreation; Department of Water Resources; California Highway Patrol; Caltrans, District 8; Caltrans, District 11; CA Department of Public Health; State Water Resources Control Board, Division of Water Rights; Regional Water Quality Control Board, Region 7; Native American Heritage Commission

Date Received 08/05/2011 ***Start of Review*** 08/05/2011 ***End of Review*** 09/19/2011

NATIVE AMERICAN HERITAGE COMMISSION
915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
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STATE CLEARING HOUSE

August 29, 2011

Ms. Patti Reyes, Planning and Special Program Manager
Coachella Valley Water District
P.O. Box 1058
Coachella, CA 92258

Re: SCH# 2007091099; CEQA Notice of Completion; draft Subsequent Environmental Impact Report (SEIR) for the **"Summary of Coachella Valley Water Management Plan 2010 Update"** located in the Coachella; Riverside County, California.

Dear Ms. Reyes:

The Native American Heritage Commission (NAHC), the State of California 'Trustee Agency' for the protection and preservation of Native American cultural resources pursuant to California Public Resources Code §21070 and affirmed by the Third Appellate Court in the case of EPIC v. Johnson (1985: 170 Cal App. 3rd 604). The NAHC wishes to comment on the proposed project.

This letter includes state and federal statutes relating to Native American historic properties of religious and cultural significance to American Indian tribes and interested Native American individuals as 'consulting parties' under both state and federal law. State law also addresses the freedom of Native American Religious Expression in Public Resources Code §5097.9.

The California Environmental Quality Act (CEQA – CA Public Resources Code 21000-21177, amendments effective 3/18/2010) requires that any project that causes a substantial adverse change in the significance of an historical resource, that includes archaeological resources, is a 'significant effect' requiring the preparation of an Environmental Impact Report (EIR) per the CEQA Guidelines defines a significant impact on the environment as 'a substantial, or potentially substantial, adverse change in any of physical conditions within an area affected by the proposed project, including ...objects of historic or aesthetic significance." In order to comply with this provision, the lead agency is required to assess whether the project will have an adverse impact on these resources within the 'area of potential effect (APE), and if so, to mitigate that effect. The NAHC Sacred Lands File (SLF) search resulted as follows: **Native American cultural resources were not identified** within one-half mile of the 'area of potential effect (APE). Note: the absence of recorded Native American cultural resources does not preclude their existence. The CVWD jurisdiction lies in a very culturally sensitive area.

The NAHC "Sacred Sites,' as defined by the Native American Heritage Commission and the California Legislature in California Public Resources Code §§5097.94(a) and 5097.96. Items in the NAHC Sacred Lands Inventory are confidential and exempt from the Public Records Act pursuant to California Government Code §6254 (r).

Early consultation with Native American tribes in your area is the best way to avoid unanticipated discoveries of cultural resources or burial sites once a project is underway. Culturally affiliated tribes and individuals may have knowledge of the religious and cultural significance of the historic properties in the project area (e.g. APE). We strongly urge that you make contact with the list of Native American Contacts on the attached list of Native American contacts, to see if your proposed project might impact Native American cultural resources and to obtain their recommendations concerning the proposed project. Pursuant to CA Public Resources Code § 5097.95, the NAHC requests that the Native American consulting parties be provided pertinent project information. Consultation with Native American communities is also a matter of environmental justice as defined by California Government Code §65040.12(e). Pursuant to CA Public Resources Code §5097.95, the NAHC requests that pertinent project information be provided consulting tribal parties. The NAHC recommends *avoidance* as defined by CEQA Guidelines §15370(a) to pursuing a project that would damage or destroy Native American cultural resources and Section 2183.2 that requires documentation, data recovery of cultural resources.

Furthermore, the NAHC is of the opinion that the current project remains under the jurisdiction of the statutes and regulations of the National Environmental Policy Act (e.g. NEPA; 42 U.S.C. 4321-43351). Consultation with tribes and interested Native American consulting parties, on the NAHC list, should be conducted in compliance with the requirements of federal NEPA and Section 106 and 4(f) of federal NHPA (16 U.S.C. 470 *et seq*), 36 CFR Part 800.3 (f) (2) & .5, the President's Council on Environmental Quality (CSQ, 42 U.S.C 4371 *et seq.* and NAGPRA (25 U.S.C. 3001-3013) as appropriate. The 1992 *Secretary of the Interiors Standards for the Treatment of Historic Properties* were revised so that they could be applied to all historic resource types included in the National Register of Historic Places and including cultural landscapes. Also, federal Executive Orders Nos. 11593 (preservation of cultural environment), 13175 (coordination & consultation) and 13007 (Sacred Sites) are helpful, supportive guides for Section 106 consultation. The aforementioned Secretary of the Interior's *Standards* include recommendations for all 'lead agencies' to consider the historic context of proposed projects and to "research" the cultural landscape that might include the 'area of potential effect.'

Confidentiality of "historic properties of religious and cultural significance" should also be considered as protected by California Government Code §6254(r) and may also be protected under Section 304 of he NHPA or at the Secretary of the Interior discretion if not eligible for listing on the National Register of Historic Places. The Secretary may also be advised by the federal Indian Religious Freedom Act (cf. 42 U.S.C., 1996) in issuing a decision on whether or not to disclose items of religious and/or cultural significance identified in or near the APEs and possibility threatened by proposed project activity.

Furthermore, Public Resources Code Section 5097.98, California Government Code §27491 and Health & Safety Code Section 7050.5 provide for provisions for accidentally discovered archeological resources during construction and mandate the processes to be followed in the event of an accidental discovery of any human remains in a project location other than a 'dedicated cemetery'.

To be effective, consultation on specific projects must be the result of an ongoing relationship between Native American tribes and lead agencies, project proponents and their contractors, in the opinion of the NAHC. Regarding tribal consultation, a relationship built around regular meetings and informal involvement with local tribes will lead to more qualitative consultation tribal input on specific projects.

If you have any questions about this response to your request, please do not hesitate to contact me at (916) 653-6251.

Sincerely,

Dave Singleton
Program Analyst

Cc: State Clearinghouse

Attachment: Native American Contact List

5. Response to: Scott Morgan, Director, State Clearinghouse

No response to State Clearinghouse letter is necessary. A response to the attached letter from the Native American Heritage Commission, which the District also received directly, is presented as comment and response No. 1 in this section.

UNITED STATES OF AMERICA
DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS
Southern California Agency
1451 Research Park Drive, Suite 100
Riverside, California 92507-2154
Telephone (951) 276-6624 Telefax (951) 276-6641

REC'D SEP 29 2011 CVWD

IN REPLY REFER TO:
Water Resources

ORIG/EML: P REYES
EML: L STOWE
J BARRETT
M JOHNSON
S BIGLEY
G GIL
FILE: 0643.511

SEP 28 2011

Coachella Valley Water District
P.O. Box 1058
Coachella, Ca 92236

Attention: Mr. Steve Robbins, General Manager, Chief Engineer

Subject: Coachella Valley Water Management Plan 2010 Update, Administrative Draft, Subsequent Program Environmental Impact Report SCH No. 2007091099

Dear Mr. Robbins,

The following comments and concerns are provided regarding the Coachella Valley Water Management Plan 2010 /Update, Administrative Draft, Subsequent Program Environmental Impact Report SCH No. 2007091099 (SPEIR).

The Bureau of Indian Affairs, Pacific Region, Southern California Agency, (BIA) saw very few comments, outreach or analysis within the draft text sections of the SPEIR, describing tribal related issues and lands for advanced review. We congratulate the Coachella Valley Water District (CVWD) for soliciting tribal concerns and interests regarding water management in the Coachella Valley in the recent past with their outreach meetings, educational presentations and discussions regarding tribal involvement in the Coachella Valley planning area and wonder why Native American concerns were not documented or recommendations provided within the Water plan update or the SPEIR to address federally reserved trust water resources. It was mentioned that the basin which is the planning area for these reports has not been adjudicated. Recommendations for preserving and formulating shared interests in the basin are not discussed adequately within the context of the SPIER.

There are several issues regarding the Coachella Valley Groundwater Basin that are of concern as it relates to land held in trust by the United States for the Indian tribes that reside in the Coachella Valley. Below is a list of some of these concerns.

6-1 1. Tribes occupying land overlying the Coachella Valley Water Basin have superior overlying rights to use basin groundwater under state law. In addition to rights to use groundwater, tribes in the Coachella Valley hold federally reserved water rights held in trust by the United

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States. CVWD and their Water plan update process must recognize the unique position the tribes hold in this valley. The SPEIR should be imposed in a manner that does not discriminate against the tribes with respect to their unique position as owners of federally reserved water rights, and must ultimately benefit the tribes rather than diminish tribal resources. The tribes as owners of federal reserved water rights are in a substantially different position than other residents of the Coachella Valley who merely posse rights to use water under State law. The Coachella tribes should participate as equal members of the planning process. It is mentioned that self governance was an issue brought up by the Tribes in the planning meetings; however no other comments were made or suggestions presented.

6-2

2. Ground Water overdraft in the Coachella West Valley has been in decline for over 60 years. The East Valley has been in decline for the last thirty years, (reference; Figure 6-5, historical cumulative change in storage). Almost no progress to slow the decline of ground water is shown in Figure 6-5 since the last plan in 2002. The analysis of this SPEIR relies on similar flawed logic, programs and economic growth as the last plan to solve the next ten years of overdraft. There has been no demonstration within this report to show success for improved conditions regarding this issue. Failure will be at the expense of both local and tribal communities. Given the lack of success since 2002, how does this plan differ and what safety measures will be in place if groundwater overdraft is not halted for both short and long term projections.

   In addition; it has been stated that groundwater recharge is necessary but treatment of recharge water from the Colorado River is not an option. There are no explanations presented regarding this statement. There is no consideration given for remediation of the basin in close proximity to the recharge locations.

6-3

3. Impacts of ground water recharge methodology to be used for recharging the upper and lower aquifer systems was not considered as it relates to tribal federal water reserves. Protecting Coachella Valley groundwater quality by pre-treating the water before it is spread into the recharge basins is a major concern for the tribes and the BIA.

6-4

4. It is very misleading to state the proposed plan for groundwater recharge and substitution of surface water is beneficial to both subsidence and groundwater levels which are still significantly declining, (albeit less than the no plan alternative). A reasonable person with a general understanding of the facts would strongly disagree with the use of "beneficial" in this case. Clearly it is being used as a sound bite to misinform and mislead the communities in the Coachella Valley. This needs to be addressed to prevent the term form misleading the public.

6-5

5. Subsidence occurring within the valley as a result of groundwater mining did not address how overdraft subsidence issues affect tribal trust lands.

6-6

6. Tribal water supply needs as well as infrastructure planning for improvement of living conditions on the reservations were not addressed.

6-7 7. Sanitary infrastructure hook-up with the local municipal districts that provide for sewage and treatment on the reservation were not addressed.

6-8 8. The general water quality monitoring plan lacks reporting requirements to the interested parties. The vague requirement stated in the SPEIR is that when standards are exceeded a substitute water supply will be furnished. The schedule, locations, and results of water quality monitoring in the Coachella Valley should be published and accessible. How this will be implemented should be fully disclosed in this document in order for the public to determine if it is adequate to protect the resources at risk. In this document it is not clear who will be responsible for testing and if the data is shared, or if each entity with concerns should have its own testing program. How will the monitoring program be implemented and the data shared between local management members of this basin and the public?

6-9 9. Elevated concentrations of native constituents found within the basin should be tested and analyzed for water quality. Treatment methods to be used to provide a safe drinking water source on tribal land should be considered and was not addressed.

6-10 10. Future permitting of ground water pumping and how it affects trust water resources on the reservations was not addressed and should be considered.

6-11 11. Recharging the aquifer system by surface run-off on the west side of the valley during flooding was not considered. Water run-off collection facilities should be considered within the plan for natural recharge in areas adjacent to tribal trust land.

6-12 12. Impacts to water quality from Coachella Valley Water district's recharge programs would likely degrade the aquifer's water quality near reservations. The Colorado River water movement, as a consequence of recharging the aquifer in these locations was not analyzed for water quality to confirm predictions and assumptions of the plume's movement already made by the water district. Potential impacts to trust tribal water reserves as well as possible mitigation measures on water quality were not identified or explored. On page 1-28 it is stated "should recharge with Colorado River water under the proposed project cause any Torres Martinez or Aqua Caliente domestic drinking water well to exceed any recognized health-based water quality standard, CVWD and DWA will work with the tribes to bring the drinking water supply to the tribes into compliance by providing domestic water service to the tribes from CVWD's or DWA's respective domestic water system or by providing appropriate well head treatment." Have the Tribes agreed to this? If not discussions need to be documented and an agreement should be made in writing before the SPEIR is finalized.

This question is now posed, at whose expense. Will CVWD or DWA incur cost to install domestic water infrastructure? Will CVWD or DWA provide treatment at the municipality's expense? Has the plan considered the other Tribes located in the valley? Namely, Cabazon Band of Mission Indians, Twenty Nine palms Band of Mission Indians and Augustine Band of Mission Indians including individual Indian allotment land?

6-13 13. Storm water run-off from urban sources and how these waters affect tribal land and the basin as it passes through were not addressed.

6-14 14. Contamination of the Salton Sea from urban, municipal and agricultural use was inadequately addressed.

6-15 15. Affects of elevated levels of contaminants on traditional native plants and wildlife important to the tribes culture was not addressed.

6-16 16. Feasibility studies for State Water Project Water Transfer to the Coachella Valley, and how this could possibly benefit tribal water reserves that are being depleted by water mining off the reservations were not addressed.

6-17 17. Reservation land must be included in the water modeling studies being conducted by the various water districts in the valley to have a complete picture of current and future impacts to the water basin was not addressed.

6-18 18. The tribes need to have a voice in water policy formulation as it relates to the Coachella Valley. The implementation for this was not addressed.

6-19 19. In comments submitted for the Coachella Valley WMP 2010 Update, it was stated that there was a general lack of specific data to support the findings in that report. It was requested that the supporting data be included in the report and appendices of the PEIR/EIR. The SPEIR does not support the findings of the Coachella Valley WMP 2010 Update and should accurately and honestly state the groundwater situation in Coachella Valley. In all probability, It is very likely groundwater levels will continue to decline near the existing rates as depicted in the Coachella Valley WMP 2002 Update.

6-20 20. Current planning for California Water Plan Update 2013 is underway and there are happening discussions about how to include other avenues to control groundwater overdraft. These actions are politically challenging and require strong leadership to propose and implement active management; monitoring and important regulations of water resources necessary to achieve sustainability of ground water basins for local communities to continue to prosper and thrive. The California Water Code allows these actions to occur in groundwater management areas. How are these discussions, groundbreaking ideas for implementation and shared management being introduced into this SPEIR to support the Coachella Valley WMP 2010 Update? How does this reporting interrelate with the Integrated Water Management planning for the Coachella Valley. Why are Federal reservation lands overlying this groundwater basin not being included in shared planning for Coachella Valley.

6-21 The Tribe and the Coachella Valley Water District should work in a manner similar to cooperating agencies under the National Environmental Policy Act. We believe this would be useful given the Tribes' sovereign status and their unique knowledge, expertise, and position as overlying landowners in the Basin.

We believe that cooperative approaches can resolve conflict and result in solutions. Comments to the plan can and should be filed to better address tribal water supply issues as part of a cooperative approach.

If there are any questions or clarification needed regarding the content of this letter, please do not hesitate to contact Ms. Christina Mokhtarzadeh, Hydrologist Southern California Agency at (951) 276-6624 ext. 257 or Ms. Lenore Lamb, Agency Natural Officer at (951) 276-6624 ext 254.

Sincerely;

Robert Eben
Superintendent

Cc: Water Rights Specialist, Pacific Region, Bureau of Indian Affairs
Regional Hydrologist, Pacific Region, Bureau of Indian Affairs
Chairperson, Agua Caliente Band of Cahuilla Indians
Chairperson, Augustine Band of Cahuilla Indians
Chairperson, Torres Martinez Desert Cahuilla Indians
Chairperson, Twenty Nine Palms Band of Mission Indians
Chairperson, Cabazon Band of Mission Indians
Chairperson, Morongo Band of Mission Indians
Regional Solicitor, U.S. Department of the Interior
Superintendent, Palms Springs Agency, Bureau of Indian Affairs

6. Response to: Robert Eben, Superintendent, U.S. Bureau of Indian Affairs, Riverside California

Although the Bureau of Indian Affairs (BIA) letter was received after the close of the public review period, CVWD offers the following responses in the interest of cooperation.

The comment letter questioned why Native American concerns were not documented or recommendations provided to address trust water resources. Native American concerns were addressed in Section 8.9 of the Draft SPEIR, pages 8-58 to 8-69. This section provides information on Indian Trust Assets and Indian lands in the Coachella Valley and tribal water rights. Impacts of the 2002 PEIR are presented for historic context, as well as impacts of the 2010 WMP Update on land use, land ownership, water quantity salinity, perchlorate, and water levels.

In addition, as BIA is aware from invitations and attendance, CVWD held more than ten meetings with the tribes and BIA over the past three years, during the preparation of the 2010 WMP Update and SPEIR, to elicit information on their concerns and to provide a forum for discussion of the Plan, the SPEIR and their relationship to the Integrated Water Management Plan, prepared in parallel. Additional meetings have been held between CVWD and individual tribes to discuss specific water issues affecting the tribes.

6-1 Water Rights

The comment letter states that tribes overlying the Coachella Valley have a superior overlying right to use basin groundwater under state law and federally reserved water rights held in trust by the United States.

The Water Management Plan 2010 Update and the SPEIR do not address the validity of water rights held by groundwater users in the Basin, nor do these documents attempt to characterize their priority or extent with respect to other users. The SPEIR acknowledges, without response, that the Tribe and the United States as Trustee for the Tribe have asserted certain water rights claims. Beyond such acknowledgement, the District believes it is inappropriate to address such claims in a CEQA document.

The Proposed Project is intended to provide all water users in the Valley with sufficient supplies to meet their current and future needs. Furthermore, the comments regarding the planning process and self governance for the tribes are not strictly WMP Update or CEQA issues. CVWD has suggested the Integrated Regional Water Management Planning (IRWMP) process as a mechanism for increased tribal participation in the planning process. The Agua Caliente and Torres Martinez tribes participated in the meetings and the Agua Caliente commented on the IRWMP report. The Torres Martinez tribe submitted projects for funding through the IRWMP.

In response to discussions of these issues at the CVWD coordination meetings with the tribes, CVWD arranged a “government to government” reception on May 18, 2010 between the CVWD Board of Directors and the tribal councils at the BIA office in Palm Springs. No tribal council members attended. CVWD is still interested in conducting meetings with individual tribal councils.

6-2 CVWD respectfully disagrees with the contention that “almost no progress to slow the decline of groundwater is shown since the last plan in 2002.” SPEIR Figure 6-5 (page 6-20) presents historical data through 2009; basin levels have risen since 2009 and are projected to rise further over the 35-year planning period (SPEIR Figures 6-14 and 6-15). While Figure 6-5 does show a continued decline in storage in the West Valley since 2002 (the result of reduced SWP Exchange deliveries due to drought), the storage decline in the East Valley was essentially zero in 2009 and has shown promising increases in 2010. Since adoption of the 2002 WMP, the State has experienced a significant drought and environmental restrictions on Delta exports have adversely affected SWP Exchange water deliveries. However, during this same time, CVWD and DWA acquired 132,900 AFY of additional SWP Table A Amounts through water transfers and acquisitions. Due to improved hydrological conditions, CVWD and DWA were able to recharge 228,000 AF in 2010 and almost 210,000 AFY through September 30, 2011 at the Whitewater replenishment facility. In addition, water levels in portions of the Valley rose significantly in 2010 and 2011 with nearly 500,000 AF of water recharged in 2010 and 2011. The WMP is a 35-year water management plan with the goal of balancing supplies and demands by 2045. Improvements in water levels are expected to occur over time. Some portions of the valley will see results sooner. The large size of the groundwater basin effectively dampens the effects of recharge activities with distance from the recharge facilities. Consequently, those portions of the basin nearest the recharge basins will respond more rapidly than more distant portions.

Since 2002, CVWD and DWA have invested more than $240 million in water acquisitions, conservation, construction of new facilities and monitoring to reduce overdraft and manage the basin. The following table provides a summary of these major investments by program element.

In the East Valley, water levels have risen sufficiently to re-establish artesian conditions in some areas. Water levels near the Thomas E. Levy Water Replenishment Facility have risen 50 feet in less than two years. In the West Valley, the Mid-Valley Pipeline Phase I was completed and golf courses are requesting Canal water delivery. With completion of the Mid-Valley Pipeline distribution system and connection of golf courses, overdraft in the entire Whitewater Basin will be reduced by one–third.

Program Element	Status	Expenditure Since 2002
Water Conservation – Agriculture, domestic and golf	On-going	$14,500,000
Water Supply Development		
Quantification Settlement Agreement	On-going	$36,000,000
SWP Table A Acquisition	Completed	$88,800,000
Source substitution		
Mid-Valley Pipeline Phase 1	Completed	$44,700,000
Groundwater Recharge		
Thomas E. Levy Recharge Facility	Completed	$44,400,000
Martinez Canyon Pilot Recharge Facility	Completed	$7,700,000
Surface and Groundwater Monitoring	On-going	$6,800,000
Total Expenditures		**$242,900,000**

Pretreatment of Colorado River water before recharge is discussed in SPEIR Section 10 Alternatives to the Proposed Project, Section 10.4.2, page 10-11 *ff*. As explained in that section, this alternative is not economically feasible at this time. Desalination of Canal water prior to recharge was found to have potentially significant impacts in addition to impacts of the WMP Update, particularly potential biological and cultural resources effects, energy demand, greenhouse gas emissions and brine disposal by methods to be determined. In addition, while the treatment process is technically feasible, the feasibility of brine disposal methods has not been sufficiently evaluated and presents a potentially significant environmental and permitting constraint. No alternative can be built if the lead agency and the rate payers cannot afford it, if it is not economically feasible, and if it has unacceptable impacts on the service area.

CVWD performed a reconnaissance-level evaluation of desalinating Canal water prior to recharge at the Whitewater facility and at the three East Valley facilities – Levy, Martinez and Indio. To bracket the desalination options at Whitewater, two options were considered, one where the capacity is limited to the average recharge (90,000 AFY capacity) with any additional water bypassed without treatment and one where all recharge water is desalinated (180,000 AFY capacity). Both of these options assume location of a treatment facility near Metropolitan's Colorado River Aqueduct (CRA) to minimize the impact of total dissolved solids (TDS) on the groundwater basin between the CRA and recharge facility. The East Valley facilities were assumed to operate at a continuous recharge rate as indicated in the WMP Update. Using costs from a CVWD-funded investigation of Colorado River water treatment (Malcolm Pirnie, 2008a), the cost of treatment was estimated as presented in the Table below to achieve: 1) a 500 mg/L TDS target based on the California recommended secondary drinking water standard for TDS and 2) a 250 mg/L TDS target based on the general water quality of the Lower aquifer. The costs of desalination treatment are also compared with the cost of the SWP Extension and several combination options involving both the SWP Extension and treatment of recharge water in the East Valley.

Previous estimates of treatment costs have excluded the cost of brine disposal. Brine flows from recharge water desalination are estimated to range from 7.4 mgd to 55 mgd, depending on the TDS target and the treatment capacity. Although the Malcolm-Pirnie studies evaluated a wide variety of potential brine disposal options, discharge to wetlands near the Salton Sea showed the most promise. Previous studies have also ignored the cost to obtain replacement water to offset the amount of water lost to brine disposal. This evaluation includes these additional costs.

This evaluation shows that the cost to construct treatment at Whitewater could range from $68 million for the smaller facility with a 500 mg/L TDS target to $508 million for the larger facility with a 250 mg/L target. These costs are exclusive of brine conveyance and disposal. Total annual costs including amortized capital, O&M and replacement water costs would range from $15 million to $71.4 million per year depending on the TDS target and the design capacity.

In addition, CVWD evaluated the cost to treat Colorado River water prior to recharge at the Thomas E. Levy Groundwater Replenishment Facility near La Quinta and the proposed recharge facilities at Martinez and Indio. As with the Whitewater options, two TDS targets were considered: 500 mg/L and 250 mg/L. The capital cost (also exclusive of brine conveyance and disposal) would be $117 million to achieve the 500 mg/L target, while the capital cost to achieve the 250 mg/L target would be $237 million. Amortized capital, O&M and replacement water costs are estimated to be $22.6 million and $47.9 million per year, respectively, for the two water quality targets.

To estimate an order of magnitude cost for brine conveyance and disposal, it is assumed that a brine line could be constructed roughly parallel to the Whitewater River channel from Whitewater to the Salton Sea, with branches to collect brine from Indio and Martinez as shown on the attached figure. Such a brine line system would be more than 66 miles long with diameters ranging from 12 to 30 inches for the smallest option and from 12 to 54 inches for the largest option. Based on current pipeline installation costs (assuming use of high density polyethylene pipe-HDPE), the brine line construction could add $158 million to more than $288 million to the capital cost of a recharge water desalination program. Assuming 1 percent per year for O&M, the annual cost of the brine line would be $1.4 million to $2.2 million per year. The capital cost of a separate brine line to serve East Valley recharge desalters would add $67 million to $79 million to the program cost. Whether discharge of brine to the Salton Sea via wetlands would be permitted is uncertain at this time. Previous evaluations of lined evaporation ponds and zero liquid discharge approaches show comparable or higher costs than those presented here (Malcolm Pirnie, 2008b).

Comparison of Desalination and SWP Importation Options

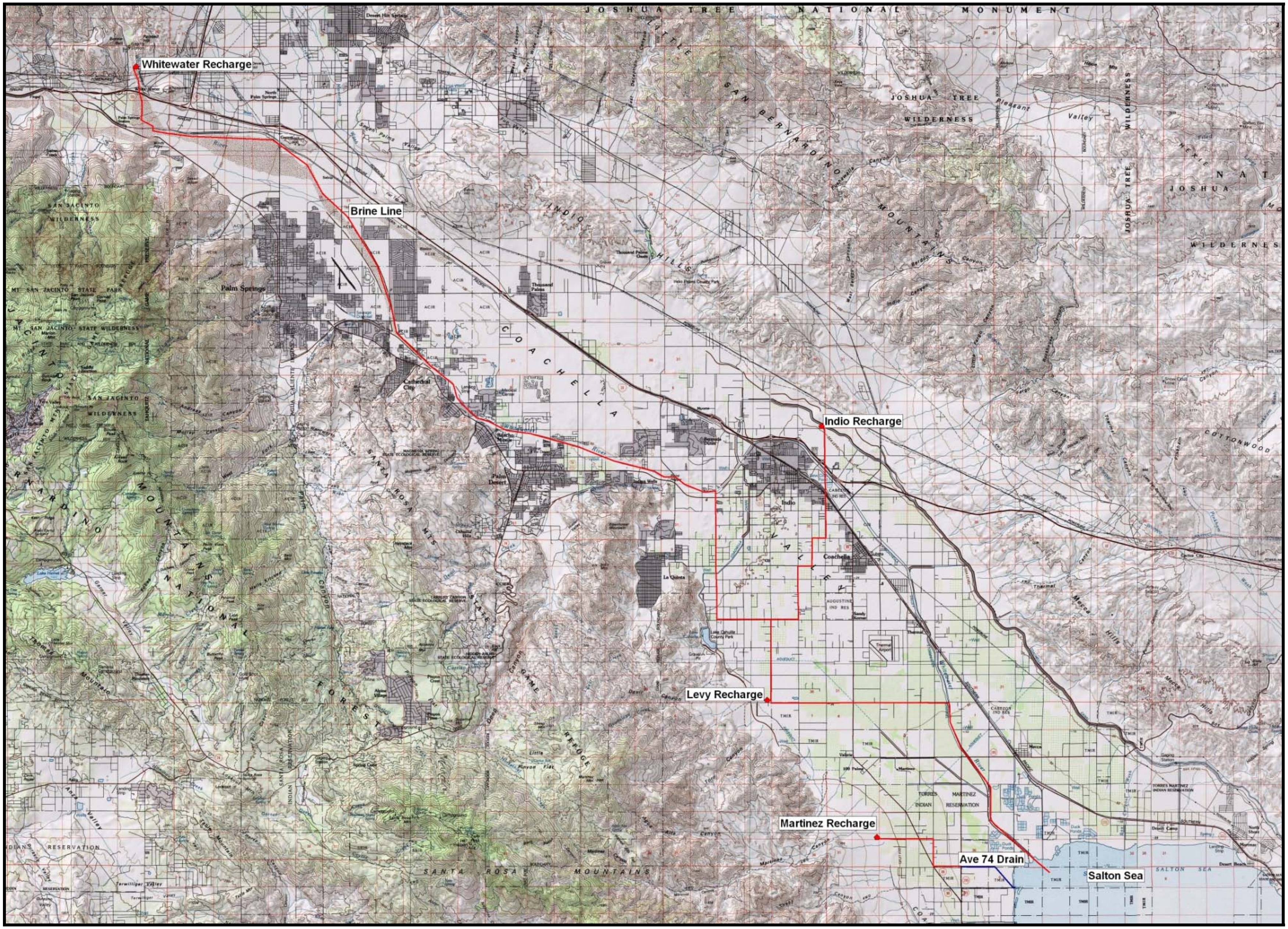
Location	TDS Target-mg/L	Avg Annual Delivery-AFY	Plant Capacity-mgd	Capital Cost	O&M Cost-$/yr	Total Annual Cost $/yr	Average Groundwater Production AFY	Average RAC Impact - $/AF	Existing Avg RAC $/AF	Percent RAC Increase
Desalination-1										
Whitewater River	500	85,000	22.6	$ 68,000,000	$ 8,100,000	$ 15,000,000				
Levy	500	40,000	20.3	$ 62,000,000	$ 6,100,000	$ 12,200,000				
Martinez	500	20,000	10.1	$ 35,000,000	$ 3,300,000	$ 6,700,000				
Indio	500	10,000	5.1	$ 20,000,000	$ 1,800,000	$ 3,700,000				
Brine System				$ 158,000,000	$ 1,600,000	$ 13,300,000				
Total				$ 343,000,000	$ 20,900,000	$ 50,900,000	257,000	$198	$90	220%
Desalination-2										
Whitewater River	500	100,000	173.2	$ 376,000,000	$ 7,800,000	$ 37,500,000				
Levy	500	40,000	20.3	$ 62,000,000	$ 6,100,000	$ 12,200,000				
Martinez	500	20,000	10.1	$ 35,000,000	$ 3,300,000	$ 6,700,000				
Indio	500	10,000	5.1	$ 20,000,000	$ 1,800,000	$ 3,700,000				
Brine System				$ 197,000,000	$ 2,000,000	$ 16,500,000				
Total				$ 690,000,000	$ 21,000,000	$ 76,600,000	257,000	$298	$90	332%
Desalination-3										
Whitewater River	250	85,000	62.9	$ 192,000,000	$ 26,100,000	$ 45,400,000				
Levy	250	40,000	39.3	$ 128,000,000	$ 14,200,000	$ 26,300,000				
Martinez	250	20,000	19.7	$ 70,000,000	$ 7,500,000	$ 14,000,000				
Indio	250	10,000	9.8	$ 39,000,000	$ 4,000,000	$ 7,600,000				
Brine System				$ 230,000,000	$ 2,200,000	$ 19,200,000				
Total				$ 659,000,000	$ 54,000,000	$ 112,500,000	257,000	$438	$90	487%
Desalination-4										
Whitewater River	250	100,000	194.6	$ 508,000,000	$ 28,100,000	$ 71,400,000				
Levy	250	40,000	39.3	$ 128,000,000	$ 14,200,000	$ 26,300,000				
Martinez	250	20,000	19.7	$ 70,000,000	$ 7,500,000	$ 14,000,000				
Indio	250	10,000	9.8	$ 39,000,000	$ 4,000,000	$ 7,600,000				
Brine System				$ 288,000,000	$ 2,700,000	$ 23,800,000				
Total				$1,033,000,000	$ 56,500,000	$ 143,100,000	257,000	$557	$90	620%
SWP Extension Only										
SWP Extension	330	100,000		$ 817,000,000	$ 12,000,000	$ 71,300,000	165,000			
Total				$ 817,000,000	$ 12,000,000	$ 71,300,000	165,000	$432	$112	386%

Comparison of Desalination and SWP Importation Options (continued)

Location	TDS Target-mg/L	Avg Annual Delivery-AFY	Plant Capacity-mgd	Capital Cost	O&M Cost-$/yr	Total Annual Cost $/yr	Average Groundwater Production AFY	Average RAC Impact - $/AF	Existing Avg RAC $/AF	Percent RAC Increase
SWP Extension and Desalination-1										
SWP Extension	330			$ 817,000,000	$ 12,000,000	$ 71,300,000				
Levy	500	40,000	20.3	$ 62,000,000	$ 6,100,000	$ 12,200,000				
Martinez	500	20,000	10.1	$ 35,000,000	$ 3,300,000	$ 6,700,000				
Indio	500	10,000	5.1	$ 20,000,000	$ 1,800,000	$ 3,700,000				
Brine System				$ 67,000,000	$ 800,000	$ 5,900,000				
Total				$1,001,000,000	$ 24,000,000	$ 99,800,000	257,000	$388	$90	432%
SWP Extension and Desalination-2										
SWP Extension	330			$ 817,000,000	$ 12,000,000	$ 71,300,000				
Levy	250	40,000	39.3	$ 128,000,000	$ 14,200,000	$ 26,300,000				
Martinez	250	20,000	19.7	$ 70,000,000	$ 7,500,000	$ 14,000,000				
Indio	250	10,000	9.8	$ 39,000,000	$ 4,000,000	$ 7,600,000				
Brine System				$ 79,000,000	$ 800,000	$ 6,700,000				
Total				$1,133,000,000	$ 38,500,000	$ 125,900,000	257,000	$490	$90	545%

Basis of Estimates:

- Size of desalination facilities based on average recharge water deliveries with a 20% peaking factor. Capacity based on mass-balance of treated and bypassed water to achieve desired TDS target. Average CRA TDS = 640 mg/L, average Canal water TDS = 767 mg/L per Reclamation projections (Reclamation, 2007).
- Capital and operations and maintenance (O&M) costs of desalination based on cost data from Malcolm-Pirnie, 2008a. Updated to 2010 cost levels using ENR construction cost index and sized based on treatment capacity.
- SWP Extension costs based on lowest cost option – Modified North Pass Alignment, Small Project serving CVWD and DWA only as presented in Final Draft SWP Extension Project Development Report (GEI, et al., 2011). Assumes 93 percent of the cost is allocated to Whitewater River Subbasin and 7 percent to Mission Creek Subbasin.
- Brine system assumes construction of high density polyethylene (HDPE) pipeline to convey brine flows by gravity from treatment sites located near each recharge facility to Salton Sea. Whitewater facility is assumed to be located near CRA turnout. Brine from Martinez facility is assumed to be discharged to Avenue 74 drain.
- Capital costs are amortized at 6 percent for 30 yrs.
- Pipeline O&M costs are assumed to be 1 percent of construction costs.
- Total annual costs consist of amortized capital, O&M and replacement water for brine discharge at $300/AF.
- Average groundwater production is for period 2021 through 2045 based on WMP Update unpublished data files for Proposed Project. For the SWP Extension Only option, the average production is for the West Valley only.
- Average Replenishment Assessment Charge (RAC) Impact assumes all costs of SWP importation or desalination are recovered through increased RAC charges on pumping.
- Existing RAC charge is the production-weighted average of the 2011-12 RAC adopted by DWA for the West Valley ($82/AF); CVWD for the West Valley ($108/AF) and CVWD for the East Valley ($31/AF).



Schematic of Potential Coachella Valley Brine Lines

Based on the foregoing analysis, the capital cost to treat Colorado River water prior to recharge including brine disposal could range from $343 million to achieve a 500 mg/L TDS target while treating most but not all of the water at Whitewater to about $1.03 billion to achieve a 250 mg/L target treating all recharge water. The economic impact of implementing a desalination program is significant as shown in the table above. The smallest desalination program would more than triple the average RAC in the Valley, while the largest program would increase the average RAC by a factor of more than seven times the current charge. The impact on private producers like golf courses and farmers would be substantial and would likely result in severe economic impacts. For example, a typical golf course using 1000 AFY of water would see its replenishment assessment increase from about $112,000 a year to $432,000 a year. Therefore, in light of the high cost and the uncertainty associated with brine disposal permitting, desalination of recharge water is considered to be infeasible at the present time.

In addition, Section 8.1.4.2 of the 2010 WMP Update states that "an evaluation of the potential effects of Colorado River recharge will be conducted in conjunction with the salt/nutrient plan" to be submitted to the State Water Resources Control Board by 2014 to meet SWRCB Recycled Water Policy requirements. The tribes, as well as CVWD, DWA, other Valley water agencies and stakeholders, will have an opportunity to participate in the preparation of that basin-wide plan on how salinity and nutrients should be managed and monitored.

6-3 The comment stated that impacts of recharge methodology as it relates to tribal federal water reserves was not considered and that pre-treating the water before recharge is a major concern for the tribes and the BIA. The WMP Update and SPEIR consider the groundwater basin as a whole for everyone, including the tribes. A key objective of the plan is to reliably meet current and future demands in a cost-effective and sustainable manner. The WMP Update and SPEIR state that impacts on groundwater quality for Torres-Martinez and Agua Caliente tribal wells are a major concern, a potentially significant impact for which there is currently no feasible mitigation (SPEIR pages 6-50 to 6-62).

Pretreatment of Colorado River water before recharge is discussed in SPEIR Section 10 Alternatives to the Proposed Project, Section 10.4.2, page 10-11 (and see response 6-2 above).

6-4 The comment questions the benefit of the Proposed Project as it relates to continued groundwater level decline and increasing subsidence. Subsidence in the Coachella Valley is an existing condition, not an impact of the Proposed Project. Subsidence may be caused by ongoing overdraft due to well pumping by all pumpers, including the tribes, or may be caused by tectonic activity in the Valley (USGS, 2007). The projected reduction in overdraft and subsidence is a fundamental beneficial effect of the 2010 WMP Update. SPEIR Figure 6-13 (page 6-43) shows projected Lower Aquifer groundwater contours with implementation of the Proposed Project from 2009 through 2045, the end of the planning period. The groundwater model projects positive changes in groundwater levels in all areas of the Whitewater River Subbasin. The rises in groundwater levels will halt further subsidence that may be caused by dewatering of aquifer strata. Increasing groundwater levels and halting subsidence are two central points of the larger WMP Update strategy. SPEIR Figure 6-12 shows that groundwater elevations may continue to decline through 2020 due to overdraft until sufficient WMP programs are in place and operating for a while before they begin to rise again. However, the current reductions in water demand, coupled with minimal growth in recent years, will likely contribute to more rapid recovery of water levels in the near term. As presented in the table above, CVWD and DWA have invested over $240 million in the last 10 years to solve overdraft and implement the 2002 WMP. While CVWD has not been able to implement all the WMP elements hoped by this point, with implementation of the WMP Update by 2045, basin groundwater levels are projected to be approximately 80 feet higher than at present.

6-5 The comment states that subsidence on tribal trust lands was not addressed. CVWD is aware of no evidence of subsidence on tribal trust lands. The ongoing USGS/CVWD subsidence monitoring program (mostly recently reported in 2007) looked at the Valley as a whole. From a review of the report, monitoring devices were not placed on tribal lands, but several were sited near East Valley ITAs— specifically, near the Cabazon, Augustine, Twenty-nine Palms and Torres Martinez tribal areas. Measured subsidence was found to be highest in Palm Desert, Indian Wells and La Quinta (USGS, 2007), in areas not near tribal land. Subsidence in the Coachella Valley is an existing condition, not an impact of the Proposed Project. According to the USGS (2007), subsidence may be caused by ongoing overdraft due to well pumping by all pumpers, including the tribes, or may be due to tectonic activity in the Valley.

6-6 The comment states that tribal water supply and infrastructure needs were not addressed. In the absence of land use and water demand information requested from the tribes for preparation of the 2010 WMP Update, tribal water supply needs were assumed based on the same Riverside County-CVAG projected land use and growth patterns elsewhere the Valley (SPEIR Section 3.1). CVWD reviewed this approach in the monthly meetings with the tribes. Infrastructure planning for improvement of reservation living conditions is not a 2010 WMP Update or SPEIR issue. The WMP Update and SPEIR are programmatic and consider basin wide issues; the documents included no infrastructure at any specific location in the Valley to meet water demands. Infrastructure improvements on reservation lands are part of other, ongoing CVWD-tribal-Indian Health Service cooperative efforts.

6-7 The comment states that tribal sanitary infrastructure hook-up to municipal districts was not addressed. Specific infrastructure hookups, including sanitary hookups, are not part of the 2010 WMP Update, as discussed in 6-6 above. SPEIR Section 8.9.4 presents mitigation for potential impacts on Indian Tribal Assets. Page 8-69 presents Mitigation Measure ITA-2, which specifically addresses potential impacts on septic tanks or cesspits on tribal land from a rise in shallow groundwater levels. CVWD is currently meeting with the Torres Martinez tribe to look for grants and other funding mechanisms for sewer hookups, independent from the 2010 WMP Update.

6-8 The comment states that the plan lacks general water quality reporting to interested parties. The 2010 WMP Update does include recommendations to improve monitoring and data management (see WMP Update page 8-13 and SPEIR page 3-22). In addition, the tribes have provided no tribal groundwater quality data to CVWD in response to the District's request for such information. Therefore, CVWD must assume that the tribes monitor the quality of their own wells in compliance with U.S. Environmental Protection Agency requirements. The District agrees that a forum for shared water quality data would be beneficial. The District also plans to work through the IRWMP process to develop a shared database with the other four public agencies in the Valley and other stakeholders who choose to participate. The District encourages the tribes to participate and share data as well. The District has prepared the SPEIR's impact analysis based upon the best information available, and is aware of no information contradicting its conclusions as to the Proposed Project's impacts on groundwater.

6-9 The comment states that concentrations of native constituents should be tested and analyzed and that treatment methods to be used to provide safe drinking water sources to tribal land were not addressed. Elevated concentrations of native constituents such as arsenic are not an impact of the Proposed Project; they are part of existing conditions. Elevated levels of native constituents are therefore not an impact of the Proposed Project, and the District is not required in connection with this project to mitigate for such existing conditions. However, the SPEIR does present general information on the levels of several key water quality parameters on Figures 6-8, 6-9 and 6-10 as part of the Existing Conditions. CVWD is not responsible for evaluating concentrations of water quality constituents on tribal land and has no authority to sample and analyze wells on tribal land and does not have information on the quality of tribal wells. The tribes, rather than CVWD, have the responsibility for providing safe drinking water on tribal lands relative to native constituents. However, CVWD is willing to work with the tribes to provide technical expertise in resolving specific water quality problems experienced by the tribes.

6-10 The comment stated that future permitting of groundwater pumping and its effect on trust water resources was not addressed. It is not clear which permits for groundwater pumping are referred to; the basin is not adjudicated. Well drilling permits are issued by the County of Riverside on an individual basis. Future wells drilled by CVWD will be subject to CEQA review when those projects are developed. Future groundwater pumping in the East Valley will decrease (see response 6-2 above) with implementation of the WMP Update elements (conservation, source substitution, recycled water use, etc.). It should be noted that the effects of the Proposed Project, including its program of groundwater pumping and recharge, have been evaluated in the SPEIR with regard to groundwater quantity and quality, as well as with regard to Indian Trust Assets. While groundwater quality would be degraded in an absolute sense, it was determined that the impact with regard to Indian Trust Assets would be less than significant because beneficial uses would be maintained for a wide variety of land uses, including for residential, commercial, industrial, and agricultural uses.

6-11 The comment states that recharge with surface runoff was not addressed. Stormwater runoff in the Valley is small in volume and occurs sporadically, during a few storms each year. On the west side of the Valley, runoff is currently captured and recharged at the Whitewater Spreading Facility and in local stormwater retention basins along the base of the mountains. The Whitewater River also percolates runoff in the West Valley since it is an unlined, soft-bottom channel. In fact, evaluation of USGS gauged streamflows in the Whitewater River near Indio indicate that flow averages 3.2 cfs (2,300 AFY) but only occurs 2.3 percent of the time (about 8 days per year). This fact demonstrates that little stormwater is currently being lost. However, in spite of this low amount, the WMP Update and SPEIR consider on-site stormwater retention in future development plans (see SPEIR section 3.2.1.9, page 3-20), incorporating stormwater capture and flood control as development proceeds in the East Valley. SPEIR page 3-25 identifies as an Implementation Plan element a feasibility study for additional stormwater capture in the East Valley to be completed by 2015.

6-12 The comment states that CVWD's recharge programs would likely degrade groundwater near the reservations. Impacts of Colorado River water recharge are considered in the SPEIR and mitigation measures are evaluated in SPEIR Section 6. CVWD concurs that the salinity of the Colorado River water recharged is higher than most native groundwater in the basin (SPEIR section 6.4.4 Groundwater Quality, page 6-50). District water quality data do confirm changes in salinity near recharge areas (SPEIR page 6-57*ff* and Figure 6-18, page 6-59, Extent of Imported Water Migration Due to Groundwater Recharge). Impacts on tribal water resources are discussed on SPEIR pages 8-62 to 8-69 and shown in Figure 8-2, Tribal Lands Potentially Affected by Recharge, page 8-65.

An analysis of water quality mitigation and alternatives is given in SPEIR Section 8.9.4 starting on page 8-69, pages 6-61to 6-65, and in Alternatives Section 10.4 starting on page 10-8.

If a health-based water quality standard is exceeded, mitigation will be implemented, if the affected tribe agrees. To date, no tribe has approached CVWD documenting exceedance of a health-based water quality standard in a tribal well and requesting wellhead treatment or an alternative water supply. In addition, it must be determined that recharged imported water is the cause of the observed water quality change in a given well. For example, in the East Valley, long-term percolation of agricultural drainage also can increase the salinity of shallow and Upper aquifer groundwater. Some West Valley wells located a significant distance from the recharge sites have salinity levels higher than Colorado River water, so recharge is not the only source of that salinity.

The groundwater model projects that only Torres Martinez and Agua Caliente wells would be affected by recharged imported water; the other tribal wells are too distant to be affected (see SPEIR Figure 8-2). The modeling of impacts from the Proposed Project indicates that primary health-based water quality standards will not be exceeded due to the Project. Mitigation measure ITA-1 is primarily included as a backup measure to ensure that this will occur even if unforeseen circumstances arise. Until such a situation arises, it would be premature to enter into an agreement with the tribes as the specifics of what the tribes would like to do would change depending on a host of variables, including the division of costs between the tribes and the District. This could include, but is not limited to, the location of any water quality standard exceedances relative to District facilities, as well as the extent that such an exceedance is caused by non-Project water sources.

6-13, 6-14 and 6-15 The comments stated that urban and agricultural runoff affecting tribal land and the Salton Sea, or effects of elevated contaminants on traditional native plants and wildlife important to tribal culture, were not addressed. These impacts would not be due to the 2010 WMP Update, but are rather part of existing conditions or would be impacts due to other, unrelated projects within the Valley. Urban and municipal stormwater runoff is collected in existing flood control channels and flows to the Whitewater River /Coachella Valley Stormwater Channel (CVSC). The quality of urban runoff sources is the responsibility of the County of Riverside and the Valley cities under the State Water Resources Control Board (SWRCB) Small Municipal Separate Storm Sewer System (MS4) Program (SWRCB, 2011). MS4 permits requirements are addressed in the jurisdictions' General Plans and EIRs. Local agencies must address urban runoff quality under requirements of the NPDES program. The SWRCB Storm Water Program (2011) is available at:
http://www.swrcb.ca.gov/water_issues/programs/stormwater/phase_ii_municipal.shtml

The contribution to the Salton Sea from agricultural use is projected to decrease, as agriculture transitions to urban land uses. The quality of agricultural drainage is anticipated to change, with increase in TDS to 2800-2900 mg/L and the possible increase in selenium. Impacts of selenium and mitigation for potential increases in concentrations in the CVSC and drains are addressed in the SPEIR, pages 5-23 to 5-24, 5-27, 5-40 to 5-41, 5-50, and in Section 10.4.5, pages 10-16 to 10-18. Salinity changes in Salton Sea inflow are discussed on SPEIR pages 5-39 to 5-40, 5-45 to 5-46, and 5-50.

The comment is not clear on which water contaminants are affecting or could affect traditional native plants and wildlife. No specific traditional native plants or wildlife were referenced in the comment and this issue was not raised at any meetings with the tribes or BIA over the past several years. The quality of recharge water would not affect any biological resources.

6-16 The comment states that feasibility studies on SWP importation to the Valley were not addressed. The preliminary analysis of potential benefits to the Valley as a whole, which includes tribal resources, and the costs of the State Water Project Extension into the Coachella Valley are discussed in Section 10–Alternatives to the Proposed Project, Section 10.4.1, based on the draft feasibility study. An expansion of that discussion follows.

CVWD, DWA, Metropolitan, San Gorgonio Pass Water Agency and Mojave Water Agency commissioned a feasibility study of extending the SWP to the Coachella Valley in 2006 (GEI, et al., 2011). The SWP Extension feasibility study initially evaluated four potential conveyance alignments: 1) a Lucerne Valley alignment originating on the East Branch of the California Aqueduct near Hesperia and running through Yucca Valley, 2) a North Pass alignment originating at the SWP Devil Canyon Afterbay in San Bernardino and paralleling Interstate 10, 3) a South Pass alignment originating at Lake Perris and paralleling State Route 60 and Interstate 10, and 4) a San Jacinto alignment originating at Lake Perris and tunneling through the San Jacinto Mountains. Following completion of the initial evaluation in 2007, two potential alignments were selected for more detailed evaluation — a 90-mile-long Lucerne Valley alignment and a 40-mile-long Modified North Pass alignment that utilized Metropolitan's Inland Feeder. For each alignment, two different project sizes were considered: a small project entailing delivery capacity for CVWD and DWA only with water delivery over 11 months per year and a large project including capacity for CVWD, DWA and other contractors along the alignment with water delivery over 9 months per year. The alignments were evaluated equally and neither alignment was selected as the proposed project.

Environmental constraints for both alignments were found to be numerous and substantive (for example, it is not certain that a Morongo Canyon alignment reach would be permitted, even if tunneled). A full EIR and NEPA EIS will be required for the project and neither process has commenced; in addition, a federal lead agency has not been identified.

The total capital cost of the Lucerne Valley project was estimated to range from $900 million to $1.2 billion for the small project and $1.1 to $1.4 billion for the large project in 2009 dollars, with a $7.5 million per year (2009 dollars) operation and maintenance (O&M) cost. The capital cost allocation to CVWD and DWA was estimated at $1.06 billion for the small project and $1.2 billion for the large project using the mid-point of the capital cost estimates. For the Modified North Pass alignment, the estimated total capital cost in 2009 dollars was $774 million to $981 million for the small project and $881 million to $1.13 billion for the large project. Estimated annual O&M costs were $26.2 million for the small project and $19.1 million for the large project. The CVWD and DWA construction cost share of the Modified North Pass alignment was estimated at $878 million for the small project and $897 million for the large project using the mid-point of the capital cost estimates. The viability of the Modified North Pass alignment also depends on Metropolitan allowing use and purchase of available Inland Feeder capacity; no commitment has been made to date. A number of additional issues affecting the project feasibility remain unresolved.

- Reliability of the SWP conservation facilities is an unresolved constraint to the SWP Extension project. SWP Conservation Facilities are basically those facilities that generate the yield of the SWP, and include Lake Oroville, San Luis Reservoir, and a portion of the California Aqueduct from the Delta to San Luis Reservoir. In order to receive the full benefit of a State Water Project extension. SWP reliability would have to increase from the current 60 percent to its historical 75 percent.

- Capacity in the California Aqueduct north of the bifurcation into the East Branch and West Branch is a potential constraint to the SWP Extension.
- The Pearblossom Pumping Plant on the East Branch of the California Aqueduct has less capacity than required to supply the SWP Extension project along with other contractors' needs.
- The capacity of the Inland Feeder may not be adequate to make deliveries to the Modified North Pass Alignment as well as meet Metropolitan's needs. Further analysis is needed to determine the anticipated available capacity in future years.
- The governance structure for the design, construction and operation of the project has not yet been determined. Such a structure is necessary for securing bond funding of the project.
- Feasibility will also be affected by the results of future stakeholder and public agency outreach.
- Participation of the project partners will depend on whether their individual needs for supplemental water can be met by the proposed project, which depends on which alignment ultimately is selected.

The SWP Extension feasibility report is in final draft form and is expected to remain in that form pending resolution of the feasibility constraints above and resolution of the Bay Delta Conservation Plan and the potentially participating agencies' ability to finance the project. For all of the above reasons, the SWP Extension is considered infeasible. In SPEIR Section 3.3, it is identified as an element for possible inclusion in future updates to the WMP, but its inclusion at this time is highly speculative and would require a drastic change in state and local agency financial conditions, at the very least.

6-17 The comment states that reservation lands were not included in water modeling studies. Reservation land was included in the groundwater modeling studies. Land use and water demand on tribal lands were assumed to be the same as for similar areas of the Valley, since information specific to tribal land and water use was not provided. CVWD would be happy to include additional tribal-specific data in the model.

6-18 The comment states that tribes need to have a voice in water policy formulation. The role of the tribes in formulation of water policy is not a CEQA issue. CVWD held several meetings with the tribes and BIA over the last three years to identify their concerns and to provide a forum for discussion of water issues. CVWD also attempted to involve tribal councils in water management meetings and arranged a government to government reception at BIA offices on May 18, 2010 with the CVWD Board of Directors. The tribal council members did not attend and chose to send staff instead. CVWD remains open to meeting with the individual tribal councils.

6-19 The comment challenges the findings of the SPEIR with regard to groundwater levels and quality. The projected ground water levels and water quality are shown as SPEIR text and figures are excerpted directly from the WMP Update. The information was based on CVWD well monitoring and the peer-reviewed groundwater model which was revisited for the WMP Update. Therefore, the analyses in the WMP Update and the SPEIR, represented in13 figures from model results, are congruent.

The District has had an extensive monitoring program in place for more than 60 years. The District's program currently monitors water levels in more than 500 wells at least three times per year. It was the results of CVWD's basin-wide, ongoing well monitoring that clearly identified a serious decline in groundwater levels in the West and East Valleys before 1993, which spurred the preparation of the first WMP. CVWD groundwater monitoring data are published in the CVWD Annual Engineer's Report prepared in conjunction with the Replenishment Assessment. CVWD publishes hydrographs for two example wells in the West Valley and 14 wells in the East Valley. Data for a minimum of 10 additional wells will be presented in future reports. The District also will be participating in the state's California Statewide Groundwater Elevation Monitoring (CASGEM) program, submitting groundwater elevation data for 45 wells twice per year starting in January 2012. The District agrees that development of a comprehensive groundwater level database would be beneficial for providing a more complete picture of groundwater conditions, and encourages the tribes to participate. Consequently, this has been included as a WMP project.

The WMP goal is to eliminate long-term overdraft, and not to continue "mining" the basin. However, that does not mean there will not be periods when extraction from the basin temporarily exceeds natural and artificial recharge. Although water levels are expected to rise in the long term, periods of increasing and decreasing water levels will occur as the result of hydrologic variation in the supplies used to recharge the basin, especially near recharge basins. CVWD and DWA strive to recharge as much water as possible when it is available with full knowledge that there will be periods when supplies are reduced due to drought. Thus, the 2002 WMP and the 2010 WMP Update identify actions to be taken over the next 35 years to halt overdraft and manage the basin in a sustainable manner. CVWD and DWA have made significant investments to acquire water supplies over the past eight years that put the Valley on a path toward sustainability.

6-20 The comment refers to the on-going California Water Plan Update 2013. The planning underway for the proposed California Water Plan Update is not part of the WMP Update or SPEIR; however, a review of the draft California Water Plan indicates that it proposes the same water resources management elements already in the WMP Update: conservation, maximizing local supplies, use of shallow groundwater, and maximizing recycling. The CVWD has already achieved 18.4 percent conservation, a long way to meeting its 20 by 2020 conservation goal; years ahead of schedule.

The interrelationship with the Coachella Valley IRWMP is not a physical impact of the 2010 WMP Update on the environment, and thus is not strictly a subject of the SPEIR. The IRWMP was prepared in 2009-2010 under a Memorandum of Understanding among CWA, CVWD, Desert Water Agency, Indio Water Authority and Mission Springs Water District to develop a regional water management plan for submittal to the Department of Water Resources (DWR) to regionally manage water resources and work cooperatively to manage available local and imported water supplies. DWR provides funding for water management projects through competitive planning and implementation grant programs. The 2002 WMP was a significant source of information for the IRWMP. Federal reservations lands overlying the groundwater basin are included in the 2010 WMP Update: land use and water demand on tribal lands within the study area were assumed to be the same as for similar areas of the Valley, since information specific to tribal land and water use was not provided. With regard to the claim that the tribes are not being involved in planning for the Valley, please see, e.g., Response to Comment 6-18.

6-21 The Coachella Valley tribes are not cooperating agencies under NEPA for the WMP Update because the Proposed Project has no NEPA nexus (no federal funding, no required federal permits or federal land involvement). Similarly, the tribes are not Responsible Agencies under CEQA, defined as those state or local agencies that have approval authority by regulation or statute over the Proposed Project.

At the same time, CVWD initiated and continued extensive coordination with the Coachella Valley tribes and BIA over several years during the preparation of the WMP Update and SPEIR. As discussed in response to comment 6-1 above, the District invited the tribal councils to a government to government reception with the CVWD Board of Directors, which the councils declined to attend. The District remains willing to arrange additional meetings with tribal councils and their staffs on issues of mutual interest.

STATE OF CALIFORNIA

Governor's Office of Planning and Research

State Clearinghouse and Planning Unit

Edmund G. Brown Jr.
Governor

Ken Alex
Director

September 26, 2011

RECD SEP 29 2011 CVWD

ORIG/EML: P REYES
EML: L STOWE
M JOHNSON
S BIGLEY
J BARRETT
G GIL
FILE: 0643.511

Patti Reyes
Coachella Valley Water District
85-955 Avenue 52
Coachella, CA 92236

Subject: Coachella Valley Water Management Plan 2010 Update
SCH#: 2007091099

Dear Patti Reyes:

The enclosed comment (s) on your Draft EIR was (were) received by the State Clearinghouse after the end of the state review period, which closed on September 19, 2011. We are forwarding these comments to you because they provide information or raise issues that should be addressed in your final environmental document.

The California Environmental Quality Act does not require Lead Agencies to respond to late comments. However, we encourage you to incorporate these additional comments into your final environmental document and to consider them prior to taking final action on the proposed project.

Please contact the State Clearinghouse at (916) 445-0613 if you have any questions concerning the environmental review process. If you have a question regarding the above-named project, please refer to the ten-digit State Clearinghouse number (2007091099) when contacting this office.

Sincerely,

Scott Morgan

Scott Morgan
Director, State Clearinghouse

Enclosures
cc: Resources Agency

SCAN & SHRED

SCANNED

STATE OF CALIFORNIA - THE NATURAL RESOURCES AGENCY
EDMUND G. BROWN, JR., Governor
COLORADO RIVER BOARD OF CALIFORNIA
770 FAIRMONT AVENUE, SUITE 100
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September 21, 2011

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STATE CLEARING HOUSE

State Clearinghouse
1400 Tenth Street
P.O. Box 3044
Sacramento, CA 95812-3044

Regarding SCH# 2007-091-099: Notice of Completion & Environmental Document Transmittal for Draft Environmental Impact Report (DEIR) for the Coachella Valley Water Management Plan 2010 Update, Coachella Valley Water District, Riverside County, California

To Whom It May Concern:

The Colorado River Board of California (CRB) has received and reviewed a copy of Notice of Completion & Environmental Document Transmittal for Draft Environmental Impact Report (DEIR) for the Coachella Valley Water Management Plan 2010 Update, Coachella Valley Water District, Riverside County, California.

At this juncture, the CRB has determined that it has no comments regarding the Notice. If you have any questions, please feel free to contact me, or Dr. Jay Chen of my staff, at (818) 500-1625.

Sincerely,

Christopher S. Harris
Acting Executive Director

7. Response to: Christopher S. Harris, Acting Executive /Director
Colorado River Board

The Colorado River Board had no comments; therefore, no response is necessary.

La Entrada Water Supply Assessment

Appendix A
Water Supply Planning Documents

Part 3
2010 Urban Water management Plan Final Report, July 2011

Coachella Valley Water District

2010 Urban Water Management Plan
Final Report
July 2011

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SECTION 1 INTRODUCTION

The Coachella Valley Water District (CVWD) is required to prepare an Urban Water Management Plan (UWMP) every five years in response to the requirements of the Urban Water Management Planning Act (UWMP Act). This section provides an overview of the UWMP Act and recent legislative changes that affect the UWMP Act. The section further describes the coordination effort undertaken by CVWD during the preparation of its 2010 UWMP with other Coachella Valley agencies. The section concludes with an overview of the report organization.

Each section and subsection in this report is organized to generally follow the outline presented in the California Department of Water Resources (DWR) *Guidebook to Assist Urban Water Suppliers to Prepare a 2010 UWMP*, dated March 2011 (Guidebook). For the benefit of the readers, pertinent laws/requirements as described in the Guidebook are cited in the beginning of each section in an italicized font. This is followed by a discussion of the elements that address the Guidebook and legislative requirements.

1.1 Overview of the Urban Water Management Planning Act

The UWMP Act was established by Assembly Bill (AB) 797 on September 21, 1983. Passage of this law by the California Legislature recognized that water is a limited resource and that efficient water use and conservation would be actively pursued throughout the State. The UWMP Act requires water suppliers in California, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet per year (AFY) of water, to prepare and adopt a plan every five years which defines their current and future water use, sources of supply, source reliability, and existing conservation measures. The UWMP Act requires that each water supplier prepare or update its Urban Water Management Plan (UWMP) every five years in years ending in five and zero. The plan is to be submitted to the DWR.

’Senate Bill (SB) 610, passed in 2001, requires that UWMPs be used as the basis for water supply assessments for new large developments (500 or more dwelling units or equivalent demand). Since SB 610 required the demonstration of water supply adequacy for 20 years, DWR has suggested that new UWMPs be prepared with a 25-year planning horizon so the UWMP demand and supply projections will be valid until the next UWMP update in 2015.

The most recent amendment to the UWMP Act was initiated by Senate Bill 7 of the 7th Extraordinary Session (SB x7-7 Steinberg) passed in 2009, which requires a 20 percent reduction in per capita water use by the year 2020 (discussed in more detail later in this section). Usually, UWMPs are due to DWR on December 31 in years ending in zero and five. But, in order to provide enough time to address SB x7-7 requirements, DWR provided a time extension to water suppliers during the 2010 cycle. According to DWR’s schedule, the UWMPs should be prepared and adopted by water suppliers by July 1, 2011 and are due to DWR by August 1, 2011.

In recognition of the state requirements, CVWD has prepared this 2010 UWMP. The purpose of the plan is to document CVWD’s projected water demands and its plans for delivering water supplies to CVWD’s water service area through 2035. This plan includes all information necessary to meet the requirements of California Water Code Division 6, Part 2.6 (Sections 10610-10657) of the UWMP Act as updated in 2010.

1.2 Significant Changes to UWMP Act Since 2005

1.2.1 Senate Bill x7-7 Water Conservation

One of the most significant changes in the UWMP law since the 2005 UWMP cycle is the addition of water conservation targets as specified in SB x7-7. The California 20x2020 Program (Program) is a statewide municipal water conservation program. In February 2008, Governor Arnold Schwarzenegger established a statewide goal of 20 percent reduction in per capita municipal use of potable water by the year 2020. Urban domestic users in California consume 8.7 million AFY of potable water; under the Program, Californians would save enough water (approximately 1.74 million AFY) to serve more than two million families each year. The California State Water Resources Control (SWRCB) in concert with DWR and five other state agencies prepared the *20x2020 Water Conservation Plan,* which sets forth a statewide road map to maximize the state's urban water efficiency and conservation opportunities between 2009 and 2020, and beyond (SWRCB, 2010).

SB x7-7 was passed in the state Senate and Assembly in late 2009 to mandate the Program. This bill requires a statewide reduction in per capita urban water usage of 20 percent by December 31, 2020. The bill also requires that the state achieves incremental progress towards the goal by reducing the per capita usage by 10 percent by December 31, 2015. The bill requires each urban water supplier to develop interim and final urban water use targets consistent with the requirements of the bill. Urban water suppliers are required to comply with the requirements established by the bill on or before July 1, 2016 in order to be eligible for state water grants or loans.

DWR has developed specific guidelines to address the SB x7-7 requirements in the 2010 UWMP. These requirements are addressed in the subsequent sections of this report.

1.2.2 DWR Methodologies for Baseline and Target Calculations to Comply with SB x7-7 Requirements

As described earlier, SB x7-7 requires all public water agencies to implement appropriate conservation measures to reduce their water demands by 20 percent by year 2020. Methods to calculate baseline demands and water use targets have been developed by DWR in accordance with the law, and are provided in the DWR Guidebook. The law provides flexibility to the agency preparing the UWMP to develop baseline demands and water use targets using methodologies of their choice.

There are currently three methods listed in the DWR Guidebook in accordance with SB x7-7 on how to establish a baseline demand:

- 10-year average per capita ranging from 1995-2004 to 2001-2010
- 15-year average if recycled water use is greater than or equal to 10 percent of the demand
- 5-year average per capita use (based on Water Code Section 10608.22) for a continuous five-year period ending no earlier than December 31, 2007, and no later than December 31, 2010.

The law requires each retail water supplier to develop urban water use targets by July 1, 2011 using one of the following methods:

1. Eighty (80) percent of the urban retail water supplier's base daily per capita water use.
2. The per capita daily water use that is estimated using the sum of the following performance standards:
   a) For indoor residential water use, 55 gallons per capita daily (gpcd) water use as a provisional standard. Upon completion of the department's 2016 report to the Legislature pursuant to Section 10608.42, this standard may be adjusted by the Legislature by statute.
   b) For landscape irrigated through dedicated or residential meters or connections, water efficiency equivalent to the standards of the State's Model Water Efficient Landscape Ordinance.
   c) For commercial, industrial, and institutional (CII) uses, a 10-percent reduction in water use from the baseline CII water use by 2020.
3. Ninety-five percent of the applicable state hydrologic region target, as set forth in the state's draft 20x2020 Water Conservation Plan (dated April 30, 2009). For the Colorado hydrologic region, this target is 211 gpcd. However, this method does not appear to be applicable to CVWD. This method is for agencies which currently have low per capita usage and it requires them to reduce their usage by at least five percent (Section 10608.22).
4. Target = base daily per capita water use minus estimated water savings from indoor residential use, unmetered water deliveries, CII use, landscape use, and system water loss.

In order to develop background information that can be used to calculate the baseline and target water use, DWR has proposed specific methodologies as described below:

- Methodology 1 – Gross Water Use
- Methodology 2 – Service Area Population
- Methodology 3 – Base Daily Per Capita Water Use
- Methodology 4 – Compliance Daily Per Capita Water Use
- Methodology 5 – Indoor Residential Use
- Methodology 6 – Landscaped Area Water Use

1.3 Law

This subsection describes the laws that govern the content of the forthcoming subsections in Section 1.

California Water Code Section 10620, Paragraph (d)

(d) Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.

California Water Code Section 10621, Paragraph (b), (c)

(b) Every urban water supplier required to prepare a plan pursuant to this part shall, at least 60 days prior to the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. The urban water supplier may consult with, and obtain comments from, any city or county that receives notice pursuant to this subdivision.

(c) The amendments to, or changes in, the plan shall be adopted and filed in the manner set forth in Article 3 (commencing with Section 10640).

California Water Code Section 10635, Paragraph (b)

The urban water supplier shall provide that portion of its urban water management plan prepared pursuant to this article to any city or county within which it provides water supplies no later than 60 days after the submission of its urban water management plan.

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.

Prior to adopting a plan, the urban water supplier shall make the plan available for public inspection and shall hold a public hearing thereon. Prior to the hearing, notice of the time and place of hearing shall be published within the jurisdiction of the publicly owned water supplier pursuant to Section 6066 of the Government Code. The urban water supplier shall provide notice of the time and place of hearing to any city or county within which the supplier provides water supplies. A privately owned water supplier shall provide an equivalent notice within its service area.

After the hearing, the plan shall be adopted as prepared or as modified after the hearing.

California Water Code Section 10643

An urban water supplier shall implement its plan adopted pursuant to this chapter in accordance with the schedule set forth in its plan.

California Water Code Section 10644, Paragraph (a)

An urban water supplier shall submit to the department, the California State Library, and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption. Copies of amendments or changes to the plans shall be submitted to the department, the

California State Library, and any city or county within which the supplier provides water supplies within 30 days after adoption.

California Water Code Section 10645

Not later than 30 days after filing a copy of its plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.

1.4 Coordination

CVWD shares a common groundwater source with Desert Water Agency (DWA), the City of Coachella (Coachella), the City of Indio (Indio), Mission Springs Water District (MSWD) and Myoma Dunes Mutual Water Company (Myoma). CVWD is a contractor with the United States to receive Colorado River water. CVWD and DWA are contractors with the State of California to receive State Water Project (SWP) water. Each agency that shares and/or coordinates water supplies with CVWD had an opportunity to review and comment on the Coachella Valley Water Management Plan (CVWMP) 2010 Update, which is a long-term planning document that helps CVWD meet current and future water demands in a cost-effective and sustainable manner. In addition, CVWD notified all cities, Riverside County, and the five Coachella Valley tribes by letter on February 10, 2011 that it was updating the UWMP and requested planning information for inclusion in the plan.

Additionally, CVWD also conducted a meeting on March 8, 2011 to solicit input from Coachella Valley water purveyors. The list of attendees included representatives from DWA, MSWD, City of Indio and City of Coachella.

Written and verbal inputs received as part of this coordination effort have been incorporated in this report. A summary of the outreach effort is provided in **Table 1-1**.

The UWMP was made available for public review and comment from May 25, 2011 through June 28, 2011. CVWD did not receive any written comments.

In addition, CVWD held a public hearing to consider adoption of this UWMP on July 12, 2011 at CVWD's headquarters in Coachella. Notification of the hearing was published on June 29, 2011 and July 6, 2011 in the Desert Sun and Imperial Valley Press as required by state law. Proofs of publication are included in the Appendix.

1.5 Plan Adoption, Submittal, and Implementation

After a public hearing was conducted on June 28, 2011, the CVWD Board of Directors adopted this UWMP by Resolution No. 2011-115. A copy of the Resolution of Adoption is included in the Appendix.

Table 1-1
Summary of Outreach and Coordination

UWMP Guidebook Table 1							
Coordinating Agencies	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	Not involved / No information
Desert Water Agency				X	X	X	
Mission Springs Water District				X	X	X	
City of Coachella				X	X	X	
City of Indio				X	X	X	
City of Cathedral City				X	X	X	
City of Palm Desert				X	X	X	
City of Rancho Mirage				X	X	X	
City of Indian Wells				X	X	X	
City of La Quinta				X	X	X	
Imperial County				X	X	X	
Riverside County				X	X	X	
Agua Caliente Band of Cahuilla Indians				X	X	X	
Augustine Band of Mission Indians				X	X	X	
Cabazon Band of Mission Indians				X	X	X	
Morongo Band of Mission Indians				X	X	X	
Torres Martinez Desert Cahuilla Indians				X	X	X	
Twenty-Nine Palms Band of Mission Indians				X	X	X	
Twenty-Nine Palms Tribal EPA				X	X	X	

1.6 Report Organization

The report is organized into the following sections:

- Section 1 – Introduction
- Section 2 – System Description
- Section 3 – System Demands
- Section 4 – System Supplies
- Section 5 – Water Supply Reliability and Water Shortage Contingency Planning

- Section 6 – Demand Management Measures
- Section 7 – Climate Change
- Section 8 – Completed UWMP Checklist

1.7 Abbreviations

The abbreviations used in this report are presented in **Table 1-2**.

Table 1-2
List of Abbreviations

Abbreviation	Description
AB	Assembly Bill
AF	acre-feet
AFY	acre-feet per year
BDCP	Bay-Delta Conservation Plan
CCLP	Coachella Canal Lining Project
CDPH	California Department of Public Health
CEQA	California Environmental Quality Act
Coachella	City of Coachella
Coachella Canal	Canal
CRA	Colorado River Aqueduct
CUWCC	California Urban Water Conservation Council
CVAG	Coachella Valley Associations of Governments
CVP	Central Valley Project
CVSC	Coachella Valley Stormwater Channel
CVWD	Coachella Valley Water District
CVWMP	Coachella Valley Water Management Plan
DHCCP	Delta Habitat Conservation and Conveyance Plan
DOE	Department of Energy
DMM	Demand Management Measure
DRR	Delivery Reliability Report
DWA	Desert Water Authority
DWR	Department of Water Resources
EDC	endocrine disrupting compound
EIS	Environmental Impact Study
ETo	evapotranspiration
ft MSL	feet above mean sea level
gpcd	gallons per capita-day
Guidebook	DWR Guidebook to Assist Urban Water Supplier to Prepare a 2010 UWMP
HOA	homeowners association

Table 1-2
List of Abbreviations (continued)

Abbreviation	Description
ICS	Intentionally Created Surplus
IID	Imperial Irrigation District
IWA	Indio Water Authority (City of Indio)
MCL	maximum contaminant level
Metropolitan	Metropolitan Water District of Southern California
MFR	Multi-Family Residence
mgd	million gallons per day
MOU	Memorandum of Understanding
mg/L	milligrams per liter
µg/L	micrograms per liter
MSWD	Mission Springs Water District
Myoma	Myoma Dunes Mutual Water Company
N/A	not applicable
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
OEHHA	Office of Environmental Health Hazard Assessment
pCi/L	picocuries per liter
PCM	Parallel Climate Model
PEIR	Program Environmental Impact Report
PHG	public health goal
PPR	Present Perfected Right
Program	California 20x2020 Program
PVID	Palo Verde Irrigation District
QSA	Quantification Settlement Agreement
Reclamation	United States Bureau of Reclamation
RCCDR	Riverside County Center for Demographic Research
RCP	Riverside County Projections
RCRA	Resource Conservation and Recovery Act
RHNA	Regional Housing Need Allocation
RISA	Regional Integrated Sciences and Assessments
RO	Reverse Osmosis
SB	Senate Bill
SCAG	Southern California Association of Governments
SDCWA	San Diego County Water Authority
SFR	Single-Family Residence
SWP	State Water Project

Table 1-2
List of Abbreviations (continued)

Abbreviation	Description
TAFY	thousand acre-feet per year
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UWMP	Urban Water Management Plan
UWMP Act	Urban Water Management Plan Act
VSD	Valley Sanitary District
WMP	Water Management Plan (2002, updated in 2010)
WRCOG	Western Riverside Council of Governments
WWTP	Wastewater Treatment Plant

SECTION 2 SYSTEM DESCRIPTION

This section describes the CVWD service area as well as the historical and projected service area population. The applicable law governing the requirements for the UWMP in regards to system description is provided in the first subsection.

2.1 Law

California Water Code Section 10631, Paragraph (a)

A plan shall be adopted in accordance with this chapter that shall do all of the following:

(a) Describe the service area of the supplier, including current and projected population, climate, and other demographic factors affecting the supplier's water management planning. The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available.

2.2 Service Area Physical Description

The Coachella Valley lies in the northwestern portion of a great valley, the Salton Trough, which extends from the Gulf of California in Mexico northwesterly to the Cabazon area. This area lies primarily in Riverside County but also extends into northern San Diego County and northeastern Imperial County. The Colorado River enters this trough, and its delta has formed a barrier between the Gulf of California and the Coachella Valley. The Coachella Valley is ringed with mountains on three sides. On the west and north sides are the Santa Rosa, San Jacinto, and San Bernardino Mountains, which rise more than 10,000 feet above mean sea level (ft MSL). To the northeast and east are the Little San Bernardino Mountains, which attain elevations of 5,500 ft MSL.

The Coachella Valley is geographically divided into the West Valley and the East Valley. Generally, the West Valley, which includes the cities of Palm Springs, Cathedral City, Rancho Mirage, Indian Wells and Palm Desert, has a predominately resort/recreation-based economy that relies on groundwater as its principal water source. The East Valley, which includes the cities of Coachella, Indio and La Quinta and the communities of Bermuda Dunes, Mecca, and Thermal, has an agricultural-based economy utilizing groundwater and Colorado River water imported via the Coachella Canal. The East Valley lies southeast of a line extending from Washington Street and Point Happy northeast to the Indio Hills near Jefferson Street, and the West Valley is northwest of this line as shown in **Figure 2-1**. The CVWD service area also includes the western and eastern shores of the Salton Sea which relies on groundwater pumped from the Whitewater River Subbasin.

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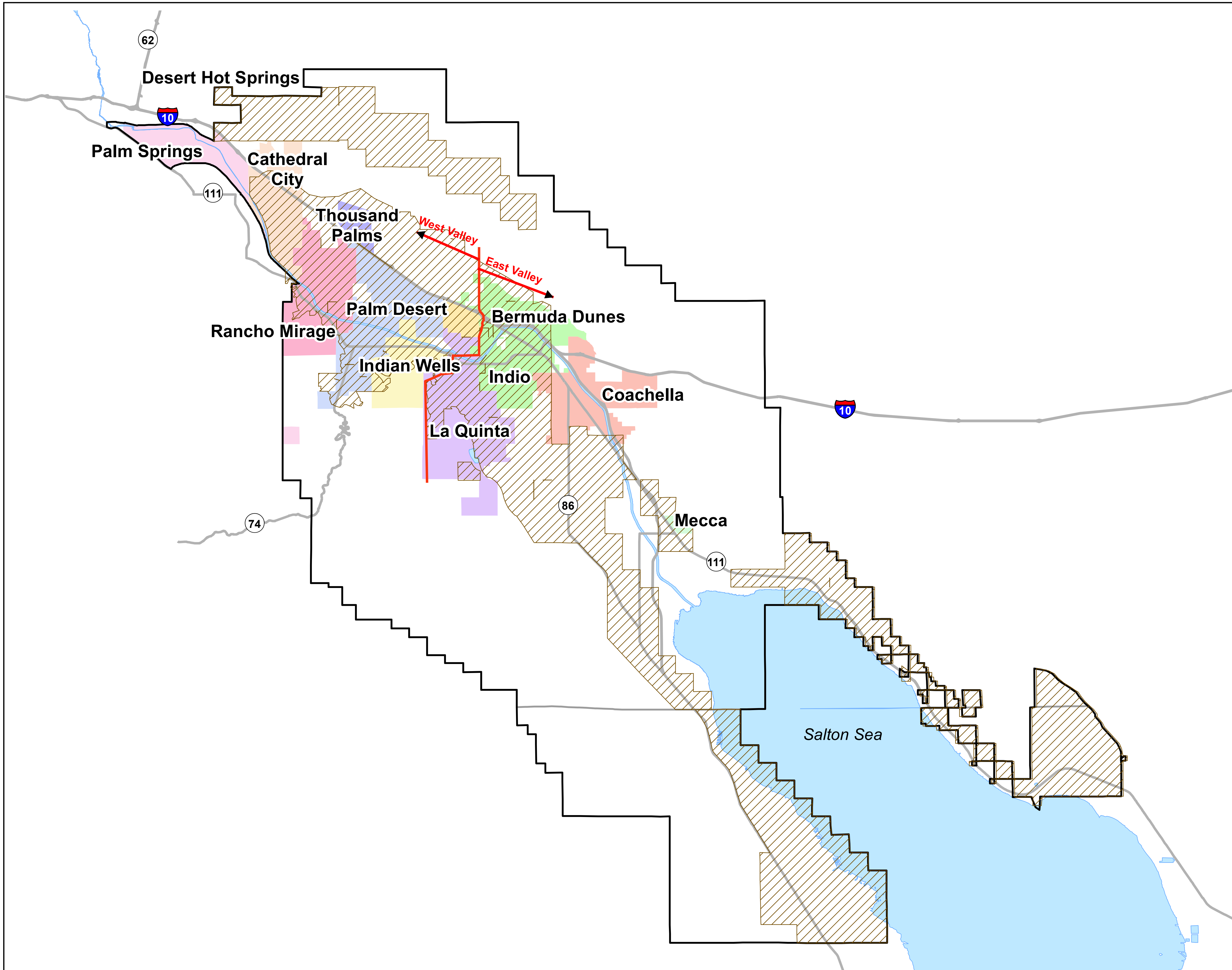


Figure 2-1
CVWD Service Area

MWH

Nearly all of the Colorado River Hydrologic Region has a subtropical desert climate with hot summers and mostly mild winters, and the average annual rainfall is quite low. Average annual precipitation ranges from three to six inches, most of which occurs in the winter (DWR, 2005a). However, summer storms do occur and can be significant in some years. Clear and sunny conditions typically prevail. The region receives 85 to 90 percent of possible sunshine each year, the highest value in the United States. Winter maximum temperatures are mild, but summer temperatures are very hot, with more than 100 days over 100 degrees Fahrenheit (º F) each year in the Imperial Valley (DWR, 2005a). CVWD is located in the Colorado River Hydrologic Region as defined by DWR. Data from climate stations in Palm Springs can be used as an indicator of climate in the Coachella Valley. Palm Springs has an average 24-hour temperature of 73º F (NCDC, 1999).

The Coachella Valley drainage area is approximately 65 percent mountainous and 35 percent typical desert valley with alluvial fan topography buffering the valley floor from the steep mountain slopes. The mean annual precipitation ranges from 44 inches in the San Bernardino Mountains to less than 3 inches at the Salton Sea. Three types of storms produce precipitation in the drainage area: general winter storms, general summer storms and local thunderstorms. Longer duration, lower intensity rainfall events tend to have higher recharge rates, but runoff and flash flooding can result from all three types of storms. Otherwise, there is little or no flow in most of the streams in the drainage area. Average monthly temperatures, precipitation and reference evapotranspiration (ET_o) are shown in **Table 2-1**.

Table 2-1
Regional Climate Information

Month	Reference Evapotranspiration, ET_o (inches) [1]	Average Rainfall (inches) [2]	Average Temperature (° F) [2]
January	2.5	1.1	56.3
February	3.4	1.2	60.8
March	5.3	0.6	64.2
April	6.9	0.2	70.3
May	8.7	0.1	77.7
June	9.6	0.0	85.6
July	9.6	0.2	91.9
August	8.7	0.3	90.9
September	7.0	0.3	84.7
October	5.0	0.3	75.4
November	3.0	0.4	63.7
December	2.2	0.9	55.9
Annual Average	71.6	5.7	73.0

Notes:

1) CIMIS, 1999 (Average ET_o for Zone 18 - Low Desert Valleys)
2) Source: NCDC, 1995

Estimated relative humidity ranges from 20 to 25 percent for summer afternoons to 35 to 45 percent for winter afternoons. Wind direction is normally from the northwest at speeds of less than 13 miles per hour (mph) about 84 percent of the time. Winds of 25 miles per hour mph or more, occasionally resulting in blowing sand or dust, have been recorded only 2.4 percent of the time for the short period of wind records (NOAA, 2002).

2.3 Service Area Population

2.3.1 Historic Population

The historical population for CVWD service area is presented in **Table 2-2**. These population figures are calculated using the 2000 Census data and 1995-2010 billing data obtained from CVWD. The method used to calculate the historical and future projected population is consistent with DWR's Technical Methodology 2: Service Area Population (DWR, 2010), and is discussed below in detail.

Table 2-2
Historical Population

Population - historical			
Year	1995	2000	2005
Service area population	145,329	171,289	193,536

The current and projected population within CVWD's service area is provided in **Table 2-4**. In accordance with DWR's Technical Methodology 2, the billing data from 2000 is geographically referenced using GIS (geographic information system) software to obtain a graphical representation of CVWD customer locations. The geo-coded meters (using service addresses from the billing data) are overlaid with a GIS layer showing the 2000 Census blocks with their respective identification numbers. A block is the smallest geographic unit used by the United States Census Bureau. A GIS union of these two layers produces a database of the service area and the 2000 Census blocks, from which the total service area population in 2000 is obtained.

To calculate the non-2000 service area population, ratios of single-family and multi-family population to total population are required for each census block. These ratios are developed by obtaining population, categorized by structure type, from 2000 Census data. Population categorized as single housing unit structure type is counted towards the single-family population and population categorized as any multiple-housing unit structure type is counted towards the multi-family population, thereby producing ratios of single-family population to total population and multi-family population to total population.

However, the 2000 Census population by structure type can only be obtained on a census block group level. A census block group is typically comprised of several census blocks. The developed ratio for each census block group is applied to the census blocks within that group, which produces a single-family population and multi-family population for each census block. A summation of all the service area census blocks provides the total single-family and multi-family populations.

The service area single-family and multi-family populations are divided by the corresponding number of single-family and multi-family water service connections from CVWD's billing data for 2000 to produce persons per connection ratios for single-family and multi-family residences, respectively. The single-family residential, multi-family residential, and composite ratios of people per connection are 1.48, 18.16, and 2.06 respectively.

The number of single-family and multi-family water service connections is also available for all other past years from CVWD's billing data. Multiplying the developed ratios by the respective number of connections produces the service area population for each non-2000 year. This calculation is shown in the following equation:

$$\begin{aligned} &Distribution\ Service\ Population\ for\ each\ Baseline\ Year \\ &= \left(No.of\ SFR\ Connections \times Census\ 2000\ SFR\ \frac{Persons}{Connection}\right) \\ &+ \left(No.of\ MFR\ Connections \times Census\ 2000\ MFR\ \frac{Persons}{Connection}\right) \end{aligned}$$

Notes: SFR = Single-Family Residence, MFR = Multi-Family Residence

The single-family, multi-family, and total populations from 1995 through 2010 is provided in **Table 2-3**.

Table 2-3
CVWD 1995-2010 Service Area Population

Year	Single-Family Population	Multi-Family Population	Total Population
1995	95,340	49,990	145,329
1996	98,981	51,352	150,333
1997	101,652	50,698	152,350
1998	106,900	52,151	159,051
1999	112,227	52,932	165,160
2000	118,175	53,114	171,289
2001	121,358	54,258	175,616
2002	127,682	56,947	184,629
2003	123,122	57,183	180,305
2004	128,777	59,581	188,358
2005	133,429	60,107	193,536
2006	135,844	59,726	195,570
2007	137,565	60,798	198,363
2008	138,088	60,889	198,976
2009	138,972	62,596	201,568
2010	137,085	65,575	202,660

2.3.2 Future Population Projections

For population projections into the future, it is assumed that the annual growth rate of the CVWD service area population will be consistent with the annual growth rates provided in the 2010 Coachella Valley Water Management Plan (CVWMP) Update. The growth rates provided in the 2010 CVWMP Update are based on the Riverside County Center for Demographic Research (RRCDR) Riverside County Projections 2006 (RCP-06). The RCP-06 was approved by the Executive Committee of the Western Riverside Council of Governments (WRCOG) on December 4, 2006, the Executive Committee of the Coachella Valley Association of Governments (CVAG), and by the Riverside County Board of Supervisors on March 14, 2007.

The annual growth rates of the cities and unincorporated areas within the CVWD service area are proportionally averaged together to obtain the annual growth rate of the CVWD service area population. **Table 2-4** provides the projected service area population through 2035 and the annual growth rate for each 5-year increment.

Table 2-4
Current and Projected Population

UWMP Guidebook Table 2							
Population — current and projected							
Year	2010	2015	2020	2025	2030	2035	Data source
Service area population	202,660	244,700	314,000	386,300	442,100	512,200	Projections based on 2010 CVWMP Update

2.3.3 Effects of Recession on Growth Forecasts

There was a rapid population increase in the Coachella Valley in the early 2000s; the population in the Valley has increased by 35 percent since 2000. Since late 2007, Riverside County has been negatively affected by the current economic recession and has experienced some of the highest rates of foreclosures and unemployment in the country. Due to this economic downturn, growth in the County has significantly moderated over the last two years. The RCP-06 growth forecasts were developed and adopted in late 2006 and early 2007, before the onset of the widespread recession. Therefore, the slowdown in the housing market, which was one of the primary components of the recession, is not accounted for in the RCP-06 forecasts.

Some economists and real estate professionals who have been studying the effects of the recession on Riverside County predict that economic recovery in the County will be slow paced over the next five years (Beacon-UCR, 2010). This could result in lower than projected growth rate for the Valley in the near term. The timing and extent of this reduced growth rate cannot be accurately predicted at this time. Because the planning period extends through 2035, it is expected that the effect of the recession on growth in the Valley will attenuate over the long term. Changes in the growth forecast will be reflected in future UWMP reports. For the purpose of this report, it is assumed that the RCP-06 growth forecasts are applicable.

SECTION 3 SYSTEM DEMANDS

Water resources planning requires reasonably accurate estimates of future water needs. This section presents CVWD's baseline and project urban water system demands. To provide an adequate long-range view of future water needs, this report uses a 25-year planning period from 2010 to 2035. The applicable laws governing the requirements for the UWMP in regards to system demands is provided below.

3.1 Law

California Water Code Section 10608.20, Paragraph (e)

(e) An urban retail water supplier shall include in its urban water management plan due in 2010 pursuant to Part 2.6 (commencing with Section 10610) the baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.

California Water Code Section 10608.36

Urban wholesale water suppliers shall include in the urban water management plans required pursuant to Part 2.6 (commencing with Section 10610) an assessment of their present and proposed future measures, programs, and policies to help achieve the water use reductions required by this part.

California Water Code Section 10631, Paragraphs (a), (e), (k)

(a) The water use projections required by Section 10631 shall include projected water use for single-family and multi-family residential housing needed for lower income households, as defined in Section 50079.5 of the Health and Safety Code, as identified in the housing element of any city, county, or city and county in the service area of the supplier.

(e) Quantify, to the extent records are available, past and current water use, and projected water use (over the same five-year increments described in subdivision (a)), identifying the uses among water use sectors, including, but not necessarily limited to, all of the following uses: (A) single-family residential; (B) multifamily; (C) commercial; (D) industrial; (E) institutional and governmental; (F) landscape; (G) sales to other agencies; (H) saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof; (I) agricultural.

(k) Urban water suppliers that rely upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (c). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (c).

3.2 Baselines and Targets

3.2.1 Baseline Water Use

In order to provide a point of comparison for the 2020 urban water use target, a baseline water use must be established. The calculation of this baseline is prescribed by Technical Methodologies 1, 2, and 3 of *Methodologies for Calculating Baseline and Compliance Urban Per Capita Water U*se as outlined in the DWR Guidebook. Technical Methodology 1 provides guidelines on calculating gross water use, Technical Methodology 2 provides guidelines on calculating service area population, and Technical Methodology 3 provides guidelines on calculating base daily per capita use.

The first step in calculating the baseline water use is to define the base period. Water Code Section 10608.20 states that the base period must end no earlier than December 31, 2004, and no later than December 31, 2010. The length of the base period may be anywhere from 10 to 15 continuous years based on these two scenarios:

- If recycled water makes up less than 10 percent of 2008 retail water delivery, the base period must be 10 continuous years.
- If recycled water makes up 10 percent or more of 2008 retail water delivery, the base period may be 10 to 15 continuous years.

Although recycled water is a part of CVWD's overall water portfolio, it is not considered to be a component of the urban water system. The customers that receive recycled water are not CVWD potable water customers, but rather private groundwater producers (golf courses and other large irrigators) that offset a portion of their groundwater production with recycled water. Hence, the base period is 10 years.

The first step in determining the baseline water use is to calculate the service area population for each potential baseline year. As described in detail in Section 2, the service area population for each non-2000 year in the baseline period is calculated using Census 2000 data and CVWD billing data.

The approach for computing gross water use for each potential baseline year is prescribed by Technical Methodology 1. All of CVWD's supply for the urban water distribution system is provided by local groundwater. The agency has flow meters on 100% of their production wells. CVWD collects monthly groundwater production data from each production well. This data is collated and summarized to calculate the system gross water use. Using the service area population and gross water use, the daily per capita water use is calculated for each potential baseline year. This calculation is shown in the equation below. The average daily per capita water use taken over the selected base period gives the base daily per capita water use used for comparison with the 2020 urban water use target.

$$Daily\ Per\ Capita\ Water\ Use\ (gpcd) = \frac{gross\ water\ use\ (mgd) \times \left(\frac{10^6 gal}{1\ million\ gal}\right)}{population}$$

To select the base period, average baseline per capita water use is calculated for all allowable base periods as prescribed by Water Code Section 10608.20. Population, gross water use and per capita water use for each potential baseline year is presented in **Table 3-1.** Average baseline per capita water use for all potential baseline periods is provided in **Table 3-2**. Since the base period of 1999 to 2008 has the highest baseline water use (591 gpcd) of all the base periods, it is selected to represent CVWD's baseline water demand. Total water deliveries for this base period are presented in **Table 3-3**, along with the parameters of the selected five-year base period, which is a required calculation for selecting the 2020 urban water use target. The 2020 urban water use target is required to be less than 95 percent of the five-year base period, which can end no earlier than December 31, 2007 and no later than December 31, 2010. See Section 3.2.2 for further details on the 2020 urban water use target and the five-year base period. **Table 3-4** provides the service area population, total gross water use, and daily per capita water use for the selected baseline period.

Table 3-1
Water Use for Potential Baseline Years

Year	Population	Gross Water Use (AFY) [1]	Per Capita Water Use (gpcd)
1995	145,329	91,826	564
1996	150,333	96,192	571
1997	152,350	94,114	551
1998	159,051	98,472	553
1999	165,160	106,805	577
2000	171,289	117,547	613
2001	175,616	116,916	594
2002	184,629	123,219	596
2003	180,305	121,231	600
2004	188,358	124,139	588
2005	193,536	121,737	562
2006	195,570	134,988	616
2007	198,363	129,871	584
2008	198,976	129,273	580
2009	201,568	123,825	548
2010	202,660	109,488	482

1- Gross water use = water deliveries + system water losses

Table 3-2
Potential Baseline Periods

Base Period	Average Baseline Water Use (gpcd)
1995-2004	581
1996-2005	581
1997-2006	585
1998-2007	588
1999-2008	591
2000-2009	588
2001-2010	575

Table 3-3
Baseline Period

UWMP Guidebook Table 13			
Base period ranges			
Base	Parameter	Value	Units
10- to 15-year base period	2008 total water deliveries	129,273	acre-feet
	2008 total volume of delivered recycled water	0	acre-feet
	2008 recycled water as a percent of total deliveries	0	percent
	Number of years in base period	10	years
	Year beginning base period range	1999	
	Year ending base period range	2008	
5-year base period	Number of years in base period	5	years
	Year beginning base period range	2003	
	Year ending base period range	2007	

3.2.2 Urban Water Use Target

There are four methods described by Water Code Section 10608.20(e) to determine the 2020 urban water use the target. These methods are summarized as follows:

- **Method 1** - target = 80 percent of base daily per capita water use.
- **Method 2** - target is a summation of performance standards for indoor residential use, outdoor landscape use, and commercial, industrial, and institutional (CII) use.
- **Method 3** - target = 95 percent of regional 2020 water conservation goal.
- **Method 4 (provisional)** - target = base daily per capita water use minus estimated water savings from indoor residential use, unmetered water deliveries, CII use, landscape use, and system water loss.

Table 3-4
10-Year Base Daily Per Capita Water Use

UWMP Guidebook Table 14				
Base daily per capita water use — 10- to 15-year range				
Base period year		Distribution System Population	Daily system gross water use (mgd)	Annual daily per capita water use (gpcd)
Sequence Year	Calendar Year			
Year 1	1999	165,160	95	577
Year 2	2000	171,289	105	613
Year 3	2001	175,616	104	594
Year 4	2002	184,629	110	596
Year 5	2003	180,305	108	600
Year 6	2004	188,358	111	588
Year 7	2005	193,536	109	562
Year 8	2006	195,570	121	616
Year 9	2007	198,363	116	584
Year 10	2008	198,976	115	580
Base Daily Per Capita Water Use				591

Potential urban water use targets utilizing each method are provided in **Table 3-5**. Calculations used to produce the potential urban water use targets are provided in Appendix B. Method 1 is chosen to determine the 2020 urban water use target since it yields the highest value, which imposes the least stringent per capita urban water use requirement for CVWD. The urban water use target is equal to 80 percent of the base daily per capita water use. Utilizing Method 1 CVWD's urban water use target for 2020 is 473 gpcd.

Table 3-5
Potential Urban Water Use Targets

Urban Water Use Target Method	Urban Water Use Target (gpcd)
Method 1	473
Method 2	457
Method 3	200
Method 4	470

In accordance with Water Code Section 10608.20(e), the 2020 urban water use target also needs to be less than 95 percent of a continuous five-year base daily per capita water use. This five-year base period must end no earlier than December 31, 2007, and no later than December 31, 2010. CVWD's five-year base period is from 2003 to 2007. The methodology to calculate the base daily per capita water use is identical to the one used for the calculating the 10-year base daily per capita water use previously described. **Table 3-6** provides the service area population, gross water use, and daily per capita water use for each base period year. Taking the average daily per capita water use over the base period, the 5-year base daily per capita water use is 590 gpcd. Ninety-five percent of this base daily per capita water use is 561 gpcd. Since the 2020 urban water use target of 473 gpcd is less than this value, the urban water use target is confirmed.

In addition to the 2020 urban water use target, an interim 2015 urban water use target is also required per Water Code Section 1068.20. The 2015 interim urban water use target is calculated by adding the 10-year base daily per capita water use and the 2020 urban water use target and dividing by two. This value is 532 gpcd. **Table 3-7** provides the values for the 10-year base daily per capita water use, 2015 interim urban water use target, and 2020 urban water use target.

Table 3-6
5-Year Base Daily Per Capita Water Use

UWMP Guidebook Table 15				
Base daily per capita water use — 5-year range				
Base period year				
Sequence Year	Calendar Year	Distribution System Population	Daily system gross water use (mgd)	Annual daily per capita water use (gpcd)
Year 1	2003	180,305	108	600
Year 2	2004	188,358	111	588
Year 3	2005	193,536	109	562
Year 4	2006	195,570	121	616
Year 5	2007	198,363	116	584
Base Daily Per Capita Water Use				590

Table 3-7
Urban Water Use Targets

Base Daily Per Capita Water Use (gpcd)	591
2015 Interim Urban Water Use Target (gpcd) [1]	532
2020 Urban Water Use Target (gpcd) [2]	473

1 - Calculated by adding the base daily per capita water use and 2020 urban water use target and dividing by two.

2 - 80 percent of base daily per capita water use per Method 1

3.3 Water Demands

3.3.1 Potable Water Demand Projections

The following tables provide past, current, and projected urban water use for CVWD. **Table 3-8** and present water deliveries by water use sector for 2005 and 2010, respectively. The two biggest water use sectors are single family and landscaping. It is estimated that 80 percent of single family water use is for outdoor landscaping. Recognizing that the vast majority of urban water use is for landscaping purposes, CVWD has focused its conservation efforts to reduce landscape water use as described in Section 6.

Table 3-8
2005 Urban Water Deliveries

UWMP Guidebook Table 3					
Water deliveries [1] — actual, 2005					
Water Use Sectors	2005				
	Metered		Not Metered		Total
	# of active accounts	Volume (AFY)	# of active accounts	Volume (AFY)	Volume (AFY)
Single family	90,386	81,571	0	0	81,571
Multi-family	3,309	6,716	0	0	6,716
Commercial	3,420	5,170	0	0	5,170
Industrial	0	0	0	0	0
Institutional/governmental	236	924	0	0	924
Landscape	4,147	25,851	0	0	25,851
Agriculture [2]	0	0	0	0	0
Construction	420	2,975	0	0	2,975
Total	101,522	123,207	0	0	123,207

1 – Consumption values, excludes system water loss.

2 - CVWD serves agricultural farms, golf courses and other uses with Colorado River water via a non-potable distribution system; the volume of agricultural water use is described in Table 3-18 (UWMP Guidebook Table 10).

Table 3-9
2010 Urban Water Deliveries

UWMP Guidebook Table 4					
Water deliveries[1] — actual, 2010					
Water Use Sectors	2010				
	Metered		Not Metered		Total
	# of active accounts	Volume (AFY)	# of active accounts	Volume (AFY)	Volume (AFY)
Single family	92,863	59,902	0	0	59,902
Multi-family	3,610	8,629	0	0	8,629
Commercial	3,821	4,841	0	0	4,841
Industrial	0	0	0	0	0
Institutional/governmental	377	1,023	0	0	1,023
Landscape	5,142	28,994	0	0	28,994
Agriculture	0	0	0	0	0
Construction	188	920	0	0	920
Total	106,018	104,309	0	0	104,309

1 – Consumption values, excludes system water loss.

Projected water use for 2015 through 2035 in five-year increments is provided in **Table 3-10**, **Table 3-11**, and **Table 3-12**. These demand projections are based on projected population and per capita water use. The population projections are based on the 2006 RCCDR population projections for Riverside County as described in Section 2. Projected per capita water use is calculated using the process shown on **Figure 3-1**. Baseline population is the current existing service area population. It is assumed that this population will have a 20 percent reduction in per capita water use due to tiered water rates and landscaping conservation. Added population is composed of future new CVWD customers. This population will have a greater reduction in outdoor per capita water use due to CVWD's landscape ordinance. See Section 6 for details on all of CVWD's conservation efforts. The total per capita water use is a weighted average of the baseline and added populations' per capita water use. **Table 3-13** presents CVWD's future per capita water use through 2035. Based on the currently available development and land use information for Coachella Valley, it is assumed that the proportions of water use by sector in the future will be equal to the sector proportions of 2010 water use.

Table 3-10
2015 Projected Urban Water Deliveries

UWMP Guidebook Table 5					
Water deliveries[1] — projected, 2015					
Water Use Sectors	2015				
	Metered		Not Metered		Total
	# of accounts	Volume (AFY)	# of accounts	Volume (AFY)	Volume (AFY)
Single family	110,400	69,900	0	0	69,900
Multi-family	4,500	10,100	0	0	10,100
Commercial	4,400	5,600	0	0	5,600
Industrial	0	0	0	0	0
Institutional/governmental	430	1,200	0	0	1,200
Landscape	6,100	33,800	0	0	33,800
Agriculture	0	0	0	0	0
Construction	240	1,100	0	0	1,100
Total	126,100	121,700	0	0	121,700

1 – Consumption values, excludes system water loss.

Table 3-11
2020 Projected Water Deliveries

UWMP Guidebook Table 6					
Water deliveries[1] — projected, 2020					
Water Use Sectors	2020				
	Metered		Not metered		Total
	# of accounts	Volume (AFY)	# of accounts	Volume (AFY)	Volume (AFY)
Single family	138,900	86,700	0	0	86,700
Multi-family	6,000	12,500	0	0	12,500
Commercial	5,400	7,000	0	0	7,000
Industrial	0	0	0	0	0
Institutional/governmental	530	1,500	0	0	1,500
Landscape	7,600	42,000	0	0	42,000
Agriculture	0	0	0	0	0
Construction	290	1,300	0	0	1,300
Total	158,700	151,000	0	0	151,000

1 – Consumption values, excludes system water loss.

Table 3-12
2025-2035 Projected Urban Water Deliveries

UWMP Guidebook Table 7						
Water deliveries[1] — projected 2025, 2030, and 2035						
Water Use Sectors	2025		2030		2035	
	metered		metered		metered	
	# of accounts	Volume (AFY)	# of accounts	Volume (AFY)	# of accounts	Volume (AFY)
Single family	169,400	104,300	194,900	117,800	223,900	134,800
Multi-family	7,500	15,000	8,500	17,000	10,000	19,400
Commercial	6,400	8,400	7,400	9,500	8,400	10,900
Industrial	0	0	0	0	0	0
Institutional/governmental	630	1,800	730	2,000	830	2,300
Landscape	9,100	50,500	10,600	57,000	12,100	65,300
Agriculture	0	0	0	0	0	0
Construction	340	1,600	7,400	1,800	440	2,100
Total	193,400	181,600	229,500	205,100	255,700	234,800

1 – Consumption values, excludes system water loss.

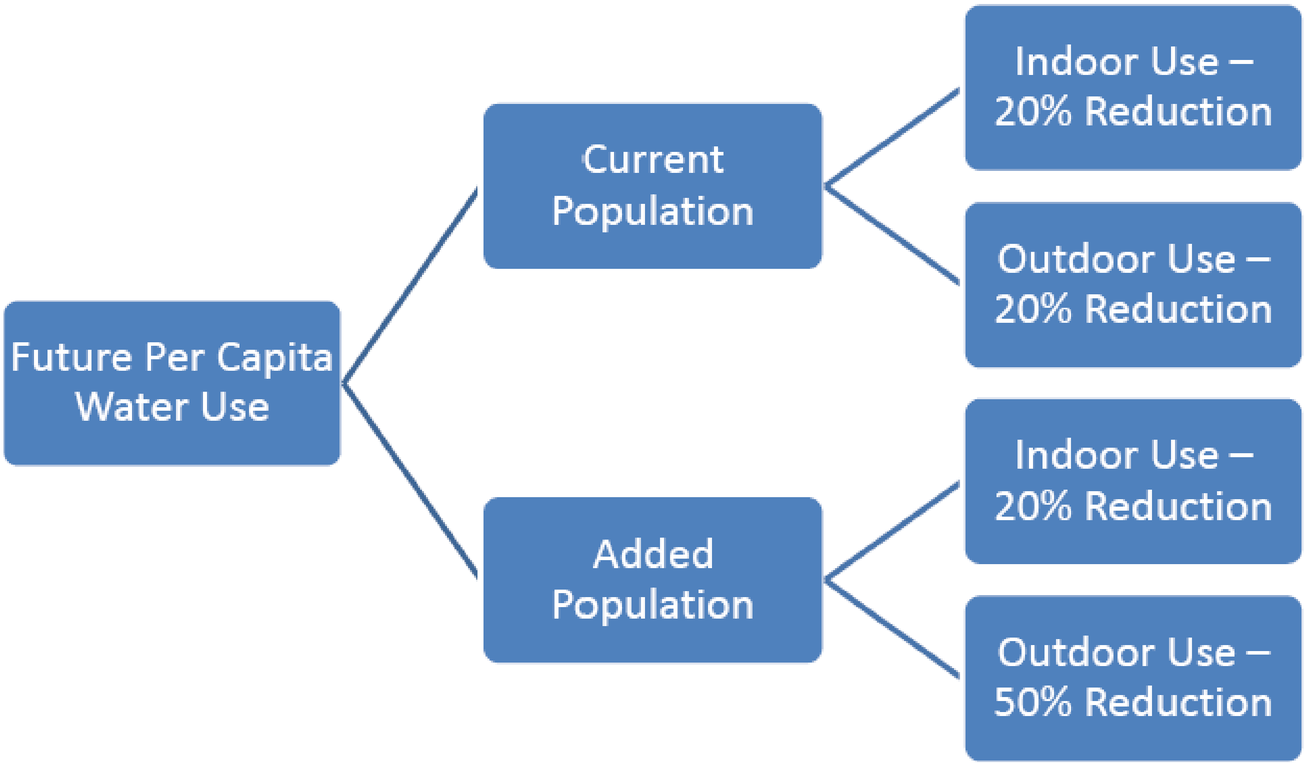


Figure 3-1
Future Per Capita Water Use

Table 3-13
Future Per Capita Water Use

Year	Total Population	Current Population	Added Population	Current Population Per Capita Water Use (gpcd)	Added Population Per Capita Water Use (gpcd)			Total Per Capita Water Use (gpcd)
					Indoor	Outdoor	Total	
2010	202,660	202,660	-	482	95	296	390	482
2015	244,700	202,700	42,000	473	95	296	390	459
2020	314,000	202,700	111,300	473	95	296	390	444
2025	386,300	202,700	183,600	473	95	296	390	434
2030	442,100	202,700	239,400	473	95	296	390	428
2035	512,200	202,700	309,500	473	95	296	390	423

Per capita water use includes water loss.

3.3.1.1 Lower Income Housing Water Demand Projections

The DWR Guidebook defines a lower income household as 80 percent of median income, adjusted for family size. CVWD requested future lower income housing project information from the cities within its service area. La Quinta and Rancho Mirage were the only two cities that responded. Rancho Mirage responded that their lower income housing projections are based on Southern California Association of Governments (SCAG) Regional Housing Need Allocation (RHNA) Plan – Planning Period (January 1, 2006 – June 30, 2014). Since City-specific data on lower income housing is not available, the analysis described below is performed using the SCAG RHNA data for Riverside County.

As a first step, projected lower income households for each City and unincorporated areas within CVWD's service area are extracted from SCAG RHNA data. This analysis assumes a linear interpolation between 2006 and 2014 lower income projections as identified in the SCAG RHNA data. Using 2010 as the base year, the projected lower income households for the CVWD service area are presented in **Table 3-14**.

The numbers of households are split into single-family residences (SFR) and multi-family residences (MFR) based on the 2010 billing data. 87 percent of the total residential accounts are SFR and 13 percent are MFR. Furthermore, as described in Section 2, ratios of 1.48 people per SFR household and 18.16 people per MFR household are applied to the number of SFR and MFR households to get the total number of people in each category. The demands associated with the lower income households are then calculated by multiplying the number of people in each category with the projected per capita water use (see **Table 3-13**). The results of this analysis are presented in **Table 3-15**.

Table 3-14
Projected Lower Income Households

Lower Income Households					
CVWD Cities	2015	2020	2025	2030	2035
Cathedral City	780	1,560	2,340	3,120	3,900
City of Coachella	1,280	2,560	3,840	5,120	6,400
Indian Wells	60	120	180	240	300
La Quinta	1,050	2,100	3,150	4,200	5,250
Palm Desert	1,100	2,200	3,300	4,400	5,500
Rancho Mirage	780	1,560	2,340	3,120	3,900
Unincorporated	360	720	1,080	1,440	1,800
Total	5,410	10,820	16,230	21,640	27,050

Table 3-15
Projected Lower Income Water Demands

UWMP Guidebook Table 8					
Lower Income Water Demands (AFY)	2015	2020	2025	2030	2035
Single-Family Residences	3,600	6,900	10,100	13,300	16,400
Multi-Family Residences	6,600	12,700	18,600	24,400	30,100
Total	10,200	19,600	28,700	37,700	46,500

3.3.2 Other Uses and System Losses

3.3.2.1 Wholesale Water Demand Projections

CVWD does not rely on a wholesale agency for its urban water supply. The agency currently draws 100 percent of its supply from local groundwater, portion of which is replenished as described in Section 3.3.2.2. In the future, CVWD will augment this groundwater supply with Colorado River water as described in Section 4. UWMP Guidebook **Table 12** is not applicable.

CVWD does not currently sell water to other agencies. There is a possibility the agency may sell water to other Coachella Valley water agencies in the future, but this demand has not been quantified yet. Hence, UWMP Guidebook **Table 9** is not provided.

3.3.2.2 Groundwater Recharge

CVWD and DWA operate groundwater recharge programs in the upper Whitewater River and Mission Creek subbasins. CVWD is also conducting pilot recharge tests in the lower Whitewater River subbasin at the Martinez Canyon Pilot Recharge Facility. As part of the CVWMP, CVWD intends to significantly expand its groundwater recharge program in the Whitewater River subbasin.

CVWD recently completed construction the Thomas E. Levy (Levy) Groundwater Replenishment Facility in the lower Whitewater River Subbasin with a capacity to 40,000 AFY. Due to water delivery limitations at this facility, CVWD is currently recharging approximately 32,500 AFY at this facility.

Groundwater is also being directly recharged on the Martinez Canyon alluvial fan. CVWD completed construction of a pilot recharge facility and several monitoring wells in this area in March 2005. This facility is designed to recharge approximately 3,000 AFY. According to the 2010 CVWMP, CVWD plans to construct a full-scale facility at Martinez Canyon to recharge 20,000 AFY by 2025. Additionally, CVWD and the City of Indio plan are considering construction of a facility to recharge about 10,000 AFY in the City of Indio to directly benefit groundwater levels in the city.

Groundwater recharge in the Mission Creek subbasin commenced in 2004 using SWP Exchange water. This program is jointly administered by CVWD and DWA with facilities constructed and operated by DWA.

Table 3-16 presents the current estimated groundwater recharge demand for the period 2005-2035.

3.3.2.3 Non-Potable Water Demand Projections

CVWD delivers Coachella Canal water and recycled water for non-potable irrigation uses. The Canal water distribution system is not a part of the domestic system, but is discussed in this section for completeness.

The primary use of Canal water is for agricultural irrigation. However, Canal water is also used for golf course and other landscape irrigation as well as groundwater recharge in the East Valley. Recycled water is used for golf course and common area irrigation in the West Valley.

Table 3-16
Projected Groundwater Recharge Demand

Year [1]	Recharge Facility (AFY)					
	Whitewater Spreading Facility [2]	Levy Spreading Facility	Martinez Canyon Spreading Facility	Indio [2]	Mission Creek Spreading Facility [3]	Total
2005	165,600	4,000	800	0	24,700	195,100
2010	87,400	32,500	4,000	0	8,200	132,100
2015	72,300	40,000	4,000	5,000	9,900	131,200
2020	88,800	40,000	4,000	5,000	10,700	148,500
2025	78,000	40,000	20,000	10,000	10,700	158,700
2030	78,700	40,000	20,000	10,000	10,700	159,400
2035	82,000	40,000	20,000	10,000	11,100	163,100

Source: CVWD, 2010 CVWMP Update
Notes:
1- Values shown for 2010 are based on anticipated operations. Actual values may be higher based on imported water availability. Values for 2015 through 2035 represent average annual values based on anticipated water availability.
2- Values are estimated. Site of the recharge facility in Indio is still under investigation.
3- Water recharged at Whitewater and Mission Creek facilities is the joint responsibilities of CVWD and DWA. Amounts will vary based on hydrologic conditions and groundwater pumping.

Local groundwater is produced for agricultural, golf course and other irrigation by many private pumpers. In the West Valley, groundwater production and usage is metered and reported to CVWD to determine groundwater replenishment assessments for each producer who pumps more than 25 AF annually. In the East Valley, CVWD implemented a groundwater replenishment assessment in January 2005. Because many wells in the East Valley are not yet metered, there is incomplete information on current non-potable water demand for groundwater. Groundwater pumping for non-potable use within the CVWD service area was estimated to be about 142,000 acre-ft in 2010 (CVWMP 2010 Update). In the absence of the CVWMP, this pumping is projected to increase to about 196,000 AFY in 2035.

Implementation of the CVWMP includes the conversion of a portion of the non-potable groundwater pumping to Canal water or recycled water to reduce groundwater overdraft. The CVWMP estimated the future demand for agricultural and other non-potable water use through the year 2035 that would be served by CVWD. Those demand estimates are presented in **Table 3-17**.

As described in the CVWMP, future urban growth in the East Valley is expected to occur equally (50 percent each) on agricultural and vacant parcels, thereby decreasing future agricultural and overall non-potable water demands. However, future golf course and municipal non-potable water demands will increase. It is not expected that the full Canal water allocation under the Quantification Settlement Agreement (see Section 4 for details) will be utilized in the future due to decreasing overall non-potable water demand and lack of infrastructure to deliver Canal water to potable water customers. In addition, CVWD's Canl water allocation will gradually increase in the future as described in Section 4.

3.3.2.4 System Losses

CVWD has very little system water loss in its domestic system. The average percentage water loss of total water production over the last five years is 3.2 percent. It is assumed that future system water loss will be equal to this percentage. **Table 3-18** provides future projections of system water loss based on this percentage. In 2005, the calculated system water loss was -1,470 AF. This negative value is believed to be due to the lag between reporting dates of production well meters and consumption meters. CVWD does not use any water from its urban distribution system for saline barriers, groundwater recharge or conjunctive use. However, raw imported water is used for groundwater recharge and other non-potable uses.

Table 3-17
Projected Non-Potable Water Demand

Year	Use Type (AFY)		
	Agriculture	Golf Course and Municipal[1]	Total
2005	283,000	22,800	305,800
2010	313,400	33,700	347,100
2015	279,700	59,300	339,000
2020	242,700	76,700	319,400
2025	222,300	91,900	314,200
2030	204,700	94,700	299,400
2035	184,000	99,600	283,600

1- Golf course and municipal non-potable demand is from use of recycled water and Canal Water.

Putting together the water delivery and system water loss data, provides total water use from 2005 through 2035 for uses not included in DWR Tables 3 through 7 (Table 3-7 to Table 3-11 of this section).

3.3.3 Total Water Demands

CVWD's urban and non-potable water demands and domestic system losses from 2005 through 2035 are summarized in **Table 3-19.**

Table 3-18
Other Urban Water Uses and Urban System Water Losses

UWMP Guidebook Table 10							
Additional water uses and losses (AFY)							
Water Use	2005	2010	2015	2020	2025	2030	2035
Saline barriers	0	0	0	0	0	0	0
Groundwater recharge	0	0	0	0	0	0	0
Conjunctive use	0	0	0	0	0	0	0
Domestic system losses[1]	-1,470 [2]	5,179	4,100	5,100	6,100	6,900	7,900
Total	-1,470	5,179	4,100	5,100	6,100	6,900	7,900

1- Future system water loss is assumed to be 3.2 percent of total water production, which is the average system water loss percentage from the past five years (2006-2010).

2- This negative value is believed to be due to the lag between reporting dates of production well meters and consumption meters.

Table 3-19
Total Urban Water Use

UWMP Guidebook Table 11							
Total urban water use (AFY)							
Water Use	2005	2010	2015	2020	2025	2030	2035
Total urban water deliveries (from Table 3-8 through Table 3-12)	123,207	104,309	121,700	151,000	181,600	205,100	234,800
Sales to other water agencies [1]	0	0	0	0	0	0	0
Additional water uses and losses (from Table 3-18)	-1,470	5,179	4,100	5,100	6,100	6,900	7,900
Total	121,737	109,488	125,800	156,100	187,700	212,000	242,700

1 – At this time CVWD does not sell water to other agencies. There may be a possibility of sales to other agencies in the future, but quantifiable estimates are not available.

Table 3-20
Total Potable and Non-potable Water Use

Total potable and non-potable water use (AFY)							
Water Use	2005	2010	2015	2020	2025	2030	2035
Total urban water use	121,737	109,488	125,800	156,100	187,700	212,000	242,700
Groundwater recharge with non-potable water	195,100	132,100	131,200	148,500	158,700	159,400	163,100
Non-potable water use	305,800	347,100	339,000	319,400	314,200	299,400	283,600
Total	622,637	588,688	596,000	624,000	660,600	670,800	689,400

3.4 Water Use Reduction Plan

Urban water use is expected to grow significantly in the future as development occurs. CVWD is implementing a number of on-going water conservation programs for both large landscape customers and residential customers. CVWD has made significant progress towards water conservation by implementing a landscape ordinance and a tiered water budget based rate structure for its customers. Water-efficient plumbing is also being installed in all new homes consistent with existing building code. In addition, landscape audit programs and rebates for replacements of lawns with water-efficient landscaping and have been implemented. CVWD is also developing a residential toilet rebate program. See Section 6 for details on CVWD’s water use reduction programs.

SECTION 4 SYSTEM SUPPLIES

This section describes the existing and future water supplies available to CVWD to meet its domestic and non-potable water demands. Water supply reliability is presented for normal, single dry and multiple dry years.

4.1 Law

California Water Code Section 10631, Paragraph (b), (d), (h), (i)

(b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a). If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information shall be included in the plan:

(1) A copy of any groundwater management plan adopted by the urban water supplier, including plans adopted pursuant to Part 2.75 (commencing with Section 10750), or any other specific authorization for groundwater management.

(2) A description of any groundwater basin or basins from which the urban water supplier pumps groundwater. For those basins for which a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the urban water supplier has the legal right to pump under the order or decree. For basins that have not been adjudicated, information as to whether the department has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to eliminate the long-term overdraft condition.

(3) A detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(4) A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the urban water supplier. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(d) Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.

(h) Include a description of all water supply projects and water supply programs that may be undertaken by the urban water supplier to meet the total projected water use as established pursuant to subdivision (a) of Section 10635. The urban water supplier shall include a detailed description of expected future projects and programs, other than the demand management programs identified pursuant to paragraph (1) of subdivision (f), that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in average, single-dry, and multiple-dry water years. The description shall identify specific projects and include a description of the

increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program.

(i) Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply.

California Water Code Section 10633

The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area, and shall include all of the following:

(a) A description of the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.

(b) A description of the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.

(c) A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.

(d) A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, indirect potable reuse, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.

(e) The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.

(f) A description of actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year.

(g) A plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.

4.2 Water Sources

The principal water supplies of the Coachella Valley are local groundwater, imported Colorado River water and imported SWP water. The Coachella Canal, which brings in Colorado River water from the All-American Canal near the Mexico-U.S. border, traverses the southeastern margin of the Valley. The Canal turns southwest around the northern end of Indio and terminates at man-made Lake Cahuilla, south of La Quinta. CVWD and DWA also obtain imported water from the SWP. Since CVWD and DWA do not have a direct connection to the SWP, this water is exchanged with Metropolitan for water from its

Colorado River Aqueduct north of Palm Springs. For purposes of this report, this water is designated SWP Exchange water.

The only direct water source for urban water use is local groundwater. Although SWP Exchange and Colorado River water are used to replenish the groundwater basin, the potable water distribution system does not currently receive water directly from either imported water source. Recycled water, as discussed later in this section, is also used extensively by non-potable water customers for irrigation purposes to offset groundwater pumping, but it is not used to offset the demand of urban potable water customers.

The urban water distribution system is defined as the area served by CVWD's potable groundwater production wells. CVWD has non-potable irrigation customers who only receive untreated Colorado River water via a separate irrigation distribution system that was installed by the United States Bureau of Reclamation in the 1950s primarily for agricultural irrigation. Prior to receiving Colorado River water, these users obtained groundwater from private wells.

CVWD plans to install infrastructure to allow its urban water customers to obtain Colorado River water in the future as development occurs. This will include both non-potable Colorado River water for landscape irrigation purposes and treated Colorado River water for potable use. CVWD's non-urban customers may also potentially receive desalinated irrigation drain water and recycled water in the future. These two potential urban water sources are discussed in Sections 4.4.1 and 4.5, respectively.

Table 4-1 presents the projected direct water supply up to 2035 for urban water use. UWMP Guidebook **Table 17** is not provided since CVWD does not receive any water from wholesale suppliers for urban water use. For the purposes of this report, total water supplies are assumed to be equal to total urban water demand. Since groundwater is the principal source of water supplies and the groundwater basin is not adjudicated, actual water supply of the basin is dependent on replenishment and production by other water users of the groundwater basin. With the on-going implementation of the Coachella Valley Water Management Plan (2002, updated in 2010), it is assumed that CVWD will either reduce or maintain its current groundwater pumping and meet the rest of its demand with Colorado River water. Management of the groundwater basin is discussed later in this section. As mentioned previously, CVWD will augment its groundwater supply with Colorado River water in the future. This urban water supply will gradually increase with time as the required infrastructure is installed. It will offset the amount of groundwater required to meet urban water demand.

Table 4-1
Projected Water Supplies

UWMP Guidebook Table 16						
Urban water supplies — current and projected (AFY)						
Water Supply Sources	2010	2015	2020	2025	2030	2035
Supplier-produced groundwater	109,488	118,700	125,600	129,900	133,500	128,700
Treated Colorado River water	0	5,700	19,300	31,400	39,500	49,100
Untreated Colorado River water	0	1,300	11,100	26,300	39,000	54,800
Desalinated agricultural drain water	0	0	0	0	0	10,000
Total	109,488	125,800	156,100	187,700	212,000	242,700

4.2.1 Groundwater

Groundwater is the principal source of municipal water supply in the Coachella Valley. CVWD obtains groundwater from both Whitewater River and the Mission Creek subbasins. The Whitewater River subbasin is a common groundwater source, which is shared by CVWD, Desert Water Agency (DWA), Myoma Dunes Mutual Water Company, the cities of Indio and Coachella, and numerous private groundwater producers. For purposes of administering a replenishment assessment, CVWD divides the Whitewater River subbasin into the Upper and Lower Whitewater River Areas of Benefit. Myoma Dunes and the cities of Indio and Coachella obtain water from the Lower Whitewater River Area of Benefit. The Mission Creek subbasin is also a common water supply that is utilized by CVWD, Mission Springs Water District and private groundwater producers.

Both CVWD and DWA have legal authority (under the 1992 CVWD-DWA Water Management Agreement) to manage the groundwater basins within their respective service areas. Subject to certain legal requirements, each agency may levy an assessment on groundwater pumping to finance the acquisition of imported and recycled water supplies and to recharge the groundwater basins.

CVWD has prepared a water management plan for the Whitewater River subbasin, the CVWMP, and is currently preparing one for the Mission Creek groundwater basin. Due to the volume of the CVWMP, only the Executive Summary is provided with this report in the Appendix. The entire report is provided on an enclosed CD and can be viewed for free online at CVWD’s website (www.cvwd.org).

The following presents a description of the groundwater basins, historical production, groundwater levels and estimates of overdraft.

4.2.1.1 Groundwater Basin Descriptions

The Coachella Valley groundwater basin, as described by the California Department of Water Resources (DWR) Bulletin 118, is bounded on the easterly side by the non-waterbearing crystalline rocks of the San Bernardino and Little San Bernardino Mountains and on the westerly side by the crystalline rocks of the Santa Rosa and San Jacinto Mountains. The trace of the Banning fault on the north side of San Gorgonio Pass forms the upper boundary (DWR, 2003).

The lower boundary is formed primarily by the watershed of the Mecca Hills and by the northwest shoreline of the Salton Sea running between the Santa Rosa Mountains and Mortmar. Between the Salton Sea and Travertine Rock, at the base of the Santa Rosa Mountains, the lower boundary roughly coincides with the Riverside/Imperial County Line.

Southerly of the lower boundary (Mortmar and Travertine Rock), the subsurface materials are predominantly fine-grained and low in permeability. Although groundwater is present, it is not readily extractable and is of poor quality. A zone of transition exists at these boundaries. To the north, the subsurface materials are coarser and more readily yield groundwater.

Although there is interflow of groundwater throughout the groundwater basin, fault barriers, constrictions in the basin profile and areas of low permeability limit and control movement of groundwater. Based on these factors, the groundwater basin has been divided into subbasins and subareas as described by DWR in 1964 and the United States Geological Survey (USGS) in 1971.

The boundaries between subbasins within the groundwater basin are generally based upon faults that are effective barriers to the lateral movement of groundwater. Minor subareas have also been delineated, based on one or more of the following geologic or hydrologic characteristics: type of water bearing formations, water quality, areas of confined groundwater, forebay areas, groundwater flow divides, and surface drainage divides.

The following is a list of the subbasins and associated subareas for the Coachella Valley groundwater basin, based on the DWR and USGS designations:

- Mission Creek subbasin
- Desert Hot Springs subbasin
- Garnet Hill subbasin
- Whitewater River subbasin (also known as the Indio subbasin)
    - Palm Springs subarea
    - Thousand Palms subarea
    - Oasis subarea
    - Thermal subarea

Figure 4-1 shows the locations of the above described subbasins. The following areas are within the CVWD boundaries where a supply of potable groundwater is not readily available:

- Indio Hills area
- Mecca Hills area
- Barton Canyon area
- Bombay Beach area which is adjacent to the Salton Sea
- Salton City area which is adjacent to the Salton Sea

Groundwater is pumped and exported from the Coachella Valley to meet water demands in these areas.

In 1964, DWR estimated that the subbasins in the Coachella Valley groundwater basin contained approximately 39,200,000 AF of water (in the first 1,000 feet below the ground surface). The capacities of the subbasins are shown in **Table 4-2**.

Table 4-2
Coachella Valley Groundwater Basin Storage Capacity

Area	Storage (AF)
San Gorgonio Subbasin [1]	2,700,000
Mission Creek Subbasin	2,600,000
Desert Hot Springs Subbasin	4,100,000
Garnet Hill Subbasin	1,000,000
Subtotal	10,400,000
Whitewater River Subbasin	
Palm Springs Subarea	4,600,000
Thousand Palms Subarea	1,800,000
Oasis Subarea	3,000,000
Thermal Subarea	19,400,000
Subtotal	28,800,000
Total	39,200,000

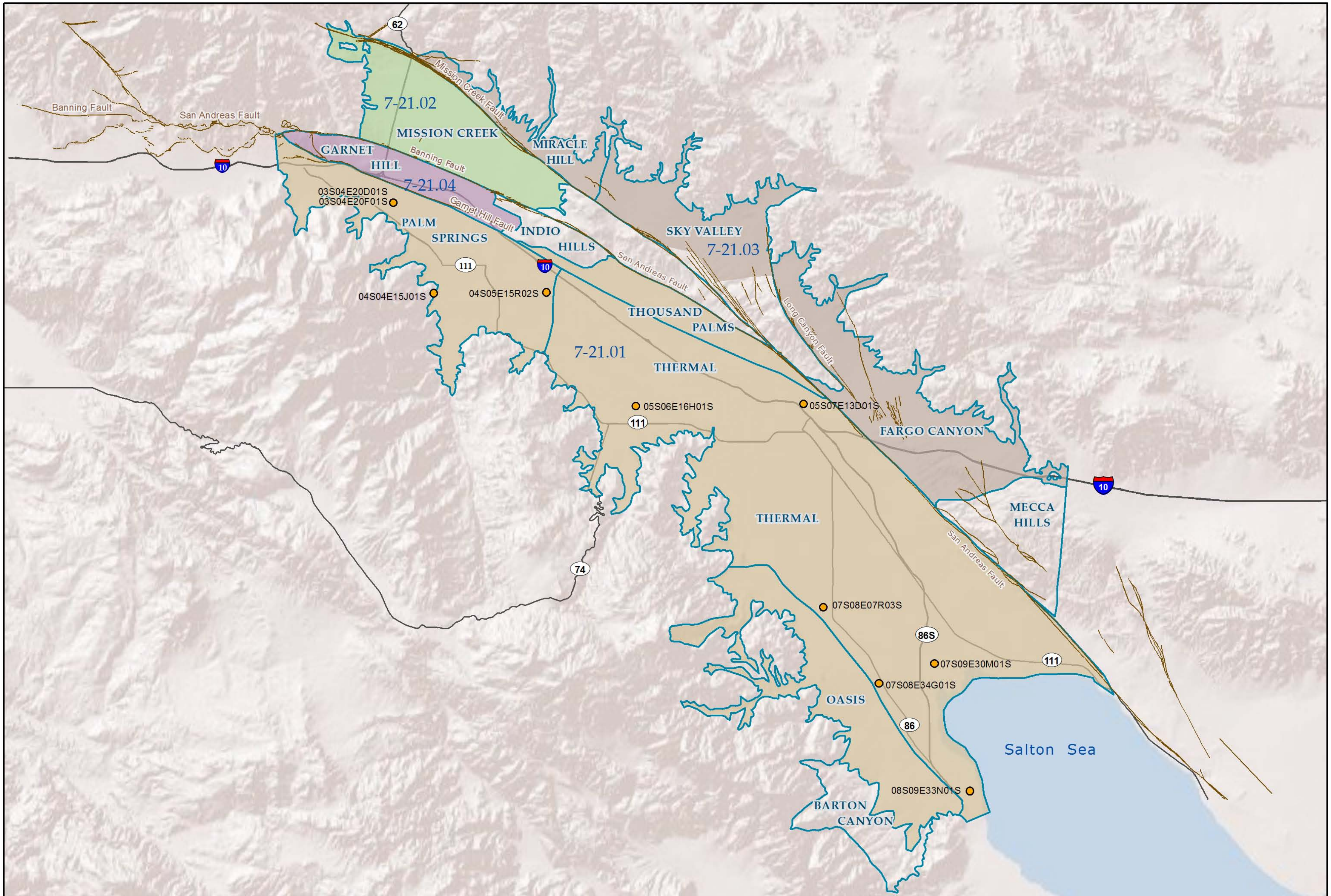
Source: CVWD Engineer's Report on Water Supply and Replenishment Assessment 2010-2011 (CVWD, 2010a)

1 - San Gorgonio Pass subbasin is located to the west of the Whitewater River subbasin and outside the planning area of CVWD.

4.2.1.1.1 Mission Creek Subbasin

Water-bearing materials underlying the Mission Creek upland comprise the Mission Creek Subbasin (number 7-21.02 in DWR Bulletin 118) (DWR, 2003). The subbasin is bounded on the south by the Banning fault and on the north and east by the Mission Creek fault. The subbasin is bordered on the west by non-waterbearing rocks of the San Bernardino Mountains. To the southeast of the subbasin are the Indio Hills, which consist of the semiwater-bearing Palm Springs Formation. The area within this boundary reflects the estimated geographic limit of effective storage within the subbasin.

Both the Mission Creek fault and the Banning fault are effective barriers to groundwater movement, as evidenced by offset water levels, fault springs and changes in vegetation. The wells drilled in this Subbasin pass thorough unconsolidated recent alluvium (sands and gravels forming the uppermost geologic formation in the Subbasin) and semi-consolidated and interbedded sands, gravels and silts. Although these Pleistocene deposits are the main source of water, water also occurs in recent alluvium where the water table is sufficiently shallow.



Key to Features

Fault

Highway

Groundwater Subbasins

Desert Hot Springs

Garnet Hill

Mission Creek

Whitewater

Groundwater Well

Groundwater Subareas

Source: DWR, ESRI, USGS, County of Riverside. Note: DWR Subbasin 7-21.04 was modified based on latest information.

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Date: April 2011

Coachella Valley Groundwater Subbasins

Figure 4-1

MWH

CVWD, DWA and Mission Springs Water District (MSWD) jointly manage this subbasin under the terms of the Mission Creek Settlement Agreement (December, 2004). This agreement and the 2003 Mission Creek Groundwater Replenishment Agreement between CVWD and DWA specify that the available SWP water will be allocated between the Mission Creek and Whitewater River Subbasins in proportion to the amount of water produced or diverted from each subbasin during the preceding year. Groundwater recharge in the Mission Creek basin has taken place since 2002 (DWA, 2010). In 2009, production from the Mission Creek Subbasin was about 7 percent of the combined production from these two subbasins. CVWD, MSWD and DWA are jointly developing a water management plan for this subbasin.

4.2.1.1.2 Desert Hot Springs Subbasin

The Desert Hot Springs subbasin is bounded on the north by the Little San Bernardino Mountains and to the southeast by the Mission Creek and San Andreas faults. The San Andreas fault separates the Desert Hot Springs subbasin from the Whitewater River subbasin and serves as an effective barrier to groundwater flow. The subbasin, designated number 7-21.03 in DWR Bulletin 118 (2003), has been divided into three subareas: Miracle Hill, Sky Valley and Fargo Canyon. Due to poor quality and low groundwater yields, all potable water demand overlying the subbasin is supplied by wells in the Mission Creek Subbasin. However, wells in the Miracle Hill area produce geothermally heated groundwater that supplies spa resorts in Desert Hot Springs.

4.2.1.1.3 Garnet Hill Subbasin

The area between the Garnet Hill fault and the Banning fault, named the Garnet Hill Subarea by DWR (DWR, 1964), was considered a distinct subbasin by the U. S. Geological Survey (USGS) (Tyley, 1974) because of the effectiveness of the Banning and Garnet Hill faults as barriers to groundwater movement. This is illustrated by a difference of 170 feet in groundwater level elevation in a horizontal distance of 3,200 feet across the Garnet Hill fault, measured in 1961. Although some recharge to this subbasin may come from Mission Creek and other streams that pass through during periods of high flood flows, the chemical character of the groundwater plus its direction of movement indicate that the main source of recharge to the subbasin comes from the Whitewater River. Based on groundwater level measurements, this area is partially influenced by artificial recharge activities at the Whitewater Recharge Facilities at Windy Point, especially during periods of high recharge. This subbasin is considered part of the Whitewater River (Indio) in DWR Bulletin 118.

Currently, there is no replenishment assessment program in the Garnet Hill Subbasin. CVWD, MSWD and DWA are jointly developing a water management plan for this subbasin along with the Mission Creek Subbasin.

4.2.1.1.4 Whitewater River Subbasin

The Whitewater River Subbasin, designated the Indio Subbasin (Basin No. 7-21.01) in DWR Bulletin No. 108 (DWR, 1964) and Bulletin 118 (DWR, 2003), underlies the major portion of the Valley floor and encompasses approximately 400 square miles. Beginning approximately one mile west of the junction of State Highway 111 and Interstate Highway 10, the Whitewater River Subbasin extends southeast approximately 70 miles to the Salton Sea. The Subbasin is bordered on the southwest by the Santa

Rosa and San Jacinto Mountains and is separated from Garnet Hill, Mission Creek and Desert Hot Springs Subbasins to the north and east by the Garnet Hill and San Andreas faults (CVWD, 2010a; DWR, 1964). The Garnet Hill fault, which extends southeastward from the north side of San Gorgonio Pass to the Indio Hills, is a relatively effective barrier to groundwater movement from the Garnet Hill Subbasin into the Whitewater River Subbasin, with some portions in the shallower zones more permeable. The San Andreas fault, extending southeastward from the junction of the Mission Creek and Banning faults in the Indio Hills and continuing out of the basin on the east flank of the Salton Sea, is also an effective barrier to groundwater movement from the northeast.

The subbasin underlies the cities of Palm Springs, Cathedral City, Rancho Mirage, Palm Desert, Indian Wells, La Quinta, Indio, and Coachella, and the unincorporated communities of Thousand Palms, Thermal, Bermuda Dunes, Oasis and Mecca. From about Indio southeasterly to the Salton Sea, the subbasin contains increasingly thick layers of silt and clay, especially in the shallower portions of the subbasin. These silt and clay layers, remnants of ancient lake beds, impede the percolation of water applied for irrigation and restrict groundwater recharge opportunities to the westerly and easterly fringes of the subbasin.

In 1964, the DWR estimated that the Coachella Valley groundwater basin contained a total of approximately 39.2 million AF of water in the first 1,000 feet below the ground surface; much of this water originated as runoff from the adjacent mountains. Of this amount, approximately 28.8 million AF of water was stored in the Whitewater River subbasin. However, the amount of water in the subbasin has decreased over the years due to pumping to serve urban, rural and agricultural development in the Coachella Valley has withdrawn water at a rate faster than its rate of recharge.

The groundwater basin is not adjudicated; rather it is jointly managed by CVWD and DWA under the terms of the 1976 Water Management Agreement. DWA and CVWD jointly operate a groundwater replenishment program whereby groundwater pumpers (other than minimal pumpers) pay a per AF charge that is used to pay the cost of importing water and recharging the aquifer.

The Whitewater River Subbasin is divided into four subareas: Palm Springs, Thermal, Thousand Palms and Oasis. The Palm Springs Subarea is the forebay or main area of recharge to the Subbasin and the Thermal Subarea comprises the pressure or confined area within the basin. The other two subareas are peripheral areas having unconfined groundwater conditions (CVWD, 2010a).

The historical fluctuations of groundwater levels within the Whitewater River Subbasin indicate a steady decline in the levels throughout the Subbasin prior to 1949. With the importation of Colorado River water from the Coachella Canal after 1949, the demand on the groundwater basin declined in the East Valley (generally east and south of Washington Street) below Point Happy and the groundwater levels rose sharply. Water levels in the deeper aquifers of the East Valley rose from 1950 to 1980. However, since the early 1980s, water levels in this area have again declined, at least partly due to increasing urbanization and groundwater usage. Recharge activities with SWP Exchange water commenced in 1973 at the Whitewater River Recharge Facility. Recharge activities at this location have varied with the availability of SWP Exchange water. Groundwater levels in the vicinity of the recharge basins have stabilized since recharge commenced. However, in the vicinity of Palm Desert and southerly, water levels have generally declined.

4.2.1.2 Groundwater Adjudication

None of the groundwater basins in the Coachella Valley are adjudicated. There are no legal agreements limiting CVWD's pumping from the above mentioned groundwater basins.

4.2.1.3 Overdraft

Since the early part of the 20th century, the Coachella Valley has been dependent on groundwater as a source of supply. The demand for groundwater has annually exceeded the limited natural recharge of the groundwater basin. The condition of a groundwater basin in which the outflows (demands) exceed the inflows (supplies) to the groundwater basin is called "*overdraft"*.

The State of California Department of Water Resources Bulletin 160-93 describes *overdraft* as follows:

"Where the groundwater extraction is in excess of inflow to the groundwater basin over a period of time, the difference provides an estimate of overdraft. Such a period of time must be long enough to produce a record that, when averaged, approximates the long-term average hydrologic conditions for the basin." (DWR, 1993)

DWR Bulletin 118-80 defines "overdraft as the condition of a groundwater basin where the amount of water extracted exceeds the amount of groundwater recharging the basin over a period of time." It also defines "critical condition of overdraft" as water management practices that "would probably result in significant adverse overdraft-related environmental, social, or economic effect" (DWR, 1980). Water quality degradation and land subsidence are given examples of two such adverse effects.

The groundwater supply consists of a combination of natural runoff and returns from groundwater, and imported water use. The supply is supplemented with artificial recharge with imported SWP and Colorado River water. Outflows from the basin consist of pumping, flows to the agricultural drainage system, evapotranspiration by native vegetation and subsurface outflow to the Salton Sea. **Table 4-3** provides the groundwater balance for each subbasin in 2009.

Bulletin 108 (1964) and Bulletin 118 (2003) are the most recent DWR bulletins that characterize the condition of the Coachella Valley aquifer as a whole. In Bulletin 108, DWR noted that the amount of usable supply in the overdrafted aquifer was decreasing, while Bulletin 118 stated that overdraft remains a "primary challenge" in the aquifer. CVWD estimates the annual change in storage annually in its Engineer's Reports on Water Supply and Replenishment Assessment. As shown on **Table 4-2**, the annual loss in storage for the Coachella Valley continued; in 2009, it was estimated to be 74,812 AFY. The 2009 loss in storage was lower than the historical loss due to increased SWP Exchange water deliveries at Whitewater River Recharge Facility and increased Canal water recharge at the Thomas E. Levy Groundwater Replenishment Facility (Levy facility) in the East Valley beginning in 2009.

The overdraft condition of the Coachella Valley has caused groundwater levels to decline in many portions of the East Valley from La Quinta to the Salton Sea, and has raised concerns about water quality degradation and land subsidence. Groundwater levels in the West Valley from Palm Springs to La Quinta have also decreased substantially, except in areas adjacent to and down gradient of the Whitewater River Recharge Facility, where artificial recharge has successfully raised water levels.

Table 4-3
2009 Groundwater Balance

Subbasin	Mission Creek	Lower Whitewater River	Upper Whitewater River
Overdraft 1978-2008	-115,300	-4,466,200	-880,700
Natural Recharge	5,000	33,700	49,000
Non-Consumptive Applied Water Return [1]	5,300	150,800	69,600
Groundwater Replenishment	4,100	21,700	57,000
Natural Outflow	-2,000	-70,100	-25,000
Water Production	-15,200	-160,000	-198,700
Annual Balance	-2,800	-23,900	-48,100
Cumulative Overdraft Through 2009 [2]	-118,100	-4,490,100	-928,800

All values are expressed in acre-feet.

Source: CVWD Engineer's Report on Water Supply and Replenishment Assessment 2010-2011 (CVWD, 2010a, 2010b, 2010c)

1 - Non-consumptive applied water return is assumed to be 35% of water production

2 - Mission Creek subbasin overdraft is calculated from 1978 through 2009. Overdraft for Lower Whitewater River and Upper Whitewater River subbasins are calculated from 1973 through 2009.

4.2.1.4 Groundwater Management Plan

As shown in **Table 4-3**, the Coachella Valley groundwater basin is in a state of overdraft. In response to this, the Coachella Valley Water Management Plan (CVWMP), which was adopted by the CVWD Board in October 2002, serves as the groundwater management plan for the Whitewater River subbasin. This plan defines CVWD's long-term approach for eliminating groundwater overdraft and providing sustainable water supply for the Coachella Valley. The 2010 Public Draft Update of this plan is provided as a reference on a CD to DWR along with the executive summary of the plan update provided as Appendix C of this UWMP. A brief description of the CVWMP is provided below. A groundwater management plan for the Mission Creek subbasin is in development.

4.2.1.4.1 Goals and Objectives

The goal of the 2002 CVWMP and the 2010 Update is to assure adequate quantities of safe, high-quality water at the lowest cost to Coachella Valley water users. To meet this goal, four objectives have been identified:

- Eliminate groundwater overdraft and its associated adverse impacts, including:
    - groundwater storage reductions
    - declining groundwater levels
    - land subsidence
    - water quality degradation
- Maximize conjunctive use opportunities
- Minimize adverse economic impacts to Coachella Valley water users

- Minimize environmental impacts

4.2.1.4.2 Elements of the CVWMP

The 2002 WMP included five major elements: 1) water conservation (urban, golf course, and agricultural), 2) substitution of surface water supplies (Colorado River water, SWP water, recycled water) for urban, agricultural, and golf course uses in lieu of pumping groundwater, 3) continued groundwater recharge at the Whitewater Recharge Facility and development of two new groundwater recharge facilities in the East Valley, 4) increasing surface water supplies, and 5) monitoring subsidence and groundwater levels and quality. Within each element, the 2002 WMP identified specific actions to aid in eliminating overdraft.

In developing the 2010 WMP Update, CVWD evaluated the success of 2002 WMP elements and determined future needs, supplies, and uncertainties. Like the 2002 WMP, the 2010 WMP Update has the same five major elements:

- Water conservation (urban, golf course, and agricultural)
- Increasing surface water supplies for the Valley from outsides sources
- Substitution of surface water supplies for groundwater (source substitution)
- Groundwater recharge
- Monitoring and evaluation of subsidence and groundwater levels and quality to provide the information needed to manage the Valley's groundwater resources

A detailed description of these elements and their efficacy in eliminating long-term overdraft are provided in Appendix C of this UWMP.

4.2.1.4.3 Legal Authority for Groundwater Management

CVWD has the legal authority to manage the groundwater basins within its service area under the County Water District Law (California Water Code, Division 12). CVWD has specific authority under Part 6, Chapter 7 to levy and collect water replenishment assessments for the purpose of replenishing ground water supplies within CVWD. CVWD has exercised its replenishment assessment authority in the upper Whitewater River subbasin since 1973, in the Mission Creek subbasin since 2003 and in the lower Whitewater River subbasin since 2005. CVWD and DWA entered the Water Management Agreement in 1976, which was amended in 1992 to jointly manage the upper Whitewater River subbasin. This agreement formalized the water replenishment program and provided a mechanism for distributing the costs of SWP water between the CVWD and DWA benefit areas based on total production within each agency's service area. A similar agreement was implemented in 2002 for the Mission Creek subbasin.

4.2.1.5 Groundwater Replenishment

CVWD and DWA are remediating the overdraft condition of the groundwater basin by artificial replenishment with Colorado River and SWP water. Colorado River water is used to recharge the Lower Whitewater River subbasin, while SWP Exchange water is used to recharge the Upper

Whitewater and Mission Creek subbasins. These two sources of water are discussed in detail later in this section.

Starting in 1973, the Upper Whitewater River subbasin has been the subject of a replenishment program using SWP exchange water for groundwater recharge. CVWD and DWA hold an agreement with Metropolitan to exchange, on an acre-foot-for-acre-foot basis, CVWD's and DWA's SWP water for a like amount of Metropolitan's Colorado River water. This exchange agreement is described in later in this section. The exchange water is diverted to a series of 19 CVWD-owned recharge basins, where it percolates to replenish groundwater.

A replenishment program using SWP exchange water is also established for the Mission Creek subbasin. Two recharge programs are currently operating in the Lower Whitewater River subbasin: the Thomas E. Levy Groundwater Replenishment Facility (Levy Facility) and the Martinez Canyon Pilot Recharge Facility. `

A summary of the recharge water deliveries to each subbasin for 2005-2010 is provided in **Table 4-4**. The variation in recharge water deliveries to the Mission Creek and Upper Whitewater subbasins is due to the variability of SWP deliveries. Water delivery to the Lower Whitewater River subbasin significantly increased in 2009 due to the completion of the Levy Facility. The year 2010 was a very successful year for groundwater replenishment due to relatively wet conditions in Northern California with nearly 300,000 AF of water replenished.

Table 4-4
Historical Annual Groundwater Recharge Water Deliveries

Year	Mission Creek Subbasin	Lower Whitewater River Subbasin	Upper Whitewater River Subbasin	Total
2005	24,723	4,743	165,554	195,020
2006	19,901	2,648	98,959	121,508
2007	1,011	5,775	16,009	22,795
2008	503	7,473	8,008	15,984
2009	4,090	21,735	57,024	82,849
2010	33,210	37,401	228,330	298,941

All units are in AFY.

Source: CVWD Engineer's Report on Water Supply and Replenishment Assessment 2010-2011 (CVWD, 2010a, 2010b, 2010c)

4.2.1.6 Groundwater Usage

The total groundwater production in each subbasin is presented in **Table 4-5**. This data includes production from all water producers who draw from these subbasins. In additional to other water retail producers such as DWA and IWA, there are individual private users who draw directly from the groundwater basin. Data is not yet available for 2010. **Table 4-6** presents CVWD's groundwater production for urban water supply from the past five years. In response to growth, CVWD will gradually increase groundwater production to meet demands. As provided in the CVWMP, their policy is to continue meeting domestic demands from groundwater but to transition customers that can use other water supplies to alternate water sources so as to reduce groundwater extraction. In addition, CVWD has enacted water-saving policies such as tiered water rates and landscape irrigation conservation.

The effect of these policies can be seen in the marked reduction of groundwater usage from 2009 to 2010.

The sufficiency of groundwater production during this time period was adequate. Although, historically groundwater levels in these basins have been declining and the groundwater basin is in a state of overdraft as described in the previous section.

Table 4-5
Total Historical Groundwater Production

Groundwater — volume pumped (AFY)						
Basin name	2005	2006	2007	2008	2009	2010
Mission Creek	16,315	17,751	17,007	16,270	15,156	14,303
Lower Whitewater River [1]	172,000	172,000	172,000	172,000	160,000	150,000
Upper Whitewater River	203,912	213,037	209,503	210,530	198,713	181,233
Total groundwater pumped	392,227	402,788	398,510	398,800	373,869	345,536

Source: CVWD Engineer's Report on Water Supply and Replenishment Assessment 2010-2011 (CVWD, 2010a, 2010b, 2010c)

1 - Data represents both reported production and an estimate of unreported production.

Table 4-6
CVWD Historic Groundwater Production

UWMP Guidebook Table 18							
Groundwater — volume pumped (acre-feet)							
Basin name	Metered or Unmetered	2005	2006	2007	2008	2009	2010
Mission Creek	Metered	2,957	3,235	3,119	3,449	3,580	3,109
Lower Whitewater River	Metered	25,776	34,257	29,057	24,920	23,636	27,961
Upper Whitewater River	Metered	93,004	97,496	97,696	100,904	96,610	78,418
Total groundwater pumped		121,737	134,988	129,871	129,273	123,825	109,488
Groundwater as a percent of total urban water supply		100%	100%	100%	100%	100%	100%

Source: CVWD metered production data

Table 4-7 provides a projection of CVWD's future groundwater production by subbasin. These projections are based on urban water demand projections discussed in Section 3 minus offsets provided by Colorado River water. While groundwater currently makes up 100 percent of CVWD's total water supply, it is projected to constitute only 50 percent of total water supply by 2035. This is facilitated by significantly increased usage of both treated and untreated Colorado River water to offset urban water demands.

Table 4-7
CVWD Future Groundwater Production

UWMP Guidebook Table 19					
Groundwater — volume projected to be pumped (AFY)					
Basin name	2015	2020	2025	2030	2035
Mission Creek	5,000	6,000	6,900	7,100	7,700
Lower Whitewater River	33,200	31,100	30,100	28,400	19,500
Upper Whitewater River	80,500	88,500	92,900	98,000	101,500
Total groundwater pumped	118,700	125,600	129,900	133,500	128,700
Percent of total water supply	94.4%	80.5%	69.2%	63.0%	53.1%

4.2.2 Colorado River Water

Colorado River water has been a major source of supply for the Coachella Valley since 1949 with the completion of the Coachella Canal. This water is used for agricultural and non-urban purposes, as well as groundwater recharge. The Colorado River is managed and operated in accordance with the *Law of the River,* the collection of interstate compacts, federal and state legislation, various agreements and contracts, an international treaty, a U.S. Supreme Court decree, and federal administrative actions that govern the rights to use of Colorado River water within the seven Colorado River Basin states.

California's apportionment of Colorado River water is allocated by the 1931 *Seven Party Agreement* among Palo Verde Irrigation District (PVID), Imperial Irrigation District (IID), CVWD and Metropolitan. The three remaining parties - the City and the County of San Diego and the City of Los Angeles - are now served by Metropolitan. The allocations defined in the *Seven Party Agreement* are shown in **Table 4-8**.

California's Colorado River supply is protected by the 1968 Colorado River Basin Project Act (PL 90-537, 1968). This act provides that, in years of insufficient supply on the main stream of the Colorado River, supplies to the Central Arizona Project shall be reduced to zero before California will be reduced below 4.4 million AF in any year. This provision assures full supplies to the Coachella Valley except in periods of extreme drought.

The Coachella Canal (Canal) is a branch of the All-American Canal that brings Colorado River water into the Imperial and Coachella Valleys. Historically, CVWD received approximately 330,000 AFY of Priority 3A Colorado River water delivered via the Coachella Canal. The Canal originates at Drop 1 on the All-American Canal and extends approximately 122 miles, terminating in CVWD's Lake Cahuilla. The service area for Colorado River water delivery under CVWD's contract with Reclamation is defined as Improvement District No. 1 (ID-1) which encompasses most of the East Valley and a portion of the West Valley north of Interstate 10. Under the 1931 California Seven Party Agreement, CVWD has water rights to Colorado River water as part of the first 3.85 million AFY allocated to California. CVWD is in the third priority position along with IID.

Table 4-8
Priorities and Water Delivery Contracts
California Seven-Party Agreement of 1931

Priority	Description	AFY
1	Palo Verde Irrigation District gross area of 104,500 acres of valley lands	
2	Yuma Project (Reservation Division) not exceeding a gross area of 25,000 acres within California	
3(a)	Imperial Irrigation District, Coachella Valley Water District, and lands in Imperial and Coachella Valleys to be served by the All American Canal	3,850,000
3(b)	Palo Verde Irrigation District - 16,000 acres of mesa lands	
4	Metropolitan Water District of Southern California for use on coastal plain	550,000
	Subtotal – California's Basic Apportionment	4,400,000
5(a)	Metropolitan Water District of Southern California for use on coastal plain	550,000
5(b)	Metropolitan Water District of Southern California for use on coastal plain	112,000
6(a)	Imperial Irrigation District and lands in the Imperial and Coachella Valleys to be served by the All American Canal	300,000
6(b)	Palo Verde Irrigation District - 16,000 acres of mesa lands	
	Total	5,362,000[1]

1 – Priorities 5-6 would only receive water if there is water available in excess of the 7.5 MAFY available to the Lower Basin States or unused water within the Lower Basin.

4.2.2.1 Quantification Settlement Agreement

In 2003, CVWD, IID, Metropolitan and San Diego along with the state and federal governments successfully completed negotiation of the Quantification Settlement Agreement (QSA). The QSA quantifies the Colorado River water allocations of California's agricultural water contractors for the next 75 years and provides for the transfer of water between agencies. Under the QSA, CVWD has a base allotment of 330,000 AFY. In accordance with the QSA, CVWD has entered into water transfer agreements with Metropolitan and IID that increase CVWD supplies by an additional 129,000 AFY as shown in **Table 4-9** and **Figure 4-2**.

As of 2010, CVWD receives 368,000 AFY of Colorado River water deliveries under the QSA (Table 4-9). This includes the base entitlement of 330,000 AFY, Metropolitan/IID Approval of 20,000 AFY, 12,000 AFY of IID/CVWD First transfer, and 35,000 AFY of Metropolitan/SWP transfer. It also includes the 26,000 AFY transferred to San Diego County Water Authority (SDCWA) as part of the Coachella Canal lining project and the 3,000 AFY transfer to Indian Present Perfected Rights (PPRs). CVWD's allocation will increase to 459,000 AFY of Colorado River water by 2026 and remain at that level for the 75 year term of the QSA. After deducting conveyance and distribution losses, approximately 428,000 AFY will be available for CVWD use.

Table 4-9
CVWD Deliveries under the Quantification Settlement Agreement

Component	2010 Amount (AFY)	2035 Amount (AFY)
Base Entitlement	330,000	330,000
1988 Metropolitan/IID Approval Agreement	20,000	20,000
Coachella Canal Lining (to SDCWA)	-26,000	-26,000
To Miscellaneous/Indian PPRs	-3,000	-3,000
IID/CVWD First Transfer	12,000	50,000
IID/CVWD Second Transfer	0	53,000
Metropolitan/SWP Transfer	35,000	35,000
Total Diversion at Imperial Dam	368,000	459,000
Less Conveyance Losses [1]	-31,000	-31,000
Total Deliveries to CVWD	337,000	428,000

1 – Estimated total losses after completion of canal lining projects.

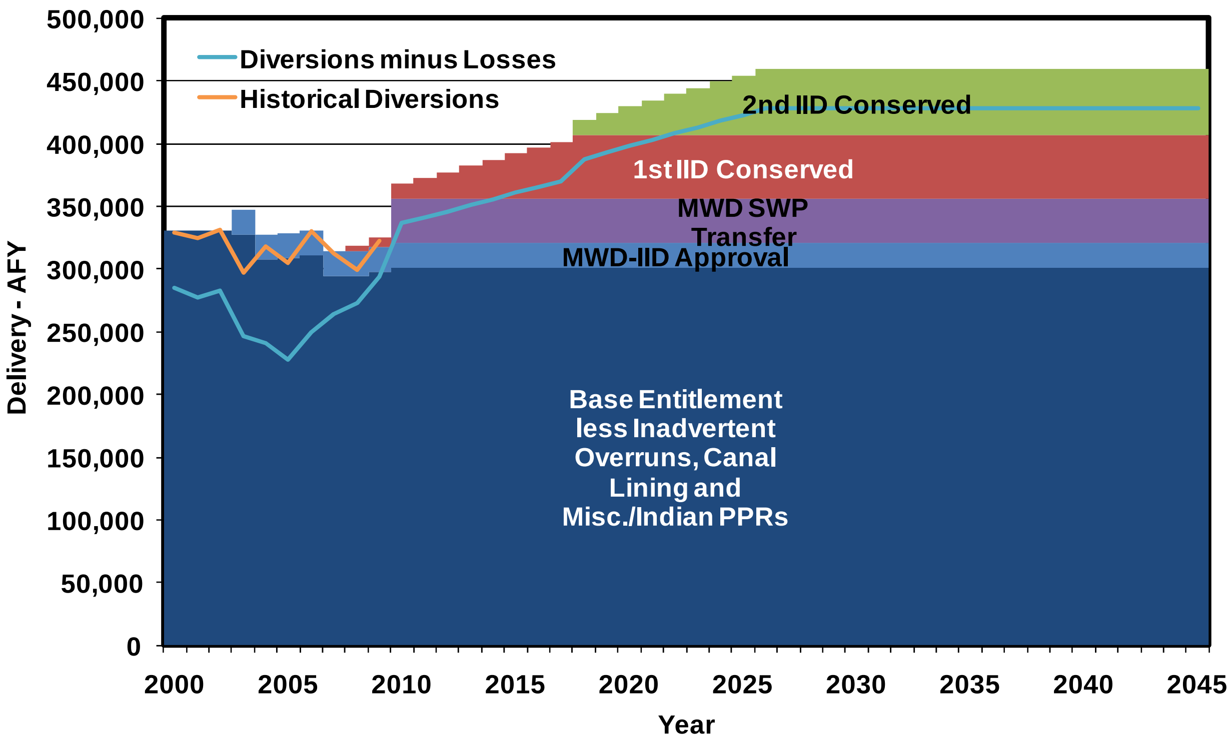


Figure 4-2
CVWD Colorado River Water Allocation Chart

4.2.3 State Water Project

To recharge groundwater supplies in the Upper Whitewater River and Mission Creek subbasins, CVWD and DWA obtain imported water supplies from the State Water Project (SWP). The SWP is managed by

DWR and includes 660 miles of aqueduct and conveyance facilities extending from Lake Oroville in northern California to Lake Perris in the south. The SWP has contracts to deliver 4.172 million AFY to 29 contracting agencies. DWA and CVWD initially contracted for water from the SWP in 1962 and 1963, respectively. CVWD's original SWP water allocation (Table A Amount[1]) was 23,100 AFY, while DWA's original SWP water allocation was 38,100 AFY. Each year, DWR determines the amount of water available for delivery to SWP contractors based on hydrology, reservoir storage, the requirements of water rights licenses and permits, water quality and environmental requirements for protected species in the Sacramento-San Joaquin Delta. The available supply is then allocated according to each SWP contractor's Table A Amount. Since the original allocation, both CVWD and DWA have obtained additional water transfers, which are discussed below. CVWD and DWA jointly manage their combined SWP Table A Amounts, allocating costs in proportion to total groundwater production within the Upper Whitewater and Mission Creek portions of their respective service areas,

There are no physical facilities to deliver SWP water to the Valley. CVWD's and DWA's Table A water is exchanged with Metropolitan for a like amount of Colorado River water from Metropolitan's Colorado River Aqueduct (CRA) that extends from Lake Havasu, through the Coachella Valley to Metropolitan's Lake Mathews. SWP Exchange water has been used to recharge the Upper Whitewater River Subbasin at the Whitewater Recharge Facility since 1973. Metropolitan, DWA and CVWD executed an advanced delivery agreement in 1985 that allowed Metropolitan to pre-deliver up to 600,000 AF of SWP water into the Coachella Valley. Metropolitan then has the option to deliver CVWD's SWP allocation either from the CRA or from water previously stored in the basin. This agreement was subsequently amended to increase the pre-delivery amount to a maximum of 800,000 AF. The amount of water that has been pre-delivered is accounted for annually and reported in the Engineer's Reports on Water Supply and Replenishment prepared by CVWD and DWA.

4.2.3.1 Metropolitan 100,000 AFY Transfer

Metropolitan historically has not made full use of its SWP Table A Amounts in normal and wet years. Under the 2003 Exchange Agreement, CVWD and DWA acquired 100,000 AFY of Metropolitan's SWP Table A water as a permanent transfer (CVWD-DWA-Metropolitan, 2003). The water is exchanged for Colorado River water and recharged at the existing Whitewater and Mission Creek Recharge Facilities. The transferred water may also be delivered from Metropolitan's Advance Delivery account. CVWD and DWA would assume all SWP costs associated with this water except as described below.

The terms of the 2003 agreement provide that CVWD receives 88,100 AFY and DWA receives 11,900 AFY of Metropolitan's SWP Table A water effective January 1, 2005. CVWD and DWA assume all capital costs associated with capacity in the California Aqueduct to transport this water and variable costs to deliver the water to Lake Perris. Metropolitan retains other rights associated with the transferred water including interruptible water service, carryover storage in San Luis Reservoir and

1 Each SWP contract contains a "Table A" exhibit which defines the maximum annual amount of water each contractor can receive excluding certain interruptible deliveries. Table A Amounts are used by DWR to allocate available SWP supplies and some of the SWP project costs among the contractors.

flexible storage at Castaic and Perris Reservoirs. Amendments to CVWD's SWP contract was executed in 2003 (DWR, 2003).

Metropolitan has the option to call back the water in years when needed. This option must be exercised no later than April 30 of each year. Metropolitan's callback options are to be exercised in two 50,000 AF blocks. To estimate the average supply from this transfer conservatively, the CVWMP assumes that Metropolitan would exercise its option to callback the 100,000 AFY in 4 wet years out of every 10 years. The actual frequency of callback would depend on the availability of Metropolitan's water supplies to meet its demands. Since 2003, Metropolitan has called back the water only in 2005.

4.2.3.2 Other SWP Transfers

In 2004, CVWD purchased an additional 9,900 AFY of SWP Table A water from the Tulare Lake Basin Water Storage District (Tulare Lake Basin) in Kings County (DWR, 2004). In 2007, CVWD made a second purchase of Table A SWP water from Tulare Lake Basin for 5,250 AFY (DWR, 2007). Also in 2007, a transfer was completed for 12,000 AFY of Table A Amounts from the Berrenda Mesa Water District in Kern County (DWR, 2007a). DWA participated in these latter two transfers in amounts of 1,750 AFY and 4,000 AFY, respectively. With these additional transfers, CVWD's total SWP Table A Amount is 138,350 AFY. **Table 4-10** summarizes CVWD's and DWA's total allocations of Table A SWP water.

Table 4-10
State Water Project Sources

Agency	Original SWP Table A	Tulare Lake Basin Transfer #1	Tulare Lake Basin Transfer #2	Metropolitan Transfer	Berrenda Mesa Transfer	Total
CVWD	23,100	9,900	5,250	88,100	12,000	138,350
DWA	38,100	0	1,750	11,900	4,000	55,750
Total	61,200	9,900	7,000	100,000	16,000	194,100

All values expressed in AFY.

Although CVWD and DWA have contracts for water amounts as shown on **Table 4-10**, the amount of water they are actually allocated in any given year is based on the amount of SWP water available. For 2010, the allocation was 50% of the total contracted amount. A more detailed discussion on SWP reliability is provided in Section 5.

4.3 Transfer Opportunities

Water transfers involve the temporary or permanent sale or lease of a water right or contractual water supply between willing parties. Water can be made available for transfer from other parties through a variety of mechanisms:

- Transferring surface water from storage that would have otherwise carried over to the following years
- Pumping groundwater instead of surface water delivery and transferring the surface water

- Transferring previously stored groundwater either by direct pumping or exchange for surface water
- Reducing consumptive use through crop idling/shifting or implementing water use efficiency measures
- Reducing return flows or conveyance losses

The water made available from these mechanisms would then be delivered through existing facilities such as the SWP.

The ability to successfully execute a water transfer depends upon a number of factors including:

- Water rights (pre- vs. post-1914 rights) and place of use requirements
- Regulatory approval (SWRCB, DWR, Reclamation)
- Ability to convey the transferred water
- Delta carriage water[2] and conveyance losses
- Environmental impacts (CEQA/NEPA compliance)
- Third-party impacts
- Supply reliability
- Cost

Potential sources of water transfers include the Sacramento Valley and the San Joaquin Valley. DWR and Reclamation typically limit water transfers involving crop idling to no more than 20 percent of the total agricultural land in a county to minimize economic impacts. Potential transfer opportunities are described below.

4.3.1 Imported Water Acquisitions

CVWD, DWA and the City of Indio (IWA) are considering the acquisition of additional imported water supply to augment existing supplies. However, specific plans for these acquisitions have not yet been identified. Congruous with the CVWD WMP 2010 Update, it is assumed that up to 50,000 AFY of additional water supplies could be acquired through either long-term leases or entitlement purchase from willing parties. Potential sources might include the Delta Wetlands Project which would store surplus water at two Delta islands for later delivery, Sacramento Valley irrigation water transfers or purchase of additional Table A water from other SWP contractors.

[2] Delta carriage water is the extra water needed to carry a unit of water through the Delta to the SWP or CVP pumping plants while maintaining Delta water quality. Carriage losses range from 0 to 25 percent depending on hydrologic conditions.

Table 4-11
Transfer and Exchange Opportunities

UWMP Guidebook Table 20			
Transfer and exchange opportunities			
Transfer agency	Transfer or exchange	Short term or long term	Proposed Volume (AFY)
Delta Wetlands Project	Transfer	Long Term	50,000

4.3.2 Other Water Exchange and Transfer Opportunities

Other potential water transfers and exchanges could include development of a new source of water elsewhere in the region or State that could be used in lieu of an existing supply. The existing supply would then be transferred to the Coachella Valley and delivered via the SWP, Metropolitan's Colorado River Aqueduct or the Coachella Canal. As an example, CVWD could pay the capital and operations cost to develop and install a drain water treatment facility in Central California that allowed a local water district that currently uses SWP or CVP water to reuse the drain water instead for irrigation. The local district's SWP or CVP water would be delivered to CVWD via the SWP aqueduct. Contractually, the local district's water would continue to be used locally while the reclaimed drain water would be transferred to CVWD. Conveyance would likely be on an "as-available" capacity basis, meaning that the water could be transferred only when sufficient SWP aqueduct capacity is available. This operational limitation might require some type of storage agreement in addition to development and exchange agreements.

Another option would be to pay for the installation of water conservation devices (such as drip irrigation, tailwater pumpback systems or urban conservation) or recycled water delivery systems at a local water district in central or northern California in exchange for their transferring the saved water to CVWD.

At this point, no specific transfer projects have been identified that follow this model.

4.4 Desalinated Water Opportunities

CVWD anticipates the future use of desalinated water as part of its water supply portfolio. Opportunities include desalinating local agricultural drain water and acquisition of desalinated ocean water through a water exchange.

4.4.1 Desalinated Drain Water

CVWD plans to use treated agricultural drainage water for irrigation purposes. The 2002 WMP recommended that a drain water desalination facility commence operation between 2010 and 2015 with a 4,000 AFY facility. The facility would be expanded to 11,000 AFY by 2025. Product water would be delivered to the Canal distribution system for non-potable use. This supply would offset groundwater pumping in the basin. The CVWMP reassessed the need for desalinated drain water in light of reduced SWP reliability as a result of environmental and regulatory issues in the Delta. To preserve future supply flexibility, CVWD is evaluating development of up to 85,000 AFY of desalinated drain water by 2045.

A brackish groundwater treatment pilot study and feasibility study was completed in 2008 (Malcolm-Pirnie, 2008a and 2008b). A variety of treatment technologies, brine management approaches and source water supply combinations were compared and assessed over a range of treatment capacities. The treatment alternatives compared reverse osmosis (RO) with dew evaporation, and RO was the chosen technology. Source water supply options consist of the collection of agricultural drainage water at select outfall locations and the installation of a well field to extract shallow groundwater in the upper part of the aquifer, which consists mostly of agricultural runoff water.

The 2008 study recommended a combined source water strategy involving wells and direct connection to the open drain outfalls. Such a combined approach will provide additional flexibility and reliability to this new water supply. The study also developed a detailed evaluation of performance and cost of the two technologies, and RO was the recommended treatment technology to meet the current water quality goals and provide additional flexibility in the level of water quality produced should the facility's objectives change in the future. After a similar evaluation of brine management strategies, the recommended approach was to convey the RO concentrate via pipeline to constructed wetlands located at the north shore of the Salton Sea. This approach takes advantage of the water quality characteristics of the RO concentrate to generate and sustain a new saline wetlands habitat. This study concluded that agricultural drainage water can effectively be treated for reuse as non-potable water and potentially as new potable water (CVWD, 2010f).

The amount of drain water that would be treated and recycled depends on supply availability (the amount of drain flow occurring), the overall supply mix (the amount of additional water needed), and the cost of treatment and brine disposal.

Treated drain water could be delivered to the Canal water distribution system and used as a non-potable supply for agricultural, golf course and landscape irrigation and potentially for potable water supply. Since the desalinated drain water is local water, it could be used anywhere within the CVWD service area. This could provide opportunities to deliver the water to users outside the Colorado River service area (ID-1) including the West Valley through a Colorado River water exchange. Such an exchange would involve delivering the treated water to existing Colorado River users in exchange for using an equal amount of Colorado River water elsewhere in the District. This exchange could allow desalinated drain water to be used for recharge at Whitewater or other locations via exchange for Colorado River water. The quality of desalinated drain water exchanged for Colorado River water would be the same as the existing SWP Exchange water.

4.4.2 Desalinated Ocean Water

Coastal communities in southern California are conducting feasibility studies and developing plans to desalinate ocean water as a water supply source. A 50 mgd capacity ocean water desalination in Carlsbad, California has received final approval and is expected to be operational in late 2012, providing water for San Diego County (Poseidon, 2010). This source offers the potential for essentially unlimited water supply. However, desalinating ocean water has relatively high costs due to the energy required to operate reverse osmosis facilities and potential environmental impacts associated with seawater intakes supplying the plant and disposal of brine.

Since the Coachella Valley is located a significant distance from the ocean, desalinated ocean water would need to be exchanged with an imported water source (SWP or Colorado River water) for delivery to the Valley. The amount of water that could be developed through ocean water desalination and exchange is likely to be limited by economics of the physical capacity to deliver desalinated ocean water into the coastal water delivery systems and water quality. Conveyance limitations may require that participation in multiple desalination projects be undertaken. Based on these uncertainties and costs, ocean water desalination is not part of CVWD's current water supply portfolio.

4.5 Recycled Water Opportunities

Recycled water is a significant potential local resource that can be used to supplement the water supply of the Coachella Valley. Wastewater that has been highly treated and disinfected can be reused for landscape irrigation and other purposes; however, treated wastewater is not suitable for direct potable use. Recycled wastewater has been used for irrigation of golf courses and municipal landscaping in the Coachella Valley since 1968.

The existing recycled water customers, which are golf courses, are not part of CVWD's urban water potable system, but rather private groundwater producers that purchase recycled water. It is expected that golf course irrigation will remain the largest use of recycled water in the future. Although CVWD's urban water demand is not offset by recycled water use, the Coachella Valley's water supply is indirectly increased by taking private producers off groundwater and using recycled water.

4.5.1 Existing Wastewater System

CVWD provides wastewater collection and treatment services for all or a part of the cities of Cathedral City, Indian Wells, La Quinta, Palm Desert, and Rancho Mirage. By agreement, a small portion of flow from DWA's service area is sent to CVWD's system.

4.5.1.1 Wastewater Collection System

CVWD's wastewater collection system consists of approximately 1,100 miles of 6-inch through 36-inch diameter sewers, and includes 35 sewage lift stations and associated force mains. The system contains trunk sewers, generally 10-inches in diameter and larger, that convey the collected wastewater flows to the District's treatment facilities (Carollo, 2009).

4.5.1.2 Wastewater Reclamation Plants

CVWD operates six water reclamation plants (WRPs), three of which (WRP-7, WRP-9 and WRP-10) generate recycled water for irrigation of golf courses and large landscaped areas. WRP-4 became operational in 1986 and serves communities from La Quinta to Mecca. WRP-4 effluent is not currently recycled; however, it will be recycled in the future when the demand for recycled water develops and tertiary treatment is constructed. The existing and projected baseline amounts of recycled water (without additional indoor residential water conservation) available from these plants are presented in **Table 4-12.** Brief descriptions of CVWD's wastewater facilities are presented below.

Table 4-12
Historical and Future Wastewater Flow

Wastewater Treatment Plant	Wastewater Flow (AFY)						
	2005	2010	2015	2020	2025	2030	2035
CVWD WRP-1	40	43	45	47	49	52	54
CVWD WRP -2	22	24	25	26	27	28	29
CVWD WRP-4	5,055	6,162	8,148	11,783	16,783	20,597	25,237
CVWD WRP-7	2,411	3,264	3,946	5,403	5,882	6,758	7,569
CVWD WRP-9	335	335	335	335	335	335	335
CVWD WRP-10	12,290	13,106	14,049	15,043	15,912	16,461	16,870
Total	20,153	22,934	26,548	32,637	38,988	44,231	50,094

4.5.1.3 WRP-1

WRP-1 serves the Bombay Beach community near the Salton Sea. WRP-1 has a design capacity of 150,000 gallons per day (gpd) and consists of two mechanically-aerated concrete-lined oxidation basins, two unlined stabilization basins, and six evaporation-infiltration basins. Currently all of the effluent from this facility is disposed by evaporation-infiltration. CVWD has no plans to recycle effluent from this facility because of the low flow and lack of potential uses near the plant.

4.5.1.4 WRP-2

WRP-2 serves the nearby North Shore community housing. WRP-2 has two types of treatment facilities: an activated sludge treatment plant capable of providing secondary treatment to a maximum of 180,000 gpd, and an oxidation treatment basin having a design treatment capacity of 33,000 gpd. The oxidation treatment basin is mechanically aerated and is lined with a single synthetic liner. The activated sludge treatment plant is used only when the maximum daily flow exceeds 33,000 gpd, otherwise the oxidation basin is used for treatment. WRP-2 is currently discharging an average of 18,000 gpd of treated secondary effluent into four evaporation-infiltration basins for final disposal. CVWD has no plans to recycle effluent from this facility because of the low flow and lack of potential uses near the plant.

4.5.1.5 WRP-4

CVWD's WRP-4 is a 9.9 million gallons per day (mgd) capacity treatment facility located in Thermal. WRP-4 provides secondary treatment consisting of pre-aeration ponds, aeration lagoons, polishing ponds, and disinfection. The treated effluent is discharged to the CVSC pursuant to a National Pollution Discharge Elimination System (NPDES) permit. The annual average flow to the facility is approximately 4.75 mgd (5,300 AFY). Effluent from WRP-4 is not currently suitable for water recycling due to the lack of tertiary treatment. However, CVWD plans to add tertiary treatment and reuse effluent from this plant in the future as development occurs.

4.5.1.6 WRP-7

WRP-7 is located in north Indio. The plant is a 5.0 mgd secondary treatment facility with a current tertiary treatment capacity of 2.5 mgd. The tertiary treated wastewater is used for irrigation of golf courses in the Sun City area. The average annual flow in 2010 is estimated to be 3 mgd (3,300 AFY). The plant consists of aeration basins, circular clarifiers, polishing ponds and filtration. Recycled water not used for irrigation is percolated at on-site and off-site percolation ponds. A plant expansion is currently under design that will increase the plant capacity to 7.5 mgd.

4.5.1.7 WRP-9

WRP-9 is located in Palm Desert. WRP-9 treats approximately 0.33 mgd (370 AFY) of wastewater from the residential development surrounding the Palm Desert Country Club. The WRP consists of the following treatment units: a grit chamber, aeration tanks, secondary clarifiers, chlorine contact chamber, aerobic digester and two infiltration basins. One basin is lined for storage of treated wastewater. Raw wastewater in excess of the design capacity is pumped to WRP-10 for treatment. Secondary effluent from WRP-9 is used to irrigate a portion of the Palm Desert Country Club golf course. During winter months when demand is low, effluent that cannot be recycled is disposed to the infiltration basins.

4.5.1.8 WRP-10

WRP-10 is located in Palm Desert. WRP-10 consists of an activated sludge treatment plant, a tertiary wastewater treatment plant, a lined holding basin, 6 storage basins and 21 infiltration basins.

The combined secondary wastewater treatment design capacity of the WRP is 18 mgd. WRP-10 treats an annual average daily flow of 10.8 mgd from the activated sludge plant. Approximately 60 percent of this plant's effluent receives tertiary treatment for reuse and is delivered to customers through an existing recycled water distribution system. The remaining secondary effluent is piped to a holding basin and/or the 6 storage basins, and then to the 21 infiltration basins for final disposal.

Most secondary effluent receives tertiary treatment and is used for irrigation of local golf courses. Since 2009, CVWD blends tertiary effluent with Canal water provided by the Mid-Valley Pipeline (MVP) for distribution to golf courses. CVWD plans to expand the non-potable water delivery system in the future.

4.5.2 Recycled Water Usage

Historical and projected recycled water production is presented in **Table 4-13**. For a point of comparison, the first row of this table provides the total wastewater flow generated for that year. Recycled water production is expected to increase to meet future non-potable water demands such as landscape irrigation, golf course irrigation, and agricultural irrigation. Most of this demand is not considered part of CVWD's urban water system, since they do not currently buy water from the agency's domestic potable supply. Recycled water production as a share of wastewater generation will increase from 28 percent in 2005 to 79 percent in 2035. This relationship is shown graphically on **Figure 4-3**.

Table 4-13
Historical and Future Recycled Water Production

UWMP Guidebook Table 21							
Recycled water — wastewater collection and treatment (AFY)							
Year	2005	2010	2015	2020	2025	2030	2035
Wastewater collected & treated in service area	20,154	20,380	23,360	25,860	30,940	35,130	39,820
Recycled water production by treatment plant (AFY)							
CVWD WRP-1	0	0	0	0	0	0	0
CVWD WRP-2	0	s0	0	0	0	0	0
CVWD WRP-4	0	0	1,760	3,930	7,930	10,980	14,690
CVWD WRP-7	1,759	2,128	2,990	3,670	4,000	4,600	5,150
CVWD WRP-9	182	130	300	300	300	300	300
CVWD WRP-10	4,761	7,510	7,810	10,000	10,590	10,970	11,240
Volume that meets recycled water standard	6,702	9,768	12,860	17,900	22,820	26,850	31,380

Source: CVWD 2009 Sewer Master Plan (adjusted for future conservation)

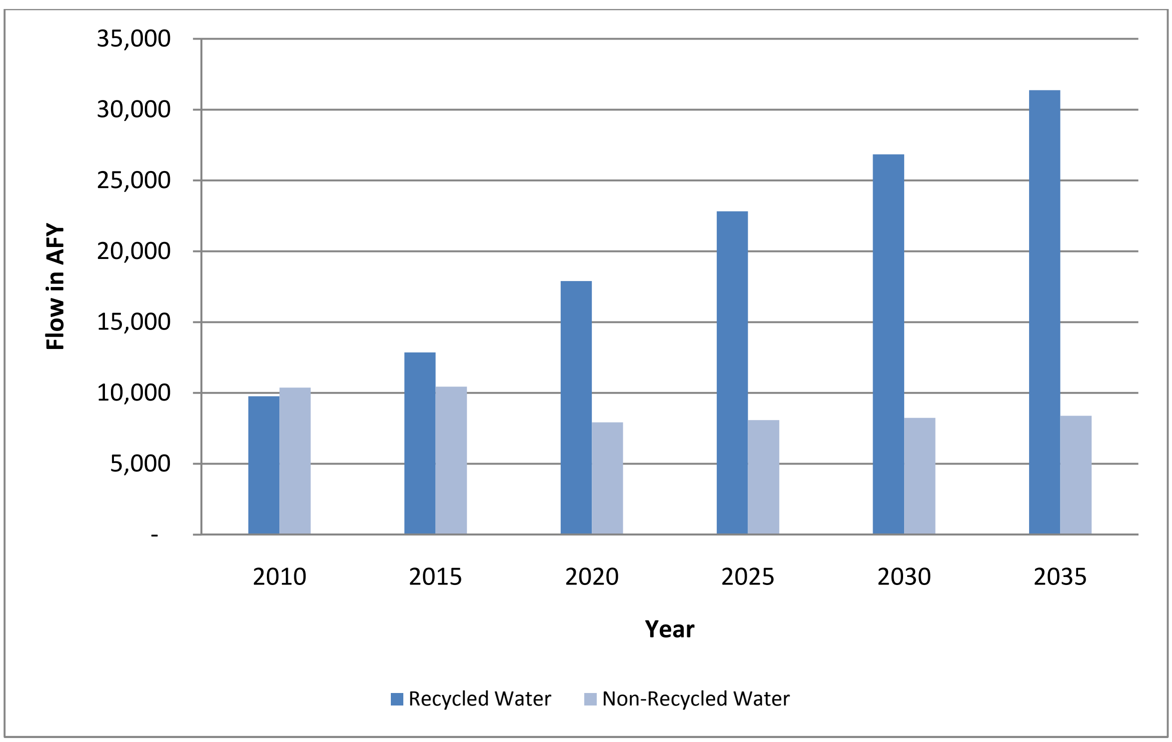


Figure 4-3
Recycled Water Production

Wastewater that is not utilized for recycled water production is expected to be disposed via percolation ponds or discharge to the Coachella Valley Stormwater Channel. **Table 4-14** indicates how each wastewater treatment plant disposes of its non-recycled wastewater, and presents non-recycled wastewater projections through 2035.

Recycled water production is mainly limited by the existing infrastructure not being able to reach potential customers. As described later in the section discussing future recycled water plans, there are several options available to CVWD to providing the required infrastructure to deliver recycled water to more customers in the Coachella Valley.

Table 4-14
Future Non-recycled Wastewater Disposal

UWMP Guidebook Table 22								
Recycled water — non-recycled wastewater disposal								
Method of disposal	Treatment Plants	Treatment Level	2010	2015	2020	2025	2030	2035
Discharge to Coachella Valley Stormwater Channel	WRP-4	Secondary	6,050	5,500	5,500	5,500	5,500	5,500
Percolation ponds	WRP-7	Secondary	638	530	650	710	810	900
Percolation ponds	WRP-10	Secondary	3,691	4,410	1,770	1,870	1,930	1,990
		Total	10,379	10,440	7,920	8,080	8,240	8,390

Table 4-15 provides the current and projected future uses of recycled water. Irrigation of agricultural, urban landscape and golf course lands comprise the current and future recycled water demand. Agricultural irrigation is expected to significantly increase around 2025 when WRP-4 is upgraded, which will allow adjacent agricultural lands to be irrigated with recycled water. Urban landscape irrigation usage is expected to remain constant in the future. This demand is expected to be met with non-potable Colorado River water instead. Golf course irrigation is expected to increase steadily from 12,048 AFY in 2010 to 39,645 AFY in 2035. All of these uses are technically and economically feasible due to the existing infrastructure and high demand for non-potable water.

Table 4-15
Recycled Water Future Uses

UWMP Guidebook Table 23								
Recycled water — potential future use (AFY)								
User type	Description	Feasibility	2010	2015	2020	2025	2030	2035
Agricultural irrigation	Crop irrigation	High	0	0	0	4,800	5,000	5,000
Landscape irrigation	Irrigation of large urban landscapes	High	532	530	530	530	530	530
Golf course irrigation	Irrigation of golf course landscape	High	7,850	12,330	17,370	17,490	21,310	25,850
		Total	8,380	12,860	17,900	22,820	26,840	31,380

Table 4-16 presents the recycled water use in 2010 in comparison to the projected 2010 usage from the 2005 Urban Water Management Plan. The actual usage was less than the 2005 projections across the board. Much of this difference can be attributed to less than projected non-potable water demand

as shown in **Table 4-17** and infrastructure projects being installed at later dates than projected in 2005. Water demands are discussed in Section 3.

4.5.3 Recycled Water Customer Incentives

The guiding policy for the use of recycled water is defined in the California Water Code. Chapter 7 Article 1 of the Porter-Cologne Act is known as the "Water Recycling Law", and states, in part,

> "The legislature finds and declares that a substantial portion of the future water requirements of this state may be economically met by beneficial use of recycled water. The legislature further finds and declares that the utilization of recycling water by local communities for domestic, agriculture, industrial, recreational, and fish and wildlife purposes will contribute to the peace, health, safety, and welfare of the people of the state. Use of recycled water constitutes the development of "new basic water supplies"…

Table 4-16
2010 Actual vs. Projected Recycled Water Use

UWMP Guidebook Table 24		
Recycled water — 2005 UWMP use projection compared to 2010 actual (AFY)		
Use type	2010 Actual Use	2005 Projection for 2010
Agricultural irrigation	0	0
Landscape irrigation	721	2,000
Golf course irrigation	9,047	21,100
Total	9,768	23,100

Table 4-17
2010 Actual vs. Projected Non-Potable Water Use

Source	2010 Actual Use	2005 Projection for 2010
Recycled Water	9,768	23,100
SWP Exchange Water	0	17,400
Colorado River Water	288,562	306,200
Desalinated Agricultural Drainage	0	4,000
Total	298,330	350,700

Section 13550 of the Water Recycling Law states that potable domestic water use for non-potable demands is "a waste of water if recycled water is of adequate quality and is available for these (non-potable) uses and can be furnished at a reasonable cost to the user." In addition, recycled water could also be used if it "is not detrimental to public health and will not adversely affect downstream water rights, degrade water quality, and is not injurious to plant life, fish, and wildlife." Water quality and health effects pose concerns to the public in regards to the use of this source. However, regulations and guidelines for recycled water have been established by the California Department of Health Services (DHS) and are published in the Code of California Regulations - Title 22. These regulations and guidelines provide water utilities with requirements for treatment, water quality and reliability of the recycled water before public use.

CVWD has long encouraged the use of recycled water for irrigation purposes. In 2006, CVWD sponsored SB 1557 that was adopted by the California Legislature as Part 8.2 (CWC §32600-32603) of the County Water District Law. This law applies only to CVWD and specifies that the use of potable domestic water for "non-potable uses for cemeteries, parks, highway landscaped areas, new industrial facilities, and golf course irrigation is a waste and an unreasonable use." The law mandates the use of non-potable water (including recycled water) for cemeteries, parks, highway landscaped areas, new industrial facilities, and golf course irrigation provided:

1. The CVWD Board determines that the source of non-potable water is of adequate quality for the proposed use and is available for that use.
2. The CVWD Board determines that the non-potable water may be furnished for the proposed use at a reasonable cost to the user.
3. The State Department of Public Health determines that the use of non-potable water from the proposed source will not be detrimental to public health.
4. The California Regional Water Quality Control Board determines that the use of non-potable water from the proposed source will comply with any applicable water quality control plan.
5. The CVWD Board determines that the use of non-potable water for the proposed use will not adversely affect groundwater rights, will not degrade water quality, and is determined not to be injurious to plant life, fish, and wildlife.

CVWD intends to use this law to encourage the use of both recycled water and Coachella Canal water for non-potable uses. In 2009, CVWD developed a standardized non-potable water use contract that mandates at least 80 percent of the demand by met with non-potable water. As part of the non-potable water use contract, CVWD establishes the price of non-potable water at 85 percent of the cost of groundwater pumping and the applicable replenishment assessment. The agreement also specifies a 50 percent "conservation charge" for any non-potable water use below 80 percent of demand. This provides a financial incentive…

Where practical, CVWD requires new developments to use recycled or non-potable water as a condition of receiving domestic and sanitation services from CVWD. The developments will then use the recycled or non-potable water as it becomes available. CVWD also has a policy of requiring that new golf courses either use recycled water or canal water where it is available. CVWD is committed to maximizing the use of non-potable water for non-potable uses by investing in infrastructure improvements as discussed previously. **Table 4-18** provides projected recycled water use as a result of financial incentives and improvements to treatment plants and conveyance facilities.

Table 4-18
Projected Recycled Water Use by Method

UWMP Guidebook Table 25						
Methods to encourage recycled water use						
Actions	Projected Results (AFY)					
	2010	2015	2020	2025	2030	2035
Financial incentives	8,380	10,238	12,428	13,018	13,388	13,668
Construction of tertiary treatment, plant expansion, and conveyance facilities	0	2,622	5,472	9,802	13,452	17,712
Total	8,380	12,860	17,900	22,820	26,840	31,380

4.5.4 Recycled Water Plan

The approach to reuse implementation will depend on the location of the wastewater discharges in the Valley. In 2010, CVWD developed a new non-potable water use agreement that requires golf courses with access to Canal or recycled water to meet at least 80 percent of their irrigation demand from that source (CVWD, 2010).

West Valley: In the West Valley, all treated municipal wastewater is either reused for irrigation uses or percolated for disposal. No treated wastewater is discharged to surface waters. When reused, the recycled water offsets groundwater pumping by golf courses and other large landscape irrigators. Wastewater that is not recycled is disposed to percolation-evaporation ponds where most of the percolated water enters the groundwater basin. This typically occurs during the winter months when irrigation demands and evaporation losses are low. Consequently, from a groundwater balance point of view, there is little difference between recycling the water for irrigation and disposal by percolation in the West Valley. However, from a water quality point of view, treated wastewater contains nutrients like nitrogen that can adversely affect groundwater quality. When the water is recycled for irrigation uses, much of the nutrients are taken up by the plants and turf reducing the need for fertilizer. Thus, reuse provides a water quality benefit.

One issue in the West Valley is that the demand for non-potable water typically exceeds the available supply, especially in the summer months. Irrigators using recycled water currently must supplement that supply with local groundwater to meet their peak summer demands. This limits the amount of overdraft reduction that is possible to the available recycled water supply.

In 2008, CVWD completed the initial phase of the Mid-Valley Pipeline (MVP) project to convey Canal water to WRP-10 where it is blended with recycled water for delivery to golf courses and other large urban irrigators. Eventually, the delivery system will be expanded to serve additional golf courses and significantly reduce their groundwater use.

CVWD also supplements the recycled supply from WRP-7 with Coachella Canal water. For the West Valley, a planning target of recycling 90 percent of the available treated wastewater has been established. Where feasible, recycled water would be supplemented with available imported water sources to reduce pumping by large landscape irrigators.

East Valley: Currently, in the East Valley, there is no recycled water use from CVWD wastewater plants. Wastewater produced from CVWD's WRP-4 is discharged into the CVSC, pursuant to a NPDES permit issued by the Colorado River Regional Water Quality Control Board (Regional Board). Effluent at CVWD WRP-1 and CVWD WRP-2 is disposed to evaporation-infiltration ponds under Regional Board-issued waste discharge permits. As growth occurs in the East Valley, significantly more wastewater will be generated and will require treatment. This represents a significant resource that could be used to offset current and future groundwater pumping.

Two options have been identified to define the range of possible reuse options for the East Valley. Option 1 would involve recycling all wastewater generated by future growth in the East Valley. However, any existing wastewater discharges to the CVSC would continue to maintain flows that support riparian and marsh habitat in the CVSC and at the mouth of the Salton Sea. Option 1 is expected to generate about 37,000 AFY of additional water supply by 2045. Option 2 would involve a "zero discharge" approach where all treated wastewater is reused. This option would eliminate all municipal wastewater discharges to the CVSC but would provide additional water supply benefits. Option 2 could generate about 53,000 AFY of additional water supply in the East Valley; however, there may be an adverse impact on habitat in the CVSC and at the mouth of the Salton Sea. A benefit of Option 2 is that treatment requirements for non-potable water reuse are likely to be less stringent than future regulatory requirements for surface water discharges.

CVWD will be developing a non-potable water master plan in the next five years, which will further evaluate recycling options in the East Valley and recommend projects for optimizing the use of recycled water in the East Valley.

4.6 Future Water Projects

CVWD recognizes the need to obtain additional water supplies to meet projected water demands and help eliminate groundwater overdraft. As described previously, the agency plans to provide both treated and untreated Colorado River water, and desalinated agricultural drain water directly to its urban water distribution system. CVWD will need to construct both conveyance and treatment facilities in order to make this happen. It is anticipated that the urban water distribution system will begin to receive Colorado River water by 2015. The capacity of the Colorado River treatment system will gradually increase over time as demand increases and more infrastructure is developed. As mentioned previously Colorado River water is a relatively reliable source of water for CVWD due to the agency's high allocation priority under the *Seven Party Agreement*.

Table 4-19 provides a summary of future water supply projects. Historically, CVWD has never had its Colorado River allocation reduced due to drought conditions because of the agency's high allocation priority. Hence, it is assumed that the agency's Colorado River supply will not be reduced in single-dry or multiple-dry years in the future. Desalinated agricultural drain water is also assumed to not be reduced in single-dry or multiple-dry years since agricultural water is also sourced from groundwater and Colorado River water.

In addition to this treatment and conveyance project, CVWD is also investigating several other programs to obtain additional supply from the Colorado River and the SWP. CVWD is also investigating feasibility of some local projects. These programs are described below.

4.6.1 Desalinated Drain Water

CVWD plans to use treated agricultural drainage water for irrigation purposes. The 2002 WMP recommended that a drain water desalination facility commence operation between 2010 and 2015 with a 4,000 AFY facility. The facility capacity would be expanded to 11,000 AFY by 2025. Product water would be delivered to the Canal distribution system for non-potable use.

A brackish groundwater treatment pilot study and feasibility study was completed in 2008. A variety of treatment technologies, brine management approaches and source water supply combinations were compared and assessed over a range of treatment capacities. The treatment alternatives compared reverse osmosis (RO) with dew evaporation, and RO was the chosen technology. Source water supply options consist of the collection of agricultural drainage water at select outfall locations and the installation of a well field to extract groundwater in the upper part of the aquifer influencing the agricultural runoff water.

Table 4-19
Future Water Supply Projects Summary

UWMP Guidebook Table 26								
Future water supply projects								
Project name	Projected start date	Projected completion date	Potential project constraints [2]	Normal-year supply	Single-dry year supply [3]	Multiple-dry year first year supply [3]	Multiple-dry year second year supply [3]	Multiple-dry year third year supply [3]
Colorado River water for East Valley - Treated	2015	2035	None	49,100	49,100	49,100	49,100	49,100
Colorado River water for East Valley - Untreated	2015	2035	None	54,800	54,800	54,800	54,800	54,800
Desalinated agricultural drain water	2031	2045	Available drain water & treatment cost	10,000	10,000	10,000	10,000	10,000
Total				113,900	113,900	113,900	113,900	113,900

Notes:

1) Water supply units are in acre-feet.
2) Water supply by 2035.
3) Colorado River water supply is not reduced in single-dry and multiple-dry years due to CVWD's high priority allocation.

Figure 4-4
Drain Water Desalination Pilot Facility

The amount of drain water that would be treated and recycled depends on supply availability (the amount of drain flow occurring), the overall supply mix (the amount of additional water needed), and the cost of treatment and brine disposal. CVWD's CVWMP considers up to 10,000 AFY of desalinated drain water by the year 2035 for urban use.

4.6.2 Future Non-Urban Water Supplies

4.6.2.1 Reduced Canal Losses

The potential may also exist to deliver additional Colorado River water by further reducing canal and distribution system conveyance losses. Current conveyance losses are estimated to be approximately 31,000 AFY.

CVWD could potentially obtain additional water by reducing its allocated losses in the All-American Canal and the first reach of the Coachella Canal. If these losses could be reduced cost-effectively, potentially as much as 10,000 AFY of additional supply may be available to CVWD.

4.6.2.2 Additional SWP Exchange Water

The SWP faces many challenges including the on-going drought, risk of Delta levee failure, legal and regulatory restrictions on exports due to environmental degradation, water quality degradation and climate change. In the absence of definitive measures to resolve these challenges, SWP reliability is likely to continue declining. The current average SWP reliability is 60 percent of the Table A Amounts consistent with DWR's 2009 SWP Delivery Reliability Report. In order to increase the amount of recharge at Whitewater Spreading Facility, additional SWP Exchange water, improved SWP reliability or other supplies will be required.

As a best case, if the Bay Delta Conservation Plan (BDCP) and Delta Habitat Conservation and Conveyance Program (DHCCP) in conjunction with the water bond issue are successfully implemented, SWP reliability would be restored to 77 percent of Table A Amounts based on the 2005 SWP Delivery Reliability Report and is consistent with Metropolitan's planning (Metropolitan, 2010). Delta conveyance improvements are expected to begin operations by 2023 with full operations by 2026. Under this assumption and based on its existing Table A Amounts and Metropolitan call-backs, CVWD and DWA could potentially increase their average annual SWP deliveries by about 39,000 AFY. Of this incremental amount, up to 85 percent (32,600 AFY) would be allocated for use in the Whitewater River Subbasin with the balance used for recharge in the Mission Creek Subbasin.

SECTION 5 WATER SUPPLY RELIABILITY AND WATER STORAGE CONTINGENCY PLANNING

This section describes the reliability of CVWD's urban water supplies. A water shortage contingency plan and a drought contingency plan are also provided. The laws governing the content of this section are provided below.

5.1 Law

California Water Code Section 10620, Paragraph (f)

(f) An urban water supplier shall describe in the plan water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions.

California Water Code Section 10631, Paragraph (c)

(c) For any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climatic factors, describe plans to supplement or replace that source with alternative sources or water demand management measures, to the extent practicable.

California Water Code Section 10632

(a) The plan shall provide an urban water shortage contingency analysis that includes each of the following elements that are within the authority of the urban water supplier:

(1) Stages of action to be undertaken by the urban water supplier in response to water supply shortages, including up to a 50 percent reduction in water supply, and an outline of specific water supply conditions that are applicable to each stage.

(2) An estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply.

(3) Actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster.

(4) Additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning.

(5) Consumption reduction methods in the most restrictive stages.

Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply.

(6) Penalties or charges for excessive use, where applicable.

(7) An analysis of the impacts of each of the actions and conditions described in paragraphs (1) to (6), inclusive, on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments.

(8) A draft water shortage contingency resolution or ordinance.

(9) A mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.

(b) Commencing with the urban water management plan update due December 31, 2015, for purposes of developing the water shortage contingency analysis pursuant to subdivision (a), the urban water supplier shall analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas, as defined in subdivision (a) of Section 115921 of the Health and Safety Code.

California Water Code Section 10634

The plan shall include information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments as described in subdivision (a) of Section 10631, and the manner in which water quality affects water management strategies and supply reliability.

California Water Code Section 10635, Paragraph (a)

(a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and multiple dry water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.

5.2 Water Supply Reliability

As described in Section 4, CVWD's only direct source of urban potable water is local groundwater. With regional management of the groundwater basin, overdraft of the basin is expected to be managed satisfactorily and water supply reliability is expected to be good. There are reliability concerns, however, with CVWD's supplies of Colorado River and SWP water. These supplies are currently used for groundwater replenishment and non-potable uses; Colorado River water is expected to be used for treated and untreated urban use in the future. A summary of the factors affecting each water supply is provided in **Table 5-1**. A discussion of these issues is provided below for each source.

Table 5-1
Supply Reliability Factors

UWMP Guidebook Table 29						
	Factors resulting in inconsistency of supply					
Water supply sources	Limitation quantification	Legal	Environmental	Water quality	Climatic	Additional information
Groundwater	None					Basin is currently in overdraft; water management plan in place to manage overdraft.
Colorado River	None expected	X	X		X	Not a currently direct urban water source
State Water Project	50% of allocation	X	X		X	Not a direct urban water source

5.2.1 Groundwater

As described in Section 4, CVWD pumps groundwater from the Whitewater River and Mission Creek Subbasins. Both subbasins have been in overdraft for a number of years. However, the large storage volume of these basins has not limited groundwater production. CVWD adopted a water management plan in 2002 to address groundwater overdraft and is implementing that plan. Projects constructed in the past five years include the Thomas E. Levy Groundwater Replenishment Facility in La Quinta, the Martinez Canyon Pilot Recharge Facility in Oasis and Phase 1 of the Mid-Valley Pipeline project, which provides recycled and Colorado River water to golf courses in the Indian Wells-Palm Desert-Rancho Mirage area of the Valley. In addition, CVWD and DWA have acquired additional SWP supplies and CVWD is signatory to the 2003 Quantification Settlement Agreement (QSA), which provides additional Colorado River water for groundwater recharge and source substitution. CVWD is currently finalizing an update to the 2002 Water Management Plan and working with DWA and Mission Springs Water District to develop a water management plan for the Mission Creek and Garnet Hill Subbasins. All of these activities will assure the reliability of the groundwater supply in the future.

5.2.2 Colorado River Water

As described in Section 4, the Colorado River is managed and operated in accordance with the *Law of the River*, which governs the rights to use of Colorado River water within the seven Colorado River Basin states. However, the Coachella Valley's Colorado River supply faces challenges that could potentially impact long-term reliability including: the extended Colorado River Basin drought, climate change, Colorado River shortage sharing agreement, endangered species and habitat protection and lawsuits challenging the validity of the QSA.

The Colorado River Basin is experiencing the worst drought in more than a century of recordkeeping. From 2000 through 2010, inflows to Lake Powell average 69 percent and ranged from 25 to 105 percent of historical averages (Reclamation, 2011). From October 1, 1999 through April 1, 2011, Colorado River system reservoir storage declined from 55.8 million AF (approximately 94 percent of capacity) to 31.4 million AF (approximately 53 percent of capacity) and was as low as 29.7 million AF (approximately 52 percent of capacity) in 2004. Although runoff projections for 2011 are expected to 120 percent of average, reduced reservoir storage will continue for some time. The southwestern United States is believed to have experienced extended droughts a number of times in the past 1,200 years, based on streamflow reconstructions using tree-ring data (Meko, D.M., et al., 2007). Based on these reconstructions, a mid-1100s drought may have exceeded 50 years in duration and one in the 800s may have lasted 80 years (TreeFlow, 2010).

In response to the drought, the U. S. Department of the Interior adopted *Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lakes Powell and Mead* in December 2007. These guidelines, which remain in effect through 2026, specify Lake Mead storage levels when shortages would occur and the magnitude of the shortage. Shortage conditions commence when Lake Mead reaches an elevation of 1,075 ft msl, which is about 19 ft below the current level. In all shortage cases, California's apportionment remains at 4.4 million AFY and CVWD would not expect any reduction in deliveries. After 2026, river operations are expected to revert to the operating criteria that existed before the Interim Guidelines. Reclamation studies indicate a 9 to 35 percent probability of some level of Lower Basin shortage in the next five years (Miller, 2010). However, due to CVWD's high priority, Arizona and Metropolitan would have to experience significant shortages before CVWD's Colorado River supply is affected.

Following execution of the QSA, IID sought to validate the QSA contracts as being consistent with state and federal law. A series of lawsuits were subsequently filed. The cases were combined into the QSA coordinated cases in California Superior Court in Sacramento. In January 2010, the QSA was rendered invalid in a state court decision along with eleven related agreements on the grounds that the environmental mitigation costs allocated to the State of California were unlimited violating the State Constitution (Superior Court of California, 2010). CVWD and the other parties appealed the judgment. On March 9, 2010, the California Court of Appeal, Third Appellate District, issued a temporary stay of the judgment pending further briefing and order of the court regarding appellants' request for a stay during the pendency of the appeal. As of May 2011, the appeal is still pending decision. In February 2010, Reclamation issued a letter stating that it intended to honor and implement the terms of the QSA (Reclamation, 2010).

Since California must still comply with its 4.4 million AFY Colorado River allocation, it appears likely that some variation of the QSA will be developed if the current invalidation is upheld on appeal. In accordance with the 2010 WMP Update, this report assumes that the current QSA or a functional equivalent will be in place in the future. Due to both California's and CVWD's high priority position regarding Colorado River allocations, this supply is expected to be reliable for the duration of the UWMP planning period.

5.2.3 State Water Project

DWR is responsible for managing water deliveries from the SWP. SWP water contractors submit annual requests to the DWR for water allocations and DWR makes an initial SWP Table A allocation for planning purposes, typically in December of each year. Throughout the year, as additional information regarding water availability becomes available to DWR, its allocation/delivery estimates are updated based on hydrologic conditions, storage levels in SWP reservoirs, SWP operational and environmental constraints and SWP contractor delivery requests. **Table 5-2** presents the historic reliability of SWP deliveries, including their initial and final allocations for the past 23 years (1988 through 2010).

DWR issues the SWP Delivery Reliability Report (DRR) every two years, with the 2009 final version currently available (DWR, 2010a). This report accounts for impacts to water delivery reliability associated with climate change and recent federal litigation. Based on information from the final 2009 DRR, the average reliability of SWP Table A deliveries through 2029 is projected to be 60 percent of Table A Amounts after taking into consideration the effects of climate change. This allocation percentage is based on computer modeling of the state's watersheds, an expected range of Delta export controls to protect the Delta smelt, the current condition of the river and reservoir systems, and a climate change scenario.

It should be noted that the published reliability of the SWP water has decreased over time. The 2003 DRR estimated a reliability of 75-76 percent in 2021; the 2005 DRR estimated a reliability of 77 percent in 2025, whereas the 2007 DRR had estimated reliability at 66-69 percent in 2027.

There are additional uncertainties related with SWP reliability in the future, which further reduces the reliability factor. As described in the 2010 CVWMP Update, the factors that could affect SWP reliability considered in this report are:

- Uncertainty in modeling restrictions associated with biological opinions,
- Risk of levee failure in the Delta,
- Additional pumping restrictions resulting from biological opinions on new species or revisions to existing biological opinions,
- Impacts associated with litigations such as the California ESA lawsuit, and
- Climate change impacts

After taking the above factors into consideration, and in order to plan for higher contingency, this report assumes a long-term future average SWP reliability of 50 percent in the absence of successful completion of the Bay-Delta Conservation Plan (BDCP) and delta conveyance facilities.

Table 5-2
Historical SWP Table A Allocations (1988-2010)

Year	Water Year Type [1]	Initial Allocation	Final Allocation
1988	Critical	100%	100%
1989	Dry	100%	100%
1990	Critical	100%	100%
1991	Critical	85%	30%
1992	Critical	20%	45%
1993	Above Normal	10%	100%
1994	Critical	50%	50%
1995	Wet	40%	100%
1996	Wet	40%	100%
1997	Wet	70%	100%
1998	Wet	40%	100%
1999	Wet	55%	100%
2000	Above Normal	50%	90%
2001	Dry	40%	39%
2002	Dry	20%	70%
2003	Above Normal	20%	90%
2004	Below Normal	35%	65%
2005	Above Normal	40%	90%
2006	Wet	55%	100%
2007	Dry	60%	60%
2008	Critical	25%	35%
2009	Dry	15%	40%
2010	Below Normal	5%	50%
	Average	47%	76%

Source: DWR, Water Contract Branch within the State Water Project Analysis Office, Notices to State Water Contractors, 1988 – 2010.

1 - Water year designation based on Sacramento Valley Water Year Hydrologic Classification, which is based on the sum of the unimpaired runoff in the water year as published in the DWR Bulletin 120 for the Sacramento River at Bed Bridge, Feather River inflow to Oroville, Yuba River at Smartville and American River inflow to Folsom reservoir (DWR, 2010a).

5.2.3.1 Metropolitan 100,000 AFY Transfer

Metropolitan has the option to call back the water in years when needed to meet Metropolitan's water management goals. This option must be exercised no later than April 30 of each year. Metropolitan's callback options are to be exercised in two 50,000 AF blocks. To estimate the average supply from this transfer conservatively, this report assumes that Metropolitan would exercise its option to callback the 100,000 AFY in 4 wet years out of every 10 years, which is in accordance with the 2010 WMP Update. The actual frequency of callback would depend on the availability of Metropolitan's water supplies to meet its demands. Since 2003, Metropolitan has called back the water only in 2005.

5.3 Water Shortage Contingency Planning

5.3.1 Intent of the Plan

CVWD's Water Shortage Contingency Plan was originally prepared to comply with AB 11x (1991). That bill required every urban water supplier to file a plan, because of the worsening 1986-1992 drought. Key requirements of the current Section 10632 are summarized and discussed in the following sections.

5.3.2 Stages of Action

The key element of CVWD's water shortage contingency plan is an ordinance with phased water use restrictions and a drought rate structure. The drought plan provides the following stages and action levels:

Table 5-3
Water Supply Shortage Stages and Reduction Goals

Stage	Action	Water Use Reduction Goal, percent
1	Voluntary	10%
2	Mandatory	10%
3	Mandatory	20%
4	Mandatory	50%

The trigger levels (to move from one stage to the next) depend on the local water situation. Based on voluntary response during Stage 1, CVWD's General Manager-Chief Engineer can determine that it is necessary to implement Stage 2 to protect the public welfare and safety. Prior to the implementation of each mandatory phase, CVWD shall hold a public hearing for the purpose of determining whether a shortage exists and which measures should be implemented. The public shall be informed of the public hearing at least 10 days prior to the hearing, and CVWD shall notify the public of its determination by public proclamations.

5.3.3 Estimate of the Minimum Water Supply in the Next Three Years

CVWD has several water supply sources that enable it to withstand imported water reductions better than agencies that are solely dependent on imported water supply.

CVWD and DWA receive delivery of their SWP Table A water through exchange with Metropolitan at the Whitewater River and the Mission Creek Turnouts on the Colorado River Aqueduct. Under the terms of the Advance Delivery Agreement, Metropolitan has stored water in the upper Whitewater River subbasin in advance of CVWD's and DWA's Table A deliveries. Metropolitan may discontinue direct delivery of SWP Exchange Water to these turnouts if the water is needed to meet Metropolitan's demands. During such years, Metropolitan would make its required deliveries from its storage account in the groundwater basin. As of January 2011, Metropolitan had approximately 177,600 acre-ft of water in storage. Based on a review of modeled SWP deliveries for 1991-1993 (Study 6), it is expected that CVWD and DWA would receive 31.3 percent of their Table A current water (194,100 acre-ft/yr) or an average of about 58,700 acre-ft/yr over three years, assuming Metropolitan does not exercise its call-back option.

For water shortage planning purposes, it is assumed that Metropolitan would take the entire amount of CVWD and DWA Table A Water Deliveries for the succeeding three years and essentially deplete the Advance Delivery Storage account. Although CVWD and DWA would not have access to SWP Exchange Water in these three years, the vast storage capacity of the Whitewater River subbasin (about 28.8 million acre-ft) would be more than adequate to meet the projected groundwater extraction needs of CVWD, DWA and the private pumpers. Without replenishment, the decline in storage would be less than 0.5 percent of the basin storage each year.

CVWD's allocation of Colorado River water from the Coachella Canal is defined by the *Law of the River* and the QSA. Under the QSA, CVWD is scheduled to receive 372,000 acre-ft/yr of water in 2011, 377,000 in 2012, and 382,000 acre-ft/yr in 2013 at Imperial Dam. The actual water deliveries to CVWD users are expected to be 341,000 acre-ft/yr in 2011, 346,000 acre-ft/yr in 2012 and 351,000 acre-ft/yr in 2013 after deducting conveyance and operating losses. Because of CVWD's Priority 3(a) allocation, this supply would not be reduced during a dry period unless the drought was so severe that Colorado River supplies are inadequate to supply both Arizona's allocation of 2.8 million acre-ft and Metropolitan's Priority 4 allocation of 550,000 acre-ft/yr. Under Reclamation's current operating rules, California would not experience a shortage until Arizona's post-1968 water contracts are reduced completely and only after Lake Mead dropped below elevation 1,025 ft msl.

Since the majority of CVWD's water supply is from groundwater sources and Coachella Canal water, the period of "driest" historical supply may not be a good indicator of shortages in supply. Instead, projections of driest multiple years of water supply for years 2011, 2012 and 2013 were used in this analysis. The three-year minimum water supplies are shown in **Table 5-4.**

Table 5-4
Three-Year Minimum Water Supply
(acre-ft/yr))

Supply Source	2011	2012	2013
Groundwater[1]	88,600	90,200	95,200
Coachella Canal Water	341,000	346,000	351,000
Recycled Water	8,900	9,500	10,000
SWP Water[2]	0	0	0
Total Supply	438,500	445,700	456,200

1 – Net groundwater is calculated by adding all the CVWD demands (domestic, agriculture, and golf) and subtracting Canal water and recycled water.
2. – Direct deliveries of SWP Exchange water could decrease to zero as shown in dry years, however, Metropolitan would deliver any SWP allocation from the Advanced Delivery storage.

The minimum supplies listed in **Table 5-4** are based on the following assumptions:

- Recycle water supplies, from WRP-7, WRP-9 and WRP-10, are assumed to be equal to the projected recycled water demands.
- CVWD and DWA do not have access to SWP Table A deliveries.

5.3.4 Catastrophic Supply Interruption Plan

Because of the significant amount of groundwater in storage, both natural and imported, CVWD does not anticipate any significant short term, drought or emergency water supply deficiencies.

In the event of a major catastrophe (including but not limited to a regional power outage, an earthquake, or other disaster), the availability of groundwater will not be affected. CVWD has a number of generators that can be used to operate wells and booster stations in case of power failure.

Most of CVWD's pressure zones are served by steel reservoirs located at higher elevations. Several of the reservoirs are equipped with automatic valves that close during a seismic event, thereby preserving the stored water. Likewise, most of the pressure zones have interconnections to other zones, which permit CVWD to transfer water to any zone that may suffer deficiencies. CVWD has portable pumps and temporary above-ground pipe is available to allow water service to be provided should earthquakes damage portions of the system.

CVWD remotely monitors the status of most key facilities at CVWD headquarters, which enables it to detect areas affected by disasters. Also most of CVWD's employees live within a short driving distance of CVWD facilities; therefore, CVWD is capable of addressing any emergency in a quick and efficient manner.

5.3.5 Water Use Restrictions

The specific water use restrictions for each Stage are listed in **Table 5-5**. Examples of water consumption reduction methods and the projected percent of reduction are presented in **Table 5-6**.

Mandatory levels of water use restriction include penalties for customers for non-compliance. This includes warning, fines, flow restriction, and finally, water service shut-off. Penalties and charges for non-compliance are summarized in **Table 5-7**.

5.3.6 Revenue Impact Analysis of Reduced Sales during Shortages

A reduction in the amount of water consumed will lead to a reduction in revenue and expenses for CVWD. These reductions will have an impact on CVWD's ability to finance its operations during periods of water shortages.

Revenues would decrease as a result of reduced water sales to customers of CVWD. Revenue reductions for years 2011 to 2013 were calculated based upon the following assumptions:

- Water reduction goals shown in **Table 5-3** by stage are met
- Water sales revenues from 2011 to 2013 are projected by scaling up 2010 revenues by the projected quantity of water delivered
- Revenues from availability charges, meter and service fees, other operating revenues, property taxes and investment income in year 2010 remain constant for all future times

Table 5-8 provides the projected revenue reduction percentage by stage.

Table 5-5
Water Use Restrictions

UWMP Guidebook Table 36	
Water shortage contingency - mandatory prohibitions	
Restriction	Voluntary Restriction Stage
• No landscape irrigation between 11 a.m. and 4 p.m. • No runoff from irrigation • Water efficient landscape encouraged	Stage 1
Restriction	Mandatory Restriction Stages
• No landscape irrigation between 6am and 6pm unless hand-held hose or drip irrigation or reclaimed water is used • Irrigation only three times per week	Stage 2
• No water served in restaurants unless requested • Irrigation only twice a week • Commercial car washing using recycled water only • No filling swimming pools	Stage 3
• No golf course watering, except greens, unless reclaimed water is used • Irrigation only once a week • Water rationing by customer class • No turf planting at new homes until drought is over	Stage 4

Table 5-6
Consumption Reduction Methods

UWMP Guidebook Table 37		
Water shortage contingency — consumption reduction methods		
Consumption Reduction Methods	Stage When Method Takes Effect	Projected Reduction (%)
Demand Reduction Program	Varies	Varies with stage
Voluntary Rationing	Varies	10%
Education Program	Varies	10%
Plumbing Fixture Replacement	Varies	10%
Mandatory Rationing	Varies	Up to 50%
Flow Restrictions	Varies	Up to 50%
Use Prohibitions	Varies	Up to 50%

Table 5-7
Penalties and Charges

UWMP Guidebook Table 38	
Water shortage contingency — penalties and charges	
Penalties or Charges	Stage When Penalty Takes Effect
First Violation - Notice of Non- Compliance	2 through 4
Second Violation - Fine, Flow Restriction, or Water Service Shutoff	2 through 4
Referral of Misdemeanor Charge	2 through 4

Table 5-8
Reduced Revenues Due to Water Shortage

Stage	2011 - 2013 Revenue Reduction Percentage
2 (10% Reduction)	9%
3 (20% Reduction)	19%
4 (50% Reduction)	47%

Expenditures by CVWD are also expected to decrease in the event of a water shortage. Reductions are expected in source supply and pumping expenses. Expenditure reduction percentage for years 2011 to 2013 are shown in **Table 5-9**.

Expense reductions were calculated based on the following assumptions.

- Water reduction goals shown in **Table 5-3** by stage are met.
- Utilities and purchased power pumping expenses from 2011 to 2013 are projected by scaling up 2010 expenses by the projected quantity of water delivered at each stage.
- Payroll expenses increase by 5 percent from 2010 payroll expenses during any stage of shortage due to extra staff man-hours required during catastrophic events.
- All other expenses including transmission and distribution expenses and non-operating expenses in year 2010 remain constant for all future times.

Table 5-9
Reduced Expenditures Due to Water Shortage

Stage	2011	2012	2013
2 (10% Reduction)	3%	4%	5%
3 (20% Reduction)	7%	9%	9%
4 (50% Reduction)	17%	22%	24%

The net revenue impact of revenue loss and expenditure reductions from reaching reduction goals is calculated as revenue reduction minus expenditure reduction. The net revenue reduction percentage for each year is provided in **Table 5-10**.

Table 5-10
Net Revenue Reduction Due to Water Shortage

Stage	2011	2012	2013
2 (10% Reduction)	7%	7%	7%
3 (20% Reduction)	15%	13%	13%
4 (50% Reduction)	36%	33%	32%

Several measures can be taken to generate additional funds to absorb the negative financial impact of a severe water shortage. Examples of such measures are listed in **Table 5-11**.

Table 5-11
Proposed Measures to Overcome Revenue and Expenditure Impacts

Proposed Measure	Potential Impacts of Measure
Rate Adjustment	• Increased savings to General Fund • In normal years, CVWD would receive more money than required for normal operations • Water customers resistance
Use of Accumulated Reserves	• Increased savings to General Fund during non-events • Decreased availability for O&M or Capital Fund
Decrease Capital Expenditure	• Increased savings to General Fund • Delay of system rehabilitation • Decrease in quality of future system facilities
Decrease of O&M Expenditure	• Increased savings to General Fund • Less staff available to respond to emergencies • Reduced maintenance frequency of system facilities

5.3.7 Water Shortage Contingency Ordinance/Resolution

CVWD's draft water shortage contingency ordinance is provided below:

A RESOLUTION TO DECLARE A WATER SHORTAGE EMERGENCY

WHEREAS, the Coachella Valley Water District is an urban water supplier providing water to approximately 100,000 customers; and

WHEREAS, the demand for water service is not expected to lessen; and

WHEREAS, when the water supply will not be adequate to meet the ordinary demands and requirements of water consumers without depleting CVWD's water supply to the extent that there may be insufficient water for human consumption, sanitation, fire protection, and environmental requirements. This condition is likely to exist until water supplies are restored and/or until water system damage resulting from a disaster re-repaired and normal water service is restored.

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of the Coachella Valley Water District as follows:

1. *The Board of Directors hereby directs the General Manager-Chief Engineer to find and declare that a water shortage emergency condition exists, which threatens the adequacy of water supply, until CVWD's water supply is deemed adequate. After the declaration of a water shortage emergency, the General Manager-Chief Engineer is directed to determine the appropriate rationing levels and implement the necessary emergency response measures.*
2. *Furthermore, the Board of Directors shall periodically conduct proceedings to determine additional restrictions and regulations which may be necessary to safeguard the adequacy of the water supply for domestic, sanitation, fire protection, and environmental requirements.*

5.3.8 Water Use Monitoring Mechanisms

Water use monitoring mechanisms that are being implemented to date by CVWD are summarized in **Table 5-12.**

Table 5-12
Water Use Monitoring Mechanisms

Mechanisms to Determine Water Use Reductions	Benefits
Water Meter Readings	Monthly records can help detect leaking service laterals
Remote Metering Program	Increased efficiency in meter readings and detection of leaking service laterals
Residential Meter Replacement Program for AMR[1] (every 10 years)	Accurate readings and revenue collection
Inter-Agency Connection readings	Accurate readings and revenue collection
Water Quality Reports	Detect standing water
Valve Exercising Program	Avoid leaking valves
Daily Production Recording (Groundwater wells, Coachella Canal, SWP, recycled water and inter-agency connections)	Determine monthly or annual system losses when compared with billing records.

1 – AMR – Automated meter reading.

5.4 Water Quality

Drinking water quality is regulated under the authority of the federal Safe Drinking Water Act (SDWA) (42 U. S. Code §300f *et seq*.) and the state Safe Drinking Water Act (California Health and Safety Code §116270 *et seq*.) and associated regulations implementing those statutes. The federal act authorizes the U. S. Environmental Protection Agency (USEPA) to establish minimum standards to protect tap water and requires all owners or operators of public water systems to comply with these primary (health-related) standards. The 1996 amendments to SDWA require that USEPA consider a detailed risk and cost assessment, and best available peer-reviewed science, when developing these standards.

The federal law establishes National Primary Drinking Water Regulations (NPDWRs or primary standards), which are legally enforceable standards that apply to public water systems. Primary standards protect public health by limiting the levels of contaminants in drinking water. National Secondary Drinking Water Regulations (NSDWRs or secondary standards) are non-enforceable guidelines regulating contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor or color) in drinking water.

California regulations follow the federal regulations in adopting either the NPDWRs or more stringent maximum contaminant levels (MCLs). A Public Health Goal (PHG) is the level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California Office of Environmental Health Hazard Assessment (OEHHA). A MCL is the highest level of a contaminant that is allowed in drinking water. Primary MCLs are established for contaminants that affect health and are set as close to the PHGs as is economically and technologically feasible. Secondary MCLs are set to protect the odor, taste and appearance of drinking water. Under the California SDWA, the California Department of Public Health (DPH) is responsible for establishing MCLs.

Groundwater quality in the Coachella Valley varies with depth, proximity to faults, presence of surface contaminants, proximity to recharge basins, and other hydrogeologic or cultural features. Current and emerging groundwater quality issues consist of salinity, arsenic, perchlorate, chromium-6, uranium, nitrate, carcinogens and endocrine disrupting compounds. Recharge of high salinity Colorado River water gives rise to salinity concerns for groundwater in the Coachella Valley. These issues are discussed below.

Overall, water quality is considered to be good. All urban water served by CVWD meets state and federal drinking water quality standards (CVWD, 2010d). Although there are potential concerns with salinity and arsenic, CVWD is proactively investigating, and in the case of arsenic, implementing solutions to mitigate potential water quality issues. **Table 5-13** provides a summary of the current and projected water supplies and their associated water quality.

Table 5-13
Water Quality Summary

UWMP Guidebook Table 30							
Water quality — current and projected water supply impacts (AFY)							
Water source	Description of condition	2010	2015	2020	2025	2030	2035
Local groundwater	Good	109,488	119,269	115,212	118,003	117,505	123,229
Treated Colorado River water	Good	0	5,161	30,966	46,449	61,932	72,254
Untreated Colorado River water	Good	0	1,302	11,462	27,193	40,261	56,533

5.4.1 Salinity

Colorado River water used for direct delivery and groundwater recharge in the Coachella Valley has higher TDS concentrations on average than most of the local groundwater. Based on historical and projected variations in Colorado River water quality, the TDS range for the SWP Exchange water recharged at the Whitewater River Recharge Facility is 530 to 750 mg/L, averaging 636 mg/L since

1973. SWP Exchange water is Colorado River water delivered via the Colorado River Aqueduct. The TDS range for the Colorado River water delivered via the Coachella Canal is 625 mg/L to 975 mg/L averaging 790 mg/L over the past 60 years. This water is used for agricultural and golf course irrigation and for groundwater recharge in the East Valley.

CVWD has recharged SWP Exchange water at the Whitewater River Recharge Facility in the West Valley since 1973. After 37 years of operation, TDS levels in wells near the Whitewater River Recharge Facility have increased, while wells farther away have shown little change in quality. In 2009, recharge began at the Thomas E. Levy Groundwater Replenishment Facility (Levy facility) in the East Valley. Since 2005, CVWD has also operated a demonstration scale recharge facility near Martinez Canyon in the East Valley.

CVWD is investigating alternatives to reduce water quality impacts of Colorado River recharge. One of these alternatives is direct importation and recharge of lower TDS SWP water. Average TDS concentration (between 1973 and 2009) of the SWP water was 245 mg/L (Lake Silverwood at Devil Canyon). CVWD and DWA, along with other partner agencies, are evaluating the feasibility of importing SWP water to the Coachella Valley via a direct connection to the SWP. If constructed, a SWP extension would terminate at the Whitewater and Mission Creek spreading facilities.

Another alternative is the treatment of Colorado River water before recharge. One of the primary deterrents to this alternative is cost. There would be significant costs to public water suppliers, in terms of groundwater replenishment rates, private groundwater users, and CVWD customers.

In summary, the use of Colorado River water for recharge increases salinity in the Valley groundwater basin. The impact of the salinity increase has not been clearly identified. Potential alternatives being investigated to mitigate this condition have high costs. Implementation of the CVWMP is expected to reverse vertical migration of poor quality water into the deeper aquifers. Since the quality of deep groundwater is excellent and management activities are in place to maintain the quality, salinity will not affect groundwater supply reliability.

5.4.2 Arsenic

Arsenic is a naturally occurring element found in the earth’s crust. It is found to have carcinogenic and non-carcinogenic effects on human health if ingested at high levels over a long period of time. Before 2001, the primary (health-based) drinking water standard for arsenic was 50 micrograms per liter (μg/L). Under the 1996 Amendments to the Safe Drinking Water Act, the U.S. Environmental Protection Agency (USEPA) was required to publish a revised standard for arsenic by January 2001. USEPA published a final Maximum Contaminant Limit (MCL) for arsenic of 10 μg/L on October 31, 2001. The new standard became enforceable on January 22, 2006. California adopted the federal MCL effective November 28, 2008.

Arsenic concentrations as high as 162 μg/L have been observed in some East Valley municipal water supply wells (CVWD water quality data). In response to the new regulations, CVWD commenced studies in 2004 to evaluate and design facilities to meet the new arsenic standard at several of its municipal wells that exceeded the new requirements. Three groundwater treatment facilities were constructed using an ion-exchange process with a brine minimization and treatment process that produces a small volume of non-RCRA (Resource Conservation and Recovery Act) hazardous solid waste and a non-hazardous liquid waste. These facilities became operational in early 2006 and continue to operate. If needed, they can be expanded to treat additional wells in the future. The waste brine produced by the treatment process is hauled by trucks to Lakeland Processing Company located in Santa Fe Springs for final disposal.

Several mobile home and RV parks in the East Valley that use private wells have arsenic levels exceeding the drinking water regulations. In Coachella and the unincorporated East Valley communities of Mecca, Oasis and Thermal, Riverside County environmental health officials have identified wells at approximately 19 mobile home and RV parks that recently tested positive for high levels of arsenic ranging from 12 to 91 µg/L (Desert Sun, 2009). These parks are served by private wells and are located some distance from CVWD's potable water system. About half of the parks have installed treatment filters to reduce the arsenic levels. CVWD and other stakeholders have applied for funding to develop regional solutions for the arsenic issue.

CVWD's arsenic treatment facilities currently eliminate arsenic as a concern from groundwater wells, thereby eliminating any potential threat to groundwater reliability. If in the future, a lower MCL for arsenic is adopted by regulatory agencies, CVWD may need to relocate, blend, or treat additional wells, thus eliminating its effect on water supply reliability.

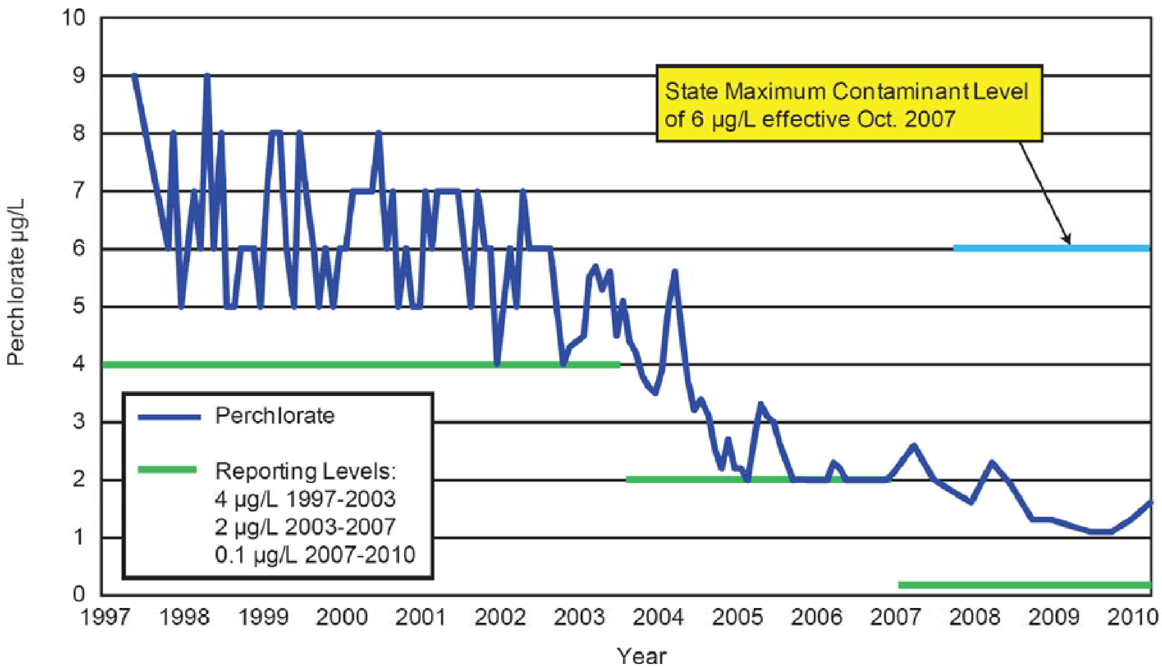
5.4.3 Perchlorate

Perchlorate is a naturally-occurring and man-made compound used for ignition of solid rocket fuel. Perchlorate salts are also found in roadside flares and airbag inflators and are used in the manufacture of matches. Perchlorate is highly soluble in water. Perchlorate reduces production of thyroid hormones in the thyroid gland. Currently, there is no federal MCL for perchlorate; however, the state MCL for perchlorate is 6 µg/L. In January 2011, the California Office of Environmental Health Hazard Assessment (OEHHA) released for public comment a new draft Public Health Goal (PHG) of 1 µg/L for perchlorate in drinking water. The PHG is not an enforceable regulatory standard but rather is the level of a chemical contaminant in drinking water that does not pose a significant risk to health. Once a final PHG is adopted, the DPH will commence development of a revised MCL.

Perchlorate was found in Colorado River water imported to the Coachella Valley in the late 1990s. The source of the perchlorate originated from the Kerr-McGee plant in Nevada on Las Vegas Wash upstream of Lake Mead. Perchlorate treatment was initiated in 1999 in Nevada at three different locations. This has resulted in significant reduction in perchlorate concentration in the Lower Colorado River. As shown on **Figure 5-1**, perchlorate concentrations have steadily declined since the initiation of treatment and have reached levels below the state reporting level of 2 µg/L. Based on the California Department of Public Health's (CDPH) water quality database, quarterly perchlorate data at Lake Havasu near Whitsett intake for 2008 and 2009 show levels below the state reporting level of 2 µg/L, with just one reading of 2.3 µg/L in the second quarter of 2008. Although perchlorate contamination in Colorado River water is no longer a major concern, CVWD monitors the quality of Canal water annually.

According to the State Water Resources Control Board's (SWRCB) Groundwater Ambient Monitoring and Assessment (GAMA) program, nine non-CVWD wells in the Coachella Valley had perchlorate levels exceeding the MCL. CVWD groundwater wells have been monitored several times between 2000 and 2009 with no detectable perchlorate. Future monitoring of CVWD wells for perchlorate will be on a nine-year cycle. The extent of perchlorate in groundwater is not believed to be significant.

Based on the current state MCL, perchlorate would not affect water supply reliability. However, if the MCL were lowered significantly, it is unknown how many wells might be affected because the detection reporting level for many of the wells was 4 µg/L.



Source: Metropolitan Water District of Southern California Annual Report 2010

Figure 5-1
Perchlorate Concentrations at Lake Havasu

5.4.4 Chromium-6

Chromium-6 (hexavalent chromium) is currently regulated in California under the 50 µg/L maximum contaminant level (MCL) for total chromium. California's MCL for total chromium was established in 1977 under what was then a "National Interim Drinking Water Standard" for chromium. The total chromium MCL was established to address exposures to chromium-6, which is considered to be the more toxic form of chromium.

California State's Office of Environmental Health Hazard Assessment (OEHHA) released a draft PHG for public comment of 0.06 µg/L for chromium-6 in August 2009. In December 2010, OEHHA released a revised draft PHG of chromium-6 of 0.02 µg/L for public comment. The public comment period closed on February 15, 2011. Once the chromium PHG is finalized, DPH can proceed with the MCL process (DPH, 2011). In September, 2010, U.S. Environmental Protection Agency (USEPA) released a draft of the scientific assessment (Toxicological Review of Hexavalent Chromium) for public comment and external peer review. When this human health assessment is completed in 2011, USEPA will carefully review the conclusions and consider all relevant information to determine if a new standard needs to be set (USEPA, 2011).

Currently, there are no wells in the Coachella Valley that exceed the 50 µg/L MCL for total chromium. **Figure 5-2** shows the areal distribution of chromium-6 in the Valley, principally based on monitoring performed in the early 2000s. Based on that monitoring, there are over 100 wells in the Valley that have detectable levels of chromium-6. In January 2011, the USEPA recommended enhanced monitoring for chromium-6 by public water systems to: better inform their consumers about the levels of chromium-6 in their drinking water, evaluate the degree to which other forms of chromium are transformed into chromium-6 in their drinking water and assess the degree to which existing treatment is affecting the levels of chromium-6 (USEPA, 2011).

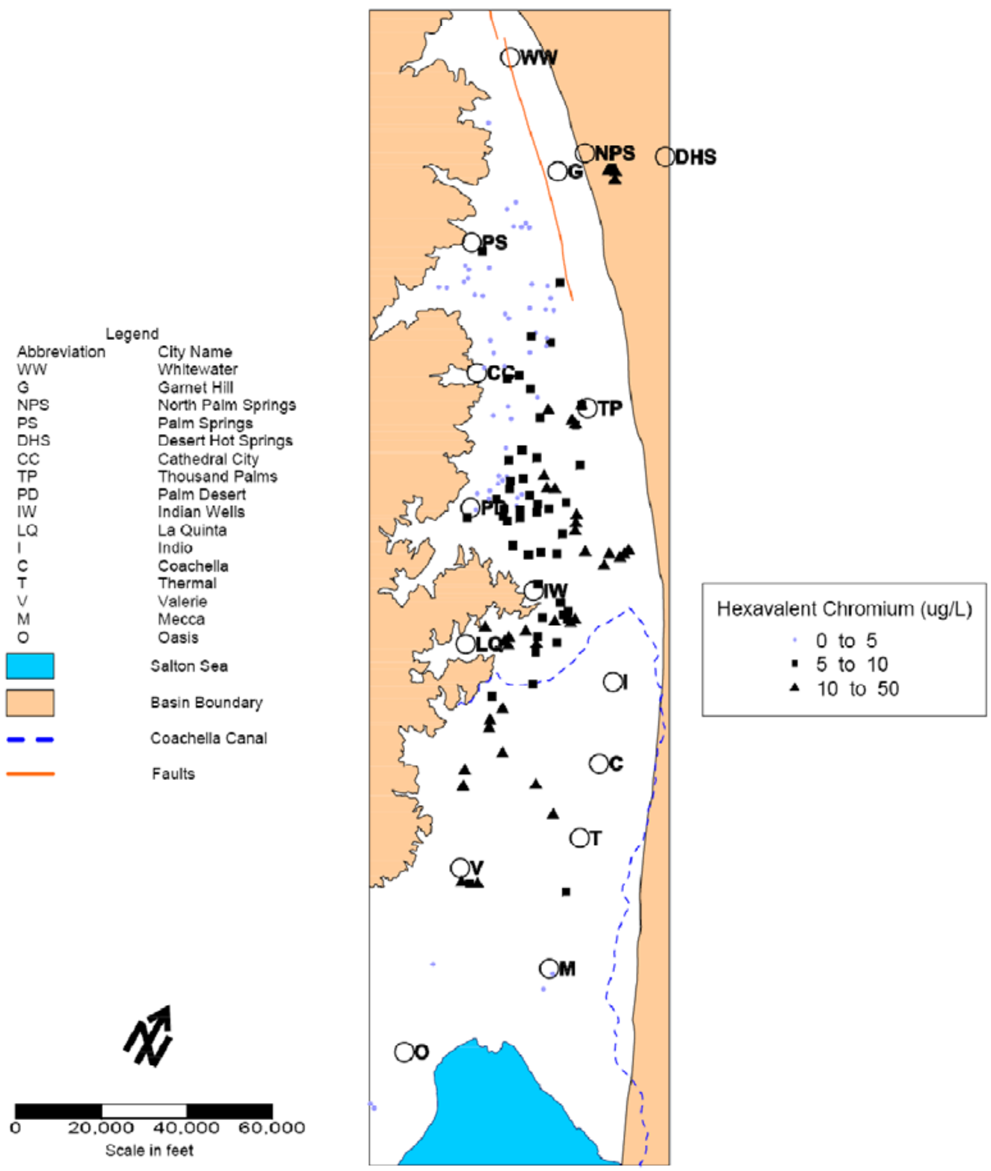


Figure 5-2
Hexavalent Chromium Concentrations in Coachella Valley, 2002 - 2009

If a chromium-6 MCL is adopted in the future, CVWD may need to blend or treat the water from groundwater wells, thus eliminating its effect on supply reliability.

5.4.5 Uranium

There are two possible sources of uranium in the Coachella Valley. The first is naturally occurring uranium in the geologic formations of the basin. The second is contamination along the Colorado River.

A review of data from the State Water Resources Control Board's (SWRCB) Groundwater Ambient Monitoring and Assessment (GAMA) program over the past ten years indicates no CVWD wells having uranium levels exceeding the 20 picocuries per liter (pCi/L) MCL.

One of the country's largest uranium deposits was found in Moab, Utah, located along the Colorado River, in 1952. A uranium reduction mill was operated at this site until 1984. Waste slurry from the uranium reduction process was stored in unlined ponds near the river. These ponds were capped after the mill was shut down. It is believed that waste was leaching from the ponds and contaminating the river with radioactive material (USDOE, 2009).

The site is currently under the control of the U.S. Department of Energy (DOE). The DOE is undertaking a project to move 10.8 million tons of radioactive tailings by rail to a lined pit in Crescent Junction, Utah, about 30 miles from the Colorado River. The removal is expected to take approximately 20 years.

Trace uranium levels have been observed in the groundwater in the Cove communities and Indio Hills system in the Valley. These traces are believed to be naturally-occurring and there is no evidence linking the uranium found in the Valley groundwater to Colorado River water. CVWD conducts annual testing of the Colorado River water in the Canal for uranium. Based on sampling in the Canal, uranium concentrations over the last four years have varied from 3.5 pCi/L to 6.1 pCi/L, with the most recent reading of 3.5 pCi/L (May 2010), which is well below the California MCL of 20 pCi/L.

CVWD and other Valley agencies (MSWD, DWA, City of Indio, City of Coachella) continue to monitor for radioactive materials in well water and Colorado River water. Uranium concentrations are not expected to have any effect on CVWD water supply reliability.

5.4.6 Nitrate

Nitrate is a nitrogen compound that is a nutrient and can also have public health implications in drinking water, especially for infants. The federal and state primary MCL for nitrate is 10 mg/L as nitrogen (45 mg/L as nitrate).

Higher concentrations of nitrate (as high as 40 mg/L as nitrogen in Cove Communities based on CVWD's 2008-09 Annual Review and Water Quality Report) exist in some of the shallower portions of the Coachella Valley groundwater basin. Sources of nitrate include nitrogen-based fertilizers used for agriculture, golf courses and landscaping; septic tank discharges; wastewater disposal through percolation; natural sources like mesquite hummocks; and alluvial fan formations. Generally, nitrates are found in the unsaturated and shallow aquifer zones above 300 to 400 feet, and have not been observed in the deeper aquifer zones below 500 feet. Activities in the basin that could cause nitrate to leach into higher quality groundwater include recharge, pumping, and overdraft reduction.

Nitrate does not adsorb to aquifer sediments and readily migrates in groundwater. Steps recommended in the 2010 WMP Update that can be taken to reduce the risk of nitrate migration include:

- Locating recharge activities away from areas known or expected to have higher nitrate contamination in shallow aquifer zones.
- Avoid pumping in areas known to have nitrate concentrations, where the nitrates can be leached downward into lower aquifer due to the downward gradient created by pumping.
- Monitor areas of high nitrate concentration to ensure that they do not become oversaturated as overdraft reduction occurs.
- In areas where shallow pumping can prevent nitrate concentrations from leaching into the deeper aquifer, consider implementing ion exchange treatment or similar approach to remove the nitrate from the pumped groundwater.

CVWD will employ nitrate treatment at groundwater wells if needed to eliminate any threat to water supply reliability.

5.4.7 Carcinogens

The USEPA is considering a new strategy to tighten restrictions on four waterborne compounds that can cause cancer. The four compounds to be addressed as a group are tetrachloroethylene (PCE), an organic compound used in dry cleaning; trichloroethylene (TCE), an organic compound used as an industrial solvent; acrylamide, a compound used in manufacturing; and epichlorohydrin, an organic compound used in plastic manufacturing. Under the new USEPA strategy, the agency would address chemical contaminants as a group for more expeditious and cost-effective enforcement. This strategy would also foster development of new water-treatment technologies, and partnerships with states to better monitor public water systems. CVWD will continue to monitor for the above constituents and track the development of the new USEPA strategy.

5.4.8 Endocrine Disrupting Compounds

There is growing interest by regulatory agencies in possible effects of endocrine disrupting compounds (EDCs) in drinking water and groundwater. EDCs are a class of chemicals that interfere with the natural action of hormones in the body, and are thought to interfere with the reproductive systems of both wildlife and humans. EDCs encompass a wide range of contaminants that include some pesticides and a number of chemicals that may be used in residential, commercial and industrial applications. Some pharmaceuticals and personal care products such as antibiotics, prescription drugs, shampoos and cleansers have also been implicated as potential EDCs.

To date, the documented levels of these compounds in drinking water are generally low, at the low end of the parts per trillion range. Most drinking water standards are set in the mg/L or µg/L range, which are 1,000 to 10,000 times higher than the levels at which EDCs are typically detected in water supplies. What is not presently known is the importance of detection at such low levels, since these compounds may have the potential for impact at low concentrations. Studies done in the Potomac River and other rivers have found instances of sex abnormalities in aquatic organisms that may be related to EDCs found in wastewater discharges to these rivers (USFWS, 2003). The mode of exposure of these populations is quite different and more intense than human exposure by drinking water, making extrapolation questionable. The issue of importance to drinking water is not presently resolved.

Several water treatment technologies can remove EDCs, including nanofiltration and reverse osmosis. CVWD will continue to monitor this issue along with the associated regulations and take appropriate action in the future should it be necessary.

5.5 Drought Planning

CVWD's future urban water supply will consist primarily of local groundwater supplemented with Colorado River water and desalinated drain water. Although the groundwater basin has been overdrafted historically, groundwater is a reliable water supply that is relatively invulnerable to seasonal or climatic variation due to the large storage volume (about 30 million AF). The groundwater supply is replenished Colorado River and SWP Exchange water. The Colorado River water supply is also considered to be relatively invulnerable to seasonal or climatic variation due to both California's and CVWD's high priority allocation. In the future, CVWD will deliver treated Colorado River water to the urban distribution system and untreated Colorado River water for landscape irrigation and other non-potable uses in a separate non-potable distribution system.

SWP Exchange water is subject to both climatic and operational variations; however, this source is used only for groundwater replenishment. As discussed previously, Metropolitan takes delivery of CVWD's and DWA's SWP allocation in any given year. Metropolitan may pre-deliver water in excess of the SWP allocation. Provided there is sufficient water in the Advanced Delivery account, Metropolitan has to option of delivering the SWP Exchange water either directly from its Colorado River Aqueduct or from the Advanced Delivery account. If there is insufficient water in the storage account to cover the annual allocation, Metropolitan must make direct delivery of the SWP allocation. As long as there is water in the Advanced Delivery account, no water shortage would occur. Metropolitan also has the option to call-back either 50,000 AFY or 100,000 AFY of CVWD's and DWA's Table A Amount in any given year if needed to meet Metropolitan's needs. However, if the Advanced Delivery account was fully depleted, Metropolitan exercised its call back option and SWP allocations were low, then a water shortage may be declared. Even under such conditions, the groundwater basin storage is large enough to absorb such a reduction in replenishment deliveries.

Desalinated drain water is considered to be a reliable source since it is not subject to climatic variations. Therefore, all of CVWD's future water supplies except SWP Exchange water are considered reliable and do not vary whether in an average water year, single dry water year, or multiple dry water years.

5.5.1 Water Supplies in Normal, Single Dry and Multiple Dry Year Conditions

The following tables provide CVWD's projected urban water supplies and demands in a normal year, single dry year, and multiple dry years. Since groundwater production is driven by demand, this report assumes supplies are equal to demand. As mentioned previously, this supply is considered reliable and does not vary in dry or multiple dry water years. Hence, UWMP Guidebook **Tables 27 and 28** are not provided.

Table 5-14
Supply and Demand Comparison – Normal Year

UWMP Guidebook Table 32					
Supply and demand comparison — normal year (AFY)					
	2015	2020	2025	2030	2035
Supply totals (from Table 4-1)	125,800	156,100	187,700	212,000	242,700
Demand totals (From Table 3-19)	125,800	156,100	187,700	212,000	242,700
Difference	0	0	0	0	0
Difference as % of Supply	0%	0%	0%	0%	0%
Difference as % of Demand	0%	0%	0%	0%	0%

Supplies and demands are for the urban water system only.

Table 5-15
Supply and Demand Comparison - Single Dry Year

UWMP Guidebook Table 33					
Supply and demand comparison — single dry year (AFY)					
	2015	2020	2025	2030	2035
Supply totals	125,800	156,100	187,700	212,000	242,700
Demand totals	125,800	156,100	187,700	212,000	242,700
Difference	0	0	0	0	0
Difference as % of Supply	0%	0%	0%	0%	0%
Difference as % of Demand	0%	0%	0%	0%	0%

Supplies and demands are for the urban water system only.

Table 5-16
Supply and Demand Comparison - Multiple Dry-Year Events

UWMP Guidebook Table 34						
Supply and demand comparison — multiple dry-year events						
		2015	2020	2025	2030	2035
Multiple-dry year first year supply	Supply totals	125,800	156,100	187,700	212,000	242,700
	Demand totals	125,800	156,100	187,700	212,000	242,700
	Difference	0	0	0	0	0
	Difference as % of Supply	0%	0%	0%	0%	0%
	Difference as % of Demand	0%	0%	0%	0%	0%
Multiple-dry year second year supply	Supply totals	125,800	156,100	187,700	212,000	242,700
	Demand totals	125,800	156,100	187,700	212,000	242,700
	Difference	0	0	0	0	0
	Difference as % of Supply	0%	0%	0%	0%	0%
	Difference as % of Demand	0%	0%	0%	0%	0%
Multiple-dry year third year supply	Supply totals	125,800	156,100	187,700	212,000	242,700
	Demand totals	125,800	156,100	187,700	212,000	242,700
	Difference	0	0	0	0	0
	Difference as % of Supply	0%	0%	0%	0%	0%
	Difference as % of Demand	0%	0%	0%	0%	0%

Supplies and demands are for the urban water system only.

Table 5-17
Drought Contingency Stages

UWMP Guidebook Table 35		
Water shortage contingency — rationing stages to address water supply shortages		
Stage No.	Water Supply Conditions	% Shortage
1	10% reduction in total groundwater and imported supplies relative to long-term average conditions	10%
2	20% reduction in total groundwater and imported supplies relative to long-term average conditions	20%
3	50% reduction in total groundwater and imported supplies relative to long-term average conditions	50%

5.5.2 Drought Contingency Plan

Table 5-17 defines CVWD's drought stages and possible water supply conditions that may be applicable to each stage. Due to the size of the groundwater basin from which CVWD draws its urban water supply, drought conditions do not adversely affect supply availability. During droughts, groundwater replenishment with imported water may be reduced based on available supply. Drought conditions would not affect CVWD's Colorado River water supply either due to the agency's high priority allocation. However, if a reduction in Colorado River water supply occurred, CVWD would initially reduce deliveries to groundwater replenishment projects, followed by reductions to golf course and urban irrigation that could be supplied by private wells, and finally by reductions to agricultural and urban customers that do not have access to private wells. Drought conditions would have an effect on CVWD's supply of SWP Exchange water. This water is used for replenishment of the groundwater basin and is not a direct source of urban water supply. Consequently, water use restrictions due to drought involving the SWP Exchange supply would likely be implemented only as a result of a prolonged drought combined with Metropolitan exercising its call back of SWP water and depletion of the Advanced Delivery storage account. Water use restrictions which would be enacted for each drought stage are provided in **Table 5-18.**

Table 5-18
Drought Contingency Restrictions

Stage No.	Restriction
1	• No landscape irrigation between 6am and 6pm unless hand-held hose or drip irrigation or reclaimed water is used • No runoff from irrigation • Irrigation only three times per week • Water efficient landscape encouraged
2	• No water served in restaurants unless requested • Irrigation only twice a week • Commercial car washing using recycled water only • No filling swimming pools
3	• No golf course watering, except greens, unless reclaimed water is used • Irrigation only once a week • Water rationing by customer class • No turf planting at new homes until drought is over

SECTION 6 DEMAND MANAGEMENT MEASURES

This section describes CVWD water conservation goals, its existing and proposed conservation programs and addresses all of the requirements of the UWMP relative to demand management.

6.1 Law

California Water Code Section 10631, Paragraphs (f), (g)

(f) Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1) A description of each water demand management measure that is currently being implemented, or scheduled for implementation, including the steps necessary to implement any proposed measures, including, but not limited to, all of the following:

(A) Water survey programs for single-family residential and multifamily residential customers.

(B) Residential plumbing retrofit.

(C) System water audits, leak detection, and repair.

(D) Metering with commodity rates for all new connections and retrofit of existing connections.

(E) Large landscape conservation programs and incentives.

(F) High-efficiency washing machine rebate programs.

(G) Public information programs.

(H) School education programs.

(I) Conservation programs for commercial, industrial, and institutional accounts.

(J) Wholesale agency programs.

(K) Conservation pricing.

(L) Water conservation coordinator.

(M) Water waste prohibition.

(N) Residential ultra-low-flush toilet replacement programs.

(2) A schedule of implementation for all water demand management measures proposed or described in the plan.

(3) A description of the methods, if any, that the supplier will use to evaluate the effectiveness of water demand management measures implemented or described under the plan.

(4) An estimate, if available, of existing conservation savings on water use within the supplier's service area, and the effect of the savings on the supplier's ability to further reduce demand.

(g) An evaluation of each water demand management measure listed in paragraph (1) of subdivision (f) that is not currently being implemented or scheduled for implementation. In the course of the evaluation, first consideration shall be given to water demand management measures, or combination of measures, that offer lower incremental costs than expanded or additional water supplies. This evaluation shall do all of the following:

(1) Take into account economic and noneconomic factors, including environmental, social, health, customer impact, and technological factors.

(2) Include a cost-benefit analysis, identifying total benefits and total costs.

(3) Include a description of funding available to implement any planned water supply project that would provide water at a higher unit cost.

(4) Include a description of the water supplier's legal authority to implement the measure and efforts to work with other relevant agencies to ensure the implementation of the measure and to share the cost of implementation.

6.2 Water Management Plan Conservation Goals

Water conservation is an important component of water resource management, not only for CVWD but also for the entire Southern California region. The Coachella Valley region is expected to be a high growth area in the future. This growth in population puts pressure on CVWD to meet the anticipated water demand over the next 25 years and beyond. Implementation of conservation programs helps reduce the expected increase in water demand.

CVWD has had a water conservation program since the 1960s. However, as a desert resort community having a large transient population, per capita water use tends to be much higher than other portions of California. CVWD recognizes the importance of conserving water in order to reduce demand on the groundwater supply. CVWD's conservation goals were originally identified as a part of the 2002 Coachella Valley Water Management Plan (WMP) and are further refined in the 2010 WMP Update to reduce water use through conservation programs.

The Memorandum of Understanding (MOU) regarding Urban Water Conservation in California sets guidelines to achieve a baseline level of water conservation in given water service area (CUWCC, 2004). Signers of the MOU agree to comply and set goals to meet the standards outlined in the MOU. CVWD is not a signatory to the MOU. Therefore, a discussion of the following 14 Demand Management Measures (DMM) listed in **Table 6-1** is included below.

Table 6-1
Demand Management Measures

DMM	Demand Management Measure	Implementation Status
A	Water Survey Program for Single-Family and Multi-Family Residential Customers	Implemented
B	Residential Plumbing Retrofit Program	Not implemented
C	System Water Audits, Leak Detection and Repair Program	Not implemented
D	Metering with Commodity Rates for all New Connections and Retrofit of Existing Connections Program	Implemented
E	Large Landscape Conservation Programs and Incentives Program	Implemented
F	High-Efficiency Washing Machine Rebate Program	Not implemented
G	Public Information Program	Implemented
H	School Education Program	Implemented
I	Conservation Programs for CII Accounts Program	Implemented
J	Wholesale Agency Programs	Exempt
K	Conservation Pricing Program	Implemented
L	Water Conservation Coordinator Program	Implemented
M	Water Waste Prohibition Program	Implemented
N	Residential Ultra-Low-Flush Toilet Replacement Rebate Program	Will be implemented

6.3 Water Survey Program for Single-Family and Multi-Family Residential Customers

In 1992, CVWD implemented a water survey/audit program aimed at reducing residential water use. The program addresses indoor and outdoor residential water use separately. For indoor residential water use, CVWD has provided a self-help guide to its customers that provides guidance on calculating individual indoor water use, recommendations on how to save water, and tips on how to fix water leaks.

For outdoor residential water use, CVWD has provided water audits for residential customers on request. The audits are offered to customers calling for assistance in improving their water use efficiency. Since CVWD utilizes a tiered water budget-based rate system as shown later in **Tiered water** rates went into effect for residential customers in 2009 and were rolled out to the remainder of all urban water customers in 2010. As shown in Section 4, CVWD's per capita consumption has decreased significantly since the tiered rates were implemented, going from 580 gpcd in 2008 to 482 gpcd in 2010. The measurement of success for this program is to show continued reductions in per capita consumption in the future.

Table 6-9, there is a financial incentive for its customers to utilize these programs to reduce their water consumption. Customer bills indicate water usage as "excellent", efficient", "inefficient", "excessive" and "wasteful" relative to each customer's water budget. Customer calls usually result from an "inefficient" or worse rating on their tiered-rate water bill. The agency has audited 173 customers in the last two years and will continue to offer this service in the future. The intensive audit procedure is similar to the one used by CVWD for its large landscape and golf course customers.

6.4 Residential Plumbing Retrofit Program

In 1992, CVWD launched a program that included low flow showerhead distribution and plumbing fixture rebates. The community met the program with limited interest. Out of 1,000 kits that were assembled, only 350 were picked up in two years. Presently, residential plumbing upgrades are being realized via advances in local plumbing codes, which set higher appliance water efficiency standards for all new construction as well as renovations. CVWD currently has no active incentive program for customers to retrofit existing plumbing fixtures.

Plumbing retrofit products such as low-flow showerheads and faucet fixtures have been on the market more than 10 years and are now sufficiently developed to be technically sound products. The use and/or distribution of these products have social value as it brings conservation products, literally, in direct contact with area users, thereby raising awareness of water conservation efforts. Furthermore, the use of these products has the potential to reduce customer water bills. The use of these products provides neither significant direct or indirect health benefit nor detriment.

A cost-benefit analysis was performed for this DMM utilizing California Urban Water Conservation Council (CUWCC)'s draft cost-effectiveness spreadsheet. A summary of the results of this analysis is provided in **Table 6-2**. Although this DMM is financially feasible, CVWD's primary focus will be to reduce outdoor water use, which accounts for 80 percent of water use in CVWD's service area. CVWD has legal authority to implement this DMM.

6.5 System Water Audits, Leak Detection and Repair Program

CVWD has no plans to expand its distribution system water audit or leak detection activities, which are presently performed on an as-needed basis. CVWD has legal authority to implement this DMM. CVWD routinely evaluates historical data on water production and consumption. As shown in **Table 6-3**, between 2006 and 2010, annual water losses have not exceeded 7.3 percent and with an average annual water loss of 3.2 percent. According to CUWCC, an existing system is considered to be in excellent condition when water losses are lower than 10 percent (Fiske, 2001). As CVWD water losses are below this recommendation, the expansion of current leak detection and repair program is not necessary at this time. Although leak and/or line break repairs are performed by CVWD, no records of these activities, including system audits or leak detection program data are available.

The domestic water system was directly built within CVWD's service area or as part of communities that were built on neighboring County land, which developed into cities and thereafter incorporated into CVWD's service area. The bulk of pipelines installed and acquired by CVWD were installed in the 1970s to present. Consequently, aging infrastructure is not currently a significant component of water losses.

CVWD, on an as needed basis, performs monitoring and repair of water leaks and breaks. CVWD's goal is to maintain the system to keep the water loss around its existing level and prevent it from exceeding the threshold level of 10 percent. This goal will be measured by reviewing monthly water consumption and production data currently being tracked by CVWD.

Table 6-2
Residential Plumbing Retrofit Program
Cost-Benefit Analysis

Program Present Value Costs		Agency Perspective	Society Perspective
1.	Total devices distributed	175	175
2.	Total water savings (AF)	5.0	5.0
3.	Agency program costs	$6,850	$6,850
4.	Customer program costs	N/A	$1,925
5.	Cost share	$0	N/A
6.	Net Program Cost	$6,850	$8,775
Program Present Value Benefits		**Agency Perspective**	**Society Perspective**
7.	Agency supply & wastewater benefits	$10,302	$10,302
8.	Environmental benefits	$0	$0
9.	Customer program benefits	NA	$3,348
10.	Other utility benefits	NA	$0
11.	Total benefits	$10,302	$13,650
12.	Net Present Value	$3,452	$4,875
	(Line 11 - Line 6)		
13.	Benefit-Cost Ratio	1.50	1.56
	(Line 11 ÷ Line 6)		
14.	Simple Unit Supply Cost ($/AF)	$1,362	$1,745
	(Line 6 ÷ Line 2)		
15.	Discounted Unit Supply Cost ($/AF)	$1,513	$1,938
	(Line 6 ÷ discounted water savings)		

Notes:

1) Agency and social discount rate = 5 percent
2) Analysis workbook is provided in the Appendix.

Table 6-3
2006-2010 Percent Water Loss

Year	Annual Percent Water Loss
2006	2.3%
2007[1]	-1.2%
2008	3.1%
2009	7.3%
2010	4.7%
Average	3.2%

Note:

1) Based on the production and consumption data for 2007, annual consumption was greater than annual production, which resulted in a percent water loss of -1.2 percent. This may be due to the fact that production and consumption meters report data at different times, which results in a lag between the two sets of data.

6.6 Metering with Commodity Rates for all New Connections and Retrofit of Existing Connections Program

One hundred percent of CVWD's urban water customers are metered. The meters are billed based on volume of use. CVWD has mixed use meters serving both domestic use and landscape irrigation. All future water users will be required to have meters on their service connections.

6.7 Large Landscape Conservation Programs and Incentives Program

Within the CVWD service area, there are two principal groups of large landscape customers – those with separate irrigation meters on the urban water system and those with private wells for golf course or other landscape irrigation. Irrigation accounts for approximately 75-80 percent of total urban water usage. There are also many golf course irrigation users, who are not CVWD urban water users, but produce groundwater from private wells. One of CVWD's goals is to reduce water use by these large landscape customers. **Table** 6-4 shows a summary of conservation measures that are undertaken by CVWD associated with its large landscape irrigators. CVWD has legal authority to implement this DMM.

Table 6-4
Large Landscape Conservation Program Summary

Projects
Landscape irrigation retrofit low-interest loan program ($50,000 cap)
Water Management Seminar for Landscape Professionals (English and Spanish sessions)
Water audits for large water users
Adoption of model landscape ordinance by Coachella Valley cities to establish water budget and landscaping criteria for new development
Plan checking for compliance with landscape ordinance
Random inspection of landscape projects in compliance with landscape ordinance approval plans
Smart Controller Rebate Program
Landscape Conversion Rebate Program

6.7.1 Landscape Irrigation Retrofit Low-Interest Loan Program

CVWD offers an irrigation retrofit low-interest loan program to provide financial assistance to large domestic water meter users with older, inefficient irrigation. The program offers low interest (three percent) loans for up to $50,000 for the replacement of inefficient irrigation systems. The public has met the program with little interest since its inception in 1992. The program averaged only two loan approvals per year through 1996. From 2002-2004, only one loan application had been both submitted and approved. No loan applications have been submitted since that time.

CVWD proposes to revamp this program by widening the eligibility criteria. The loan cap would be increased to $100,000 per participant, which will increase the accessibility of the program as well as accommodate increased irrigation system hardware costs since 1992.

The goal of this program is to increase program participation to a minimum of six loans per year by expanding eligibility to a larger selection pool consisting of all irrigation meter sites, all landscape recycled water user sites, all landscape canal water user sites and all sites utilizing private groundwater wells as their source of landscape irrigation water. Measurement of these goals through 2015 will be performed by comparing the number of loans implemented per year versus the goal number of loans to be implemented. Prior to CVWD's recent conservation efforts, no goals had been established for this program.

6.7.2 Water Management Seminar for Landscape Professionals (English and Spanish)

Commercial and recreational landscape irrigation systems are often improperly installed, poorly maintained and inefficiently scheduled by transitory landscape maintenance personnel who are often unskilled and uneducated in the science and practice of landscape irrigation efficiency. Career landscape maintenance professionals have little or no in-valley, irrigation science educational opportunities.

Starting in September 2009, CVWD began offering a water landscape workshop specifically aimed at landscape professionals. The 6-hour workshop is designed to help local landscape professionals efficiently irrigate their clients' lawns and gardens without wasting water. Certified water conservation managers and turf and irrigation experts give presentations on Coachella Valley soils, drip irrigation, smart controllers, water pressure regulation, and irrigation scheduling. At the conclusions of each workshop, all participants receive a certificate of completion. Participants with professional landscape companies are listed on CVWD's website (www.cvwd.org).

The workshop, which is offered twice a year in both English and Spanish, has enjoyed much interest and participation since its inception. The workshops have an average attendance of approximately 50 people for each workshop. Class participants have included industry business owners, landscape managers, landscapers from cities and country clubs, and homeowners association (HOA) landscape committee members.

CVWD will continue to offer this workshop in the future. The measure of success of this program will be performed by surveying participants in the program as well as monitoring and measuring the annual attendance at the program.

6.7.3 Water Audits for Large Water Users

The purpose of the large landscape irrigation audit program is to assist users in maximizing the efficient operation of their irrigation system by measuring performance, generating irrigation schedules and recommending improvement actions.

The goals of this audit program are to determine the irrigation uniformity, efficiency and application rate of each approved site, suggest modifications in design, operation, maintenance and scheduling and estimate the water and energy savings associated with the suggested modifications. A report summarizing the audit's findings and recommendations is hand-delivered and explained to the irrigation manager.

Audit sites are chosen based on excessive water consumption or in response to a request for audit services. CVWD's Water Management Specialist evaluates and approves each site. All auditors must take the Irrigation Association's Landscape Irrigation Auditor course and pass the Certified Landscape Irrigation Auditor's Examination.

Once a site is approved for audit, the owner or operator of the facility is contacted and an appointment is made to conduct the audit. After measurements and calculations are completed, a summary report and recommendations is delivered and explained to the site operator by the auditor. The large landscape audit program operates continuously and completes approximately 20 landscape audits per year. The success of this program will be measured by the annual water reduction achieved by large water users participating as a result of the program. A study in 2005 found that the average HOA saved 3.1 acre feet per year as a result of implementing some of the audit recommendations.

6.7.4 Adoption of Model Landscape Ordinance by Coachella Valley Cities to Establish Water Budget and Landscaping Criteria for New Development

The Water Conservation in Landscaping Act of 2006 (Assembly Bill 1881, Laird) required cities and counties, to adopt water conservation ordinances by January 1, 2010. In accordance with the law, the DWR prepared an updated Model Efficient Landscape Ordinance (MWELO). For all cities and counties that do not adopt their own conservation ordinances, DWR's updated MWELO would apply within their jurisdiction by January 1, 2010.

In response to this law, CVWD worked with the Coachella Valley Association of Governments, Coachella Valley cities, Riverside County, other water agencies, and the Building Industry Association for the acceptance of CVWD's Landscape Water Conservation Ordinance No. 1302.1. A copy of CVWD's landscape ordinance is provided in the Appendix.

CVWD's Landscape Ordinance No. 1302.1 not only meets the state requirements, but also is tailored specifically to the unique climate and water conservation needs of the Coachella Valley. As shown in **Table 6-5**, Coachella Valley cities and agencies have adopted CVWD's landscape ordinance either in its entirety or have adopted an ordinance that meets or exceeds it.

6.7.5 Plan Checking for Compliance with Landscape Ordinance

New and rehabilitated landscape sites are required to submit water conserving landscape plans to CVWD's Water Management Department for a plan check prior to construction. The plan check is conducted to insure that the water conserving features of the new landscape meet the provisions of CVWD's Landscape Water Conservation Ordinance No. 1302. Each proposed site is given an annual maximum water allowance based on landscaped area, plant water use zone, low-moderate landscape plant water use rates and high irrigation system application efficiency. The landscape designer must utilize a combination of plant choice and irrigation system choice such that the estimated annual water use of the finished landscape does not exceed the annual maximum water allowance assigned. In addition, certain irrigation system design practices are mandated, such as setting sprinkler irrigated areas at least 24 inches back from street curbs, or prohibited, such as overhead sprinkling of street median strips.

Table 6-5
City/Community Compliance with CVWD Landscape Irrigation Ordinance

No.	City/Community Name	CVWD Landscape Irrigation Ordinance Status
1	Rancho Mirage	Accepted
2	Palm Desert	Accepted
3	Indian Wells	Accepted
4	Coachella	Accepted
5	Indio	Accepted
6	Cathedral City	Accepted
7	Palm Springs	Accepted
8	La Quinta	Accepted
8	Desert Hot Springs	Accepted
9	Riverside County (Unincorporated Communities)	Has lower standard ordinance
10	Indio Water Authority	Accepted
8	Building Industry Association, Desert Chapter	Accepted
9	Desert Water Agency	Accepted

The site plans and calculations are submitted to CVWD's Water Management Department for review and correction. Once the plans are in full compliance with the ordinance, the plans are signed and the developer is allowed to apply for water service and proceed with construction.

Fees are charged for this plan check service. Including income from these fees, the cost to CVWD to implement this program is approximately $81,000/year. Based on past performance, annual water savings generated by this program is approximately 1,644 acre-ft/yr.

The goal of this program is to reduce landscape irrigation consumption by mandating high efficiency irrigation systems and low water use landscaping wherever possible. To determine the success of the program, water use of new sites will be compared to water use of existing landscape sites that have not been rehabilitated.

6.7.6 Random Inspections of Landscape Projects for Compliance with Landscape Ordinance

As mentioned in the previous section, all new and rehabilitated landscape sites are required to submit water conserving landscape plans to CVWD's Water Management Department for a plan check prior to construction. The plan check is conducted to ensure that the water conserving features of the new landscape meet the provisions of CVWD's Landscape Water Conservation Ordinance. Recent investigations of excessive water use and nuisance water complaints have revealed that some of these new sites did not construct their landscape to include the approved water conservation features.

In order to ensure that contractors are installing plan-checked, water conserving landscapes as approved, CVWD has implemented a random inspection program. The inspections signal to the landscape construction industry that CVWD is spot checking completed landscape irrigation systems for plan-check compliance and will require errors and omissions to be corrected or face the possibility of discontinued water service.

Since 2007, CVWD has inspected approximately 40 sites per year. The measurement of success of this program will be the recorded percent of "in-compliance" designation of each randomly inspected site. The goal of the program is that 100 percent of the randomly inspected sites will be near or in compliance with CVWD ordinances by 2015. Compliance levels will be judged to be 100 percent if: 1) the installed landscape water use is calculated to be less than or equal to the maximum water allowance, 2) there is no overspray or runoff from the landscape, 3) actual measured water use for a period of one year after the initial plant establishment period has ended, is equal to or less than the estimated water use, and 4) all irrigation system components are installed according to plans and specifications.

6.7.7 Smart Controller Rebate Program

Beginning in 2005, CVWD instituted a smart irrigation controller rebate program to financially assist large water users in reducing landscape irrigation water consumption by purchasing an advanced irrigation controller capable of synchronizing their landscape irrigation schedules with seasonal variations in Coachella Valley reference evapotranspiration (ETo) rates.

ETo is a scientific description of the rate at which plant water use varies with the weather. Since the weather changes from season-to-season, week-to-week and even day-to-day, programming irrigation controllers frequently and efficiently remains one of the landscape industry worker's most neglected tasks. CVWD's rebate program is specifically aimed at encouraging the use of "smart" irrigation clocks that reprogram themselves according to periodic variations in ETo after the initial calibrating program has been professionally installed.

CVWD initially offered this program to residential customers in November 2005 and expanded the program to large landscape customers in March 2008. The rebate amount allocated is $750 per irrigated acre or half the cost of the smart controller, whichever one is less. In addition to the rebate, CVWD will also perform installation and follow-up work for residential customers. Large landscape customers typically self-install their smart controllers. CVWD has issued over 1,500 rebates since the program's inception.

The measurement of success of this program will be documenting water reduction by each participating user as well as showing an annual increase in applications for the rebate as the region grows.

6.7.8 Landscape Conversion Rebate Program

Since 2007, CVWD has offered a rebate to its customers for converting their outdoor grass landscaping to desert-friendly landscaping, which requires less irrigation. CVWD's landscaping guide, *Lush & Efficient: Landscape Gardening in the Coachella Valley*, provides guidelines on which plants work best in the hot, arid climate that CVWD's customers are situated in. The rebate consists of $1 per square foot of landscaping or turf, up to $2,000. The cost of the rebate is shared by CVWD and the cities within its service area. Since the program's start in 2007 through the end of 2010, 189 rebates have been issued covering nearly 280,000 square feet. Based on research from the Southern Nevada Water Authority, it is estimated that these 189 turf conversion projects will save as much as 53 AF of water per year. CVWD is currently conducting a study of 60 turf conversion program homes in the city of La Quinta. Each home will be compared with a neighboring home to determine actual water savings. Results of this study should be available by July, 2011.

The measurement of the success of this program will be the number of rebates issued per year and a marked reduction in a participating customer's water consumption.

6.8 High-Efficiency Washing Machine Rebate Program

CUWCC classifies washing machines with a water use factor of less than 8.5 as high efficiency clothes washing machines (HEWS). Presently, CVWD does not provide high-efficiency washing machine rebates. CVWD is the principal water and wastewater provider within its service area and has legal authority to implement this DMM. Nearly all of the wastewater generated in CVWD is reused or is returned to the groundwater.

The promotion and use of high-efficiency washing machines has social value as it brings conservation products, literally, in direct contact with area users, thereby raising awareness of water conservation efforts. Furthermore, the use of these products has the potential to reduce customer water, wastewater, gas and electric bills. The use of these products provides no direct health benefit or detriment. The indirect benefits of this are that less energy and detergents are used to operate the machines. This would reduce the need for groundwater pumping and replenishment, collection, treatment and the subsequent reuse or disposal of wastewater as well as the numerous environmental benefits of reducing energy consumption.

Exhibit 1 of the MOU guidelines provides a guideline for calculating the benefits of this program were used (CUWCC, 2004). A cost-benefit analysis was performed for this DMM utilizing CUWCC's draft cost-effectiveness spreadsheet. A summary of the results of this analysis is provided in **Table** 6-6. Although there is a positive cost-benefit ratio, CVWD will focus more on outdoor water use conservation programs due to the fact that approximately 80 percent of water use in the CVWD service area is for irrigation purposes.

In addition, nearly all discharge from washing machines are discharged to CVWD's sewer system where essentially all water is recycled. The implementation of this program would not significantly save discarded water in the CVWD service area.

6.9 Public Information Program

There are several public information programs being operated presently by CVWD. The purpose of these programs is to educate the public on conservation programs being planned and/or implemented by CVWD as well as educational tips that customers can use to lower their water usage. **Table** 6-7 provides a list of CVWD's current public information tools.

Table 6-6
High-Efficiency Washing Machine Rebate Program
Cost-Benefit Analysis

Program Present Value Costs		Agency Perspective	Society Perspective
1.	Total rebates distributed	100	100
2.	Total water savings (AF)	19.1	19.1
3.	Agency program costs	$16,500	$16,500
4.	Customer program costs	NA	$30,000
5.	Cost share	$0	NA
6.	Net Program Cost	$16,500	$46,500
Program Present Value Benefits			
7.	Agency supply & wastewater benefits	$30,866	$30,866
8.	Environmental benefits	$0	$0
9.	Customer program benefits	NA	$43,784
10.	Other utility benefits	NA	$0
11.	Total benefits	$30,866	$74,649
12.	Net Present Value	$14,366	$28,149
	(Line 11 - Line 6)		
13.	Benefit-Cost Ratio	1.87	1.61
	(Line 11 ÷ Line 6)		
14.	Simple Unit Supply Cost ($/AF)	$863	$2,431
	(Line 6 ÷ Line 2)		
15.	Discounted Unit Supply Cost ($/AF)	$1,216	$3,428
	(Line 6 ÷ discounted water savings)		

Notes:

1) Agency and social discount rate = 5 percent
2) Analysis workbook is provided in the Appendix.

Table 6-7
Public Information and Education Programs

Projects
Publications – Lush and Efficient: Landscape Gardening in the Coachella Valley
Demonstration Garden
Annual Horticulture Workshop
Expanded Water Education Program for Residential Users
Water Conservation Webpage

6.9.1 Publications – Lush and Efficient

CVWD publishes a guide on water-efficient landscaping in the Coachella Valley titled *Lush and Efficient*: *Landscape Gardening in the Coachella Valley*. The guide draws on the expertise of local irrigation and landscaping specialists to provide users with step-by-step instructions and techniques for creating and maintaining water-efficient landscapes. First published in 1988, the popular book is available for free from CVWD's website. Hard copies are also readily available, accompanied by an interactive CD, which provides users with samples of water-efficient landscapes, a searchable list of plants, and a directory of additional landscape resources. In 2010, approximately 350 hard copies of *Lust and Efficient* were given out and the online-version received 27,193 page views.

The measurement of interest and success of this program will be to show a steady and/or increase in the number of hard copies distributed and the number of page views the online version receives.

6.9.2 Demonstration Gardens

The majority of urban potable water distributed by CVWD is used outside with about 70-80 percent being used to maintain landscapes. Since CVWD's boundaries fall within the California Department of Water Resources' highest ET zone (18), it takes more water to grow landscapes here than in any other portion of California. The Coachella Valley shares this highest water use designation with the Palo Verde Valley, Imperial Valley and Death Valley.

One way to reduce landscape water requirements is to use native desert plants in landscaping. Desert native plants have evolved both anatomical and physiological mechanisms that allow them to survive on annual rainfall alone.

Within the Coachella Valley, which is one of the lowest annual rainfall areas in the state, desert plants from other, wetter deserts can be utilized with a minimum amount of irrigation. CVWD has identified and illustrated these plant choices in its publication *Lush and Efficient*: *Landscape Gardening in the Coachella Valley*. CVWD's two demonstration gardens, one at its headquarters in Coachella and the other at its office in Palm Desert, provide the landscape industry and the general public an opportunity to observe the plants in a landscape setting.

The objective measurements of interest and success of this program will be attendance at the gardens and subjective measurements achieved through the feedback from visitor surveys.

6.9.3 Annual Horticulture Workshop

Started 18 years ago with about 30 people attending a half-day session at College of the Desert, this program has been sold out nearly every year despite increases in the number of presentations. In 2010, 220 people participated in two workshops. Speakers include CVWD staff and community members who are experts in various fields related to landscaping. Participants are given a copy of *Lush and Efficient*: *Landscape Gardening in the Coachella Valley* and other xeriscape information.

The measurement of interest and success of this program will be through steady and/or increase in the number of people attending the course offered under this program.

6.9.4 Expanded Water Education Program for Residential Users

CVWD has a long-standing tradition of promoting conservation at the Riverside County Fair and National Date Festival through a booth and display. In 2005, CVWD began loaning their display to other government agencies to be showcased to a larger number of people. The display has made numerous appearances at various conferences and events, including the Association of California Water Agencies, Colorado River Water Users Association, Ag Summit 6 and the Coachella Valley Water Symposium.

Under this program, welcome packets will be distributed to new residential accounts. The packet provides basic information about CVWD, but is more heavily aimed at water conservation techniques. This program is currently being developed and success of the program will be monitored by surveying users subject to this program.

6.9.5 Water Conservation Website

CVWD has a section on their website (www.cvwd.org/conservation) that is devoted to water conservation and education. Started in 2005, the webpage provides information on all of the agency's conservation programs including information on the annual horticulture workshop and a link to download CVWD's landscaping guide, *Lush and Efficient*: *Landscape Gardening in the Coachella Valley.* In addition, regional daily and monthly weather and ETo information is provided to guide water users. CVWD also provides links to *The Water Wheel,* a quarterly newsletter published by the agency that supplies teachers with water education news and information.

The conservation section received 100,243 page views in 2010. The measurement of interest and success of this program will be to show a steady and/or increase in the number of page views to the section.

6.10 School Education Program

Started in 1992, CVWD has an established school education program. The agency has a program manager as well as two full time teachers on staff implementing the program. Presently, there are two components to the program. The first is the presentation of classroom lesson plans and the second is science fair promotion and sponsorship. CVWD's teachers make audience-specific water education presentations to students at every level from pre-school to college. All school lesson plans are developed using California State Board of Education Standards and Frameworks. In addition to classroom presentations, CVWD's teachers judge science fairs for the public and private schools within the agency's service area. **To measure the effectiveness of the program, participating audiences will be** surveyed and their responses recorded. For the newsletter and educational website, effectiveness will be measured by the number of hits the website garners.

Table 6-8 provides a statistical summary of the achievements of the program.

To measure the effectiveness of the program, participating audiences will be surveyed and their responses recorded. For the newsletter and educational website, effectiveness will be measured by the number of hits the website garners.

Table 6-8
School Education Program Summary

School Year 2009-2010	Affected Audience
Grade visited	Pre-school through college
Students taught	1,550
Science fair awards sponsored	12

6.11 Conservation Programs for CII Accounts Program

The CVWD service area is not a heavily industrialized area and most water use, up to 80 percent in fact, is used for irrigation. In 2010, commercial, industrial, and institutional (CII) use made up 6 percent of CVWD's urban water demand. Much of existing passive conservation by CII customers is due to current plumbing codes. In addition, CII customers are subject to the landscape ordinance described in Section 6.7.4 or a similar ordinance that meets or exceeds the requirements of CVWD's ordinance, and tiered water rates described in Section 6.13.

6.12 Wholesale Agency Programs

CVWD is not a wholesale agency at this time and thus this DMM is not directly applicable to them. However, CVWD is actively pursuing and implementing opportunities to collaborate with other Valley-wide agencies on water conservation programs.

6.13 Conservation Pricing Program

Conservation pricing provides incentives to customers to reduce average or peak use, or both. For its urban water system, CVWD uses a water budget-based tiered rate structure that discourages wasteful water use. The agency uses water commodity rates for its non-potable (including recycled) water and wastewater services.

Every residential customer is given a personalized water budget based on the number of people living in the home, size of the home's landscaped area (budgeting more water to those with larger landscapes), and daily weather (budgeting more water during hotter months). Customers pay the tier rate for all water used within that tier. The base rate is dependent on where the customer is located within CVWD's four cost centers

Table 6-9 presents CVWD's tier rates and the costs associated with each tier.

Tiered water rates went into effect for residential customers in 2009 and were rolled out to the remainder of all urban water customers in 2010. As shown in Section 4, CVWD's per capita consumption has decreased significantly since the tiered rates were implemented, going from 580 gpcd in 2008 to 482 gpcd in 2010. The measurement of success for this program is to show continued reductions in per capita consumption in the future.

Table 6-9
Tiered Water Rates

Tiers	Water use	Cost	Example Cost (for Rate Area 1)
Tier 1: Excellent	Up to 1,000 ft^3 per month	90% Base Rate	$1.01
Tier 2: Efficient	Up to 105% of water budget	Base Rate	$1.12
Tier 3: Inefficient	105% to 150% of water budget	Base Rate x 1.5	$1.68
Tier 4: Excessive	150% to 250% of water budget	Base Rate x 2	$2.24
Tier 5: Wasteful	250% or more of water budget	Base Rate x 4	$4.48

6.14 Water Conservation Coordinator Program

CVWD currently has a full-time water conservation coordinator as well as support staff for CVWD's conservation program. Supporting positions include a water management supervisor, water management specialist, water management technicians, and water management aides. Beginning in 2001 with a staff of two people, the staff now consists of 12 people to carry out the agency's various conservation programs.

6.15 Water Waste Prohibition Program

CVWD does not have a stand-alone water waste prohibition ordinance. It does, however, have provisions written in the model landscape ordinance, which can be found in the Appendix D, with specific penalties for water waste. These provisions are provided below:

Section 0.00.040, Part C

1. *Water Waste Prevention. Water waste resulting from inefficient landscape irrigation including run-off, low-head drainage, overspray, or other similar conditions where water flows onto adjacent property, nonirrigated areas, walks, roadways, or structures is prohibited. All broken heads and pipes must be repaired within 72 hours of notification. Penalties for violation of these prohibitions are established in Section 0.00.070.*
2. *Water service to customers who cause water waste may have their service discontinued.*

3. *Customers who appear to be exceeding the Maximum Applied Water Allowance (MAWA) may be interviewed by the District Water Management Department to verify customer water usage to ensure compliance.*

As discussed previously, all cities within CVWD's service area have adopted the agency's landscape ordinance or one that meets or exceeds its requirements. The measurement of success for this program is a reduction in water waste violations in the future.

6.16 Residential Ultra-Low-Flush Toilet Replacement Rebate Program

Ultra-low-flush (ULFT) toilets conserve water by utilizing far less water than older, less efficient toilets. CUWCC's BMP 14 defines ULFT as toilets using less than 1.6 gallons per flush. In addition to direct conservation benefits, the promotion and use of these toilets has social value as it brings conservation products, literally, in direct contact with area users, thereby raising awareness of water conservation efforts. Furthermore, the use of these products has the potential to reduce customer water and electric bills. The use of these products provides no direct health benefit or detriment.

Having the legal authority to do so, CVWD is planning to implement a ULFT replacement rebate program in 2011. The agency will provide a rebate of $100 for each toilet replacement, which will cover approximately half the cost of purchasing and installing a ULFT. CVWD is planning to roll-out this program with an initial offering of 60 rebates in the first year. The number of rebates offered can be adjusted in the future as demand dictates.

A cost-benefit analysis was performed on the proposed program utilizing CUWCC's draft cost-effectiveness spreadsheet. The rebate program has a positive cost-benefit ratio as shown in **Table 6-10**.

In addition to the rebate program, ULFTs are required for all new construction per plumbing code requirements. ULFTs were first introduced to the U.S. market in 1980 and the manufacturing of older, less efficient toilets designs was halted shortly thereafter. It is estimated that natural replacement of residential toilets occurs every 20-30 years or at a rate of about 3-5 percent per year (CUWCC, 2004). Using this methodology, approximately 25 percent of the toilets from pre-1980 houses would still be installed in 2025.

6.17 Golf Course Conservation

CVWD does not deliver domestic water for golf course irrigation. However, it does deliver Canal water, recycled water or a blend of the two to selected golf courses within Coachella Valley. The CVWD Landscape Ordinance established maximum allowable turf area and associated water demands for new golf courses by limiting turf to 4 acres per hole plus 10 acres for associated practice areas (driving ranges and putting greens). Other landscaping must use low water-using plant materials. Based on a typical 18-hole course encompassing about 125 acres of landscaped area, the expected water use would be about 700 AFY, which is an additional 22 percent reduction compared with the 2002 WMP goal for new courses and about 40 percent less than existing older courses.

CVWD continues to work with new and existing golf courses to reduce water demands through programs such irrigation system audits, plan checking, inspecting new golf courses for plan check compliance, and monitoring maximum water allowance compliance.

Existing golf courses could achieve enhanced water savings by the following methods:

- Scientific irrigation scheduling
- Water audits - each course is audited every five years
- Monitoring of maximum water allowance compliance

Table 6-10
ULFT Replacement Rebate Program
Cost-Benefit Analysis

Program Present Value Costs		Agency Perspective	Society Perspective
1.	Total ULFTs distributed	60	60
2.	Total water savings (AF)	19.1	19.1
3.	Agency program costs	$9,750	$9,750
4.	Customer program costs	NA	$5,700
5.	Cost share	$0	NA
6.	Net Program Cost	$9,750	$15,450
Program Present Value Benefits		**Agency Perspective**	**Society Perspective**
7.	Agency supply & wastewater benefits	$26,958	$26,958
8.	Environmental benefits	$0	$0
9.	Other utility benefits	NA	$0
10.	Total benefits	$26,958	$26,958
11.	Net Present Value	$17,208	$11,508
	(Line 10 - Line 6)		
12.	Benefit-Cost Ratio	2.76	1.74
	(Line 10 ÷ Line 6)		
13.	Simple Unit Supply Cost ($/AF)	$511	$810
	(Line 6 ÷ Line 2)		
14.	Discounted Unit Supply Cost ($/AF)	$823	$1,304
	(Line 6 ÷ discounted water savings)		

Notes:

1) Agency and social discount rate = 5 percent
2) Analysis workbook is provided in the Appendix.

As described earlier, the water demand for future golf courses is expected to be 22 percent less than the amount used in the 2002 WMP for new courses. This reduction can be achieved by the following methods:

- Full implementation of turf limitations specified in the Landscape Ordinance
- Plan checking for all new golf courses
- Inspection of all new courses after construction
- Water audits every five years

6.18 Agricultural Conservation

Similar to golf courses, agricultural customers are served with canal water. For agricultural conservation, it has been demonstrated that CVWD-provided programs with voluntary grower participation are effective in increasing water use efficiency through both the 2025 and the Extra-ordinary Conservation Measures programs. The Extra-ordinary Conservation Measures programs are a series of voluntary agricultural conservation measures, which pay back Reclamation for past excess Colorado River diversions under the Inadvertent and Overrun and Payback Policy. The following programs are currently being developed for agricultural conservation by CVWD.

Grower Education and Training: This would consist of grower meetings and grower training programs funded by CVWD. In order to encourage grower participation, CVWD would implement confidential grower audits.

CVWD-Provided Services: This would include CVWD-funded conservation programs provided as a service to growers within the District. Programs would include scientific irrigation scheduling, scientific salinity management, soil moisture monitoring, and farm distribution uniformity evaluations. From 2004 through 2009, 73,400 acre-ft of documented extraordinary conservation occurred using these programs for a total program cost of $2,954,000 (about $40/acre-ft). Additional expenditures of $200,000 in 2009-10 resulted in savings of 3,400 acre-ft/yr ($59/acre-ft).

Irrigation Upgrade/Retrofit: This would add full funding, partial funding or financial support to growers that wish to convert from flood and sprinkler to micro-sprinkler and drip systems. In a fully funded program, CVWD would provide reasonable reimbursement to a grower who upgrades his irrigation system or retrofits an aging drip system. A partially funded program would share the expenses and a program that offers financial support would provide low or no-interest loans for the upgrades or retrofits.

Economic Incentives: This would involve adoption of one or more pricing approaches to encourage conservation, if needed. This might be accomplished by establishing an irrigation water allocation based on evapotranspiration and a crop-specific coefficient. Water use in excess of the base allocation would be charged at a higher rate.

Regulatory Programs: These types of programs would be considered as a last resort, and would include regulations that support and provide for agricultural conservation. Programs could include the following:

- Grower-prepared on-farm water management plans defining the methods of applying water and the water conservation measures utilized, and
- All new permanent crops would use drip and/or micro-spray irrigation systems. All current crops must be converted within a 5 year period.

SECTION 7 CLIMATE CHANGE

Climate change has the potential to affect Coachella Valley's two major sources of imported water: the Colorado River and the SWP. Potential effects of climate change could also increase water demand within the Coachella Valley. This section describes these potential changes and CVWD's climate change adaptation approach.

7.1 Colorado River Basin

The U.S. Bureau of Reclamation (Reclamation) Lower Colorado Region (LC Region) has undertaken an extensive research and development program to investigate the use of new methods for projecting possible future Colorado River flows that take into account increased hydrologic variability and potential decreases in the river's annual inflow due to a changing climate. The Colorado River Hydrology Work Group (Hydrology Work Group) and the Colorado River Modeling Work Group (Modeling Work Group) are conducting several studies as part of this research and development program.

Precise estimates of future impacts of climate change on runoff throughout the Colorado River basin are not currently available and studies are on-going to get a better handle on these impacts (Reclamation, 2007). These impacts may include decrease in annual flow and increased variability, including more frequent and more severe droughts. Furthermore, even without precise knowledge of the effects, increasing temperatures alone would likely increase losses due to evaporation and sublimation, resulting in reduced runoff.

Increased air temperature will result in earlier snow melt runoff and a greater proportion of runoff due to rainfall. Because reservoir storage in the Colorado River basin is so large in comparison to annual basin runoff (roughly four times average runoff), a change in the timing of annual runoff would not be expected to significantly affect basin yield (DWR, 2006).

Potential changes in the amount of precipitation received by the Colorado River basin could affect basin yield. Warmer temperatures could also be expected to increase water demands and increase evaporation from reservoirs and canals. While changes in any particular location will likely be small, the aggregate change for the basin could be significant because so much land is involved. No reliable quantitative estimates of potential changes in precipitation (or increased demand) are available (Reclamation, 2007).

Climate changes impacts were evaluated in the Environmental Impact Study (EIS) on the "Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lakes Powell and Mead," (Reclamation, 2007). The guidelines extend through 2026, providing the opportunity to gain valuable operating experience through the management of Lake Powell and Lake Mead, particularly for low flow reservoir conditions, and to improve the bases for making additional future operational decisions during the interim period and thereafter.

The shortage sharing guidelines are crafted to include operational elements that would respond if potential impacts of climate change and increased hydrologic variability occur. The guidelines include coordinated operational elements that allow for adjustment of Lake Powell releases to respond to low average storage conditions in Lake Powell or Lake Mead. In addition, the guidelines enhance conservation opportunities in lower basin and retention of water in Lake Mead.

While impacts from climate change cannot be quantified at this time, the interim guidelines should provide additional protection against impacts of shortage sharing at least through 2026. Coachella Valley water supplies are protected from impacts of climate change and corresponding shortages by 1) California's high priority for Colorado River water supplies in the lower Colorado River basin, and 2) CVWD's third priority for Colorado River supplies among California users of Colorado River water.

Additionally, Reclamation is currently developing the "Colorado River Basin Water Supply and Demand Study". This study will define the current and future water supply and demand imbalances in the Colorado River Basin for the next 50 years. The study is scheduled to be completed by January 2012. More accurate information on climate change is expected to be available in the subsequent UWMP cycles.

7.2 State Water Project

To assess impacts of climate change on the SWP, DWR evaluated four scenarios generated from two different Global Climate Models (GCMs), a Geophysical Fluid Dynamic Lab (GFDL) model and a Parallel Climate Model (PCM). All four scenarios predict a warming trend for California. The likelihood of any one of these scenarios occurring over another has not been assessed (DWR, 2006). DWR conducted an updated analysis using six different global climate models in 2009. The analysis shows a 7 percent to 10 percent reduction in Delta exports by mid century and up to 25 percent reduction by the end of the century. Reservoir carryover storage is projected to decrease by 15 percent to 19 percent by mid century and up to 38 percent by the end of the century.

The models also projected a change in the timing of runoff from the Sierra Nevada and the southern end of the Cascades. More runoff will occur in the winter and less in the spring and summer, making it more difficult for the SWP to capture water and deliver it to contractors. The 2006 study performed by DWR predicted significant declines in SWP deliveries. **Table 7-1** presents potential impacts on SWP water deliveries.

DWR assessed the impacts of climate change on SWP Table A and Article 21 deliveries in 2007 and 2009. The assessment included the impact of court rulings to protect the endangered Delta smelt. A review of the effects of climate change, as presented in DWR's 2009 SWP Reliability Report (DWR, 2009), indicates that climate change could decrease average SWP deliveries by as much as 5 percent by 2029 based on interpolation of the 2006 climate change report.

The average SWP reliability factor of 50 percent of Table A Amount assumed in this report and the 2010 WMP is believed to account for potential climate change impacts on supply through 2045.

Table 7-1
Impacts of Five Climate Change Scenarios on State Water Project Table A and Article 21 Average Deliveries (for 2020)

Scenario	Table A			Article 21		
	Average	Difference		Average	Difference	
	TAFY	TAFY	%	TAFY	TAFY	%
BASE	3,186	0	0	99	0	0
GFDL A2	2,879	-307	-9.6	106	7	7.1
PCM A2	2,964	-222	-7.0	103	4	4.0
GFDL B1	2,861	-325	-10.2	101	2	2.0
PCM B1	3,224	+38	+1.2	88	-11	11.1

TAFY = Thousand acre-feet per year

GFDL = National Oceanic and Atmospheric Administration Geophysical Fluid Dynamics Laboratory CM2.1 model

PCM = Parallel Climate Model

Source: Progress on Incorporating Climate Change into Management of California's Water Resources, DWR, July 2006

7.3 Coachella Valley Supplies and Demands

Projected potential changes in temperature or evapotranspiration for the Coachella Valley due to climate change are not currently available. However, based on larger scale studies, it can be inferred that increased temperatures in the Coachella Valley would increase water demands for crop and landscape irrigation, municipal water use, and evaporative losses from canals and open reservoirs. It has been suggested that increased summer temperatures could draw increased monsoonal flow resulting in more frequent summer thunderstorms. However, no formal studies have been conducted.

7.4 Adaptation Strategies

CVWD is taking the following measures to adapt to the potential impacts of climate change on its water resources:

- Increased emphasis on water conservation and efficient use
- Inclusion of a 10 percent water supply planning contingency to provide a buffer in the event that current and planned supplies do not generate the amount of water anticipated
- Evaluation of reduced future SWP supply reliability in the absence of improved Delta conveynace facilities

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APPENDIX B
URBAN WATER USE TARGET CALCULATIONS

Urban Water Use Target

Method 1	
Base Daily Per Capita Water Use (gpcd)	591
80% of Base (gpcd)	473

Method 2	
Indoor Residential Use (gpcd)	55
Landscaped Area Water Use (gpcd)	339
Baseline CII Water Use (gpcd)	54
Target CII Water Use (gpcd) 10% Reduction	48
Water Loss Factor	3.2%
Urban Water Use Target (gpcd)	457

Method 3	
Hydrologic Region (Colorado River) 2020 Target (gpcd)	211
Urban Water Use Target (gpcd) 95% of Hydrologic Region Target	200

Method 4	
Base Daily Per Capita Water Use (gpcd)	591
Default Indoor Residential Use (gpcd)	70
CII Baseline (gpcd)	54
Estimated Landscape & Water Loss (gpcd)	467
Indoor Residential Savings - default (gpcd)	15
Unmetered Deliveries Metering Savings (gpcd)	-
	-
CII Savings - 10% (gpcd)	5
Landscape & Water Loss Savings - 21.6% (gpcd)	101
Total Savings	121
Urban Water Use Target (gpcd)	470

5-Year Base Period Check	
5-Year Base Daily Per Capita Use (gpcd)	590
95% of Base Daily Per Capita Use (gpcd)	561
Urban Water Use Target:	
Method 1 (gpcd)	473
Method 2 (gpcd)	457
Method 3 (gpcd)	200
Method 4 (gpcd)	470
Check	OK

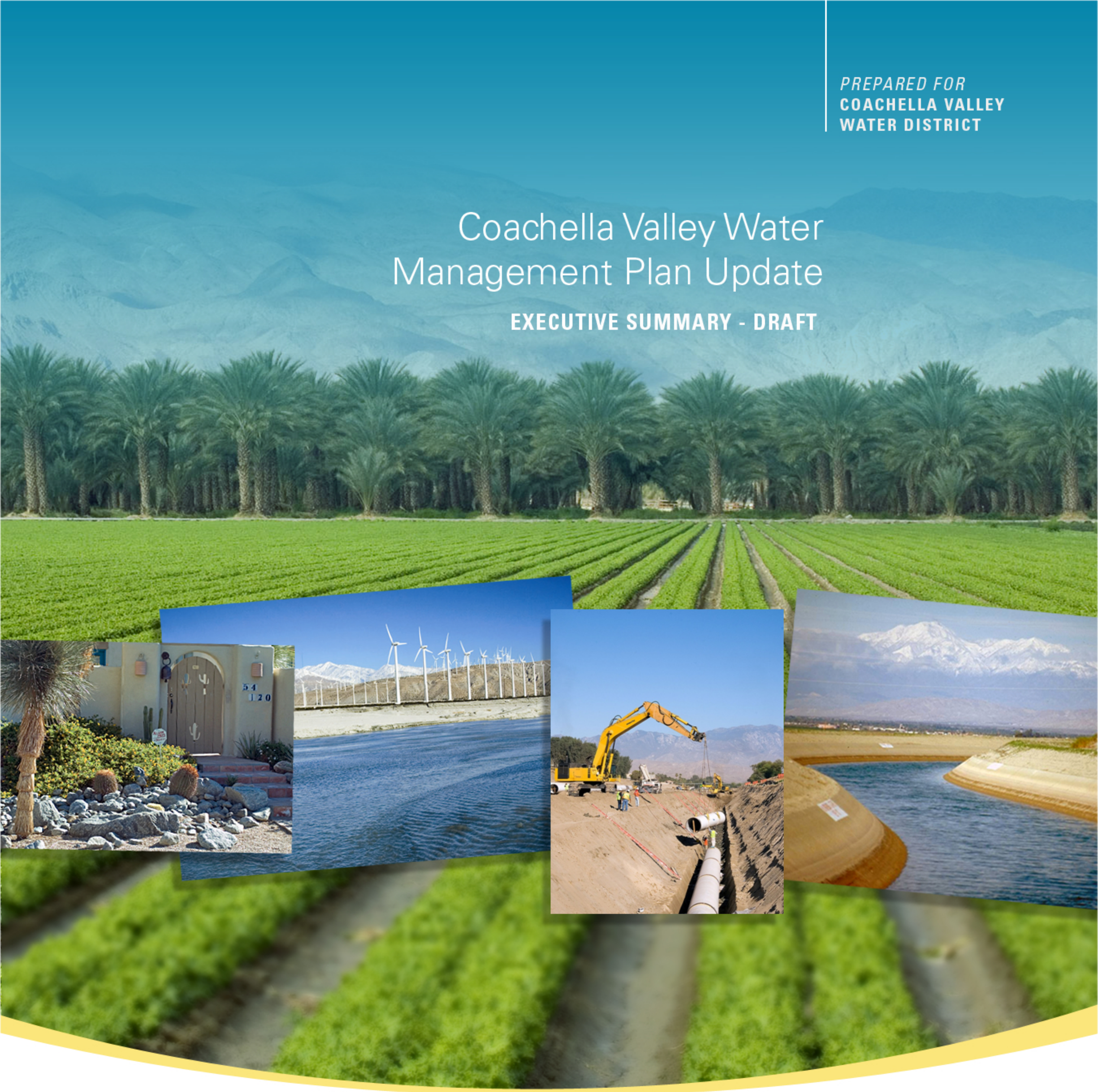
Interim Urban Water Use Target	
Base Daily Per Capita Use (gpcd)	591
Urban Water Use Target (gpcd)	473
Interim Urban Water Use Target (gpcd)	532

APPENDIX C
CVWMP EXECUTIVE SUMMARY

PREPARED FOR
COACHELLA VALLEY WATER DISTRICT

Coachella Valley Water Management Plan Update

EXECUTIVE SUMMARY - DRAFT



December 2010

Coachella Valley Water District

MWH
BUILDING A BETTER WORLD

Water Consult
Engineering and Planning Consultants

COACHELLA VALLEY WATER MANAGEMENT PLAN 2010 UPDATE

Executive Summary - Draft

Prepared by:

Coachella Valley Water District

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General Manager-Chief Engineer

Patti Reyes
Planning and Special Program Manager

December, 2010

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Executive Summary

The Coachella Valley Water Management Plan was adopted by the Board of Directors, Coachella Valley Water District (CVWD) in September, 2002. The goal of the Water Management Plan is to reliably meet current and future water demands in a cost effective and sustainable manner. The Board recognized the need to update the Plan periodically to respond to changing external and internal conditions. This 2010 WMP Update meets that need. It defines how the goal will be met given changing conditions and new uncertainties regarding water supplies, water demands, and evolving federal and state regulations.

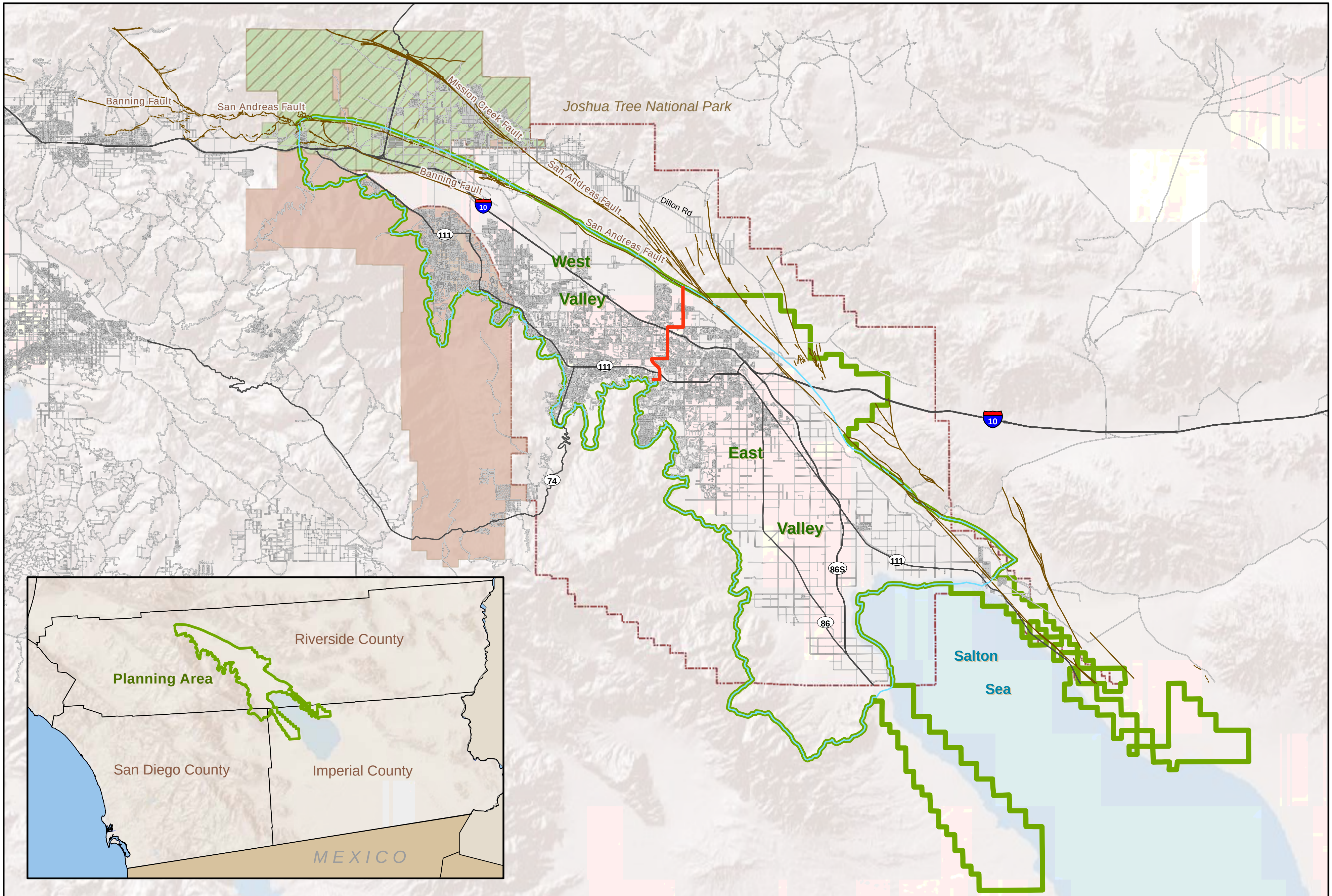
ES-1 THE COACHELLA VALLEY

The Coachella Valley is located in the central portion of Riverside County. For purposes of this Water Management Plan, the Coachella Valley is divided into the West Valley and the East Valley. Geographically, the East Valley is southeast of a line extending from Washington Street and Point Happy northeast to the Indio Hills near Jefferson Street, and the West Valley is northwest of this line (**Figure ES-1**).

The West Valley includes the cities of Palm Springs, Cathedral City, Rancho Mirage, Indian Wells and Palm Desert, and has a predominately resort/recreation-based economy that uses groundwater. The East Valley includes the cities of Coachella, Indio and La Quinta and the communities of Mecca and Thermal and historically has had an agricultural-based economy that uses Colorado River water imported via the Coachella Canal and groundwater. Water in the West Valley is supplied by several sources; groundwater, surface water from local streams, State Water Project Exchange water and recycled water. East Valley sources consist primarily of Coachella Canal water and groundwater, with a small amount of recycled fish farm effluent for agricultural uses. Urban growth is occurring in the East Valley and is projected to continue in the future.

The Coachella Valley's principal groundwater basin, the Whitewater River Subbasin extends from Whitewater in the northwest to the Salton Sea in southeast. The basin has a storage capacity of approximately 30 million acre-feet[1] (AF) (DWR, 1964). Water placed on the ground surface in the West Valley will percolate through the sands and gravels directly into the groundwater aquifer. In the East Valley, however, several impervious clay layers lie between the ground surface and the main groundwater aquifer. Water applied to the surface in the East Valley does not readily reach the lower groundwater aquifers due to these impervious clay layers. The only outlets for groundwater in the Coachella Valley are through subsurface outflow under the Salton Sea or through collection in drains and transport to the Salton Sea via the Coachella Valley Storm Channel (CVSC).

1 One acre-foot (AF) is the amount of water that would cover one acre of land (approximately the size of a football field), one foot deep or about 326,000 gallons.



Key to Features
Area of Benefit Boundary
Fault
Whitewater River Sub-Basin
DWA
CVWD
MSWD
Highways
Study Area
MSWD/DWA

Source: DWR, ESRI, County of Riverside

0 4.5 9 Miles

Document:\Coachella Valley WD\WMP Update\14 Electronic Files - Modeling\GIS\Projects\EastWest.mxd

Date: December 2010

2010 Water Management Plan Update Study Area

Figure ES-1

MWH

ES-2 WATER MANAGEMENT IN THE COACHELLA VALLEY

Water management in the Valley began as early as 1915. With groundwater levels falling, the need for a supplemental water source was recognized for the Valley to continue to flourish.

The Coachella Valley Stormwater District was formed in 1915 followed by formation of CVWD in January 1918. CVWD's first directors quickly filed paperwork to secure rights to all unclaimed Whitewater River water, an important source for aquifer recharge. In 1918, a contract was awarded for construction of water spreading and recharge facilities in the Whitewater River northwest of Palm Springs.

CVWD next focused on obtaining imported Colorado River water. In 1934, negotiations with the federal government were completed, and plans were in place for the construction of the Coachella Branch of the All American Canal. Construction of the Canal began in 1938, but was interrupted by World War II. The first deliveries of imported Colorado River water to East Valley growers began in 1949. The service area for Canal water delivery under the CVWD's contract with the U.S. Bureau of Reclamation (Reclamation) is defined as Improvement District No. 1 (ID-1). The impact of imported water on the Valley was almost immediate. By the early 1960s, water levels in the East Valley had returned to their historical high levels.

Although groundwater levels in the East Valley had stabilized, water levels in the West Valley continued to decline as growth occurred. Desert Water Agency (DWA) was formed in 1961 to import State Water Project (SWP) water into the Palm Springs and Desert Hot Springs areas. In 1962 and 1963 respectively, DWA and CVWD entered into contracts with the State of California for 61,200 AFY of SWP water. To avoid the then estimated $150 million cost of constructing an aqueduct to bring SWP water directly to the Valley, CVWD and DWA entered into an agreement with the Metropolitan Water District of Southern California (Metropolitan) to exchange SWP water for Colorado River water.

Starting in 1973, the CVWD and DWA began exchanging their annual SWP allocation with Metropolitan for Colorado River water to recharge West Valley groundwater at the Whitewater River Recharge Facility. CVWD, DWA and Metropolitan also signed an advance delivery agreement in 1984 that allows Metropolitan to store additional water in the Valley. Since 1973, the spreading facility had percolated in excess of 2.2 million acre-feet (AF) of Colorado River water exchanged for SWP water.

By the 1980s, groundwater demand in the East Valley had again exceeded supplies, resulting in significant groundwater level decreases in some parts of the East Valley. Because groundwater recharge in the East Valley is complicated by relatively impervious clay layers in the Valley floor, CVWD began looking for sites sufficiently far away from the main clay layer to allow groundwater recharge. In 1995, the CVWD began operating the Dike No. 4 pilot recharge facility located on the west side of the East Valley in La Quinta. The pilot successfully demonstrated the feasibility of East Valley groundwater recharge. The facility was expanded in 1998 to determine the ultimate recharge capacity at this location. In October 2009, the Thomas E. Levy Groundwater Replenishment Facility (Levy facility, formerly Dike 4) was dedicated. It has a current recharge capacity of 32,000 AFY, upgradable to 40,000 AFY.

Recycled water has been a priority water supply in the Valley since 1965. Currently, CVWD and DWA provide more than 14,000 AFY of recycled water for golf course and greenbelt irrigation purposes from four wastewater treatment facilities. While recycled water is available in the East Valley, it is not currently treated to sufficient levels for unrestricted reuse. Water conservation is also a key element of managing water demands.

ES-3 CURRENT CONDITION OF COACHELLA VALLEY GROUNDWATER BASIN

The demand for groundwater has annually exceeded the limited natural recharge of the groundwater basin. The condition of a groundwater basin in which the outflows (demands) exceed the inflows (supplies) to the groundwater basin over the long term is called "*overdraft.*" Overdraft has caused groundwater levels to decrease in significant portions of the East Valley. Groundwater levels in the West Valley have also decreased substantially, except in the areas near the Whitewater Recharge Facility where artificial recharge has successfully raised water levels.

Overdraft has serious consequences. The immediate and direct effect is increased groundwater pumping costs for all water users. With continued overdraft, wells will have to be deepened, larger pumps will have to be installed and energy costs will increase as the pump lifts increase. The need for deeper wells and larger pumps will increase the cost of water for agriculture, municipalities, resorts, homes and businesses. Continued decline of groundwater levels could result in a substantial and possibly irreversible degradation of water quality in the groundwater basin due to the intrusion of lower quality and high TDS water applied at the surface for irrigation and due to the reduced drain flows carrying the salts out of the basin. Continued overdraft also increases the possibility of land subsidence. As groundwater is removed, the dewatered soil begins to compress from the weight of the ground above, causing subsidence. Subsidence can cause ground fissures and damage to buildings, homes, sidewalks, streets, and buried pipelines – all of the structures that make the Valley livable. Subsidence also reduces storage capacity in the aquifer. Continued overdraft would eventually stifle growth in the Valley, as it would not be possible to demonstrate that adequate water supplies exist to support growth.

Change in freshwater storage is the difference between the inflows and outflows of the basin, excluding the inflows of poor-quality water (irrigation return flows and Salton Sea water) which are induced by the overdraft. By excluding these inflows, a more accurate approximation of actual annual overdraft is possible. In 1999, the decrease in freshwater storage in the Valley was estimated to be 136,700 acre-ft/yr. The cumulative decrease in freshwater storage from 1936 to 1999 is estimated to be nearly 4.8 million AF; i.e., 4.8 million AF of freshwater was withdrawn from the basin and not replaced. Using freshwater storage as an indicator of overdraft does not account for all aspects of overdraft such as subsidence and other water quality, environmental, social and economic effects.

ES-4 THE 2002 WATER MANAGEMENT PLAN

Continued decline of groundwater levels and overdraft is unacceptable. CVWD and DWA are charged with providing a reliable, safe water supply now and in the future. In order to fulfill obligations to Valley residents, these agencies must take action to prevent continuing decline of groundwater levels and degradation of water quality on a long term basis. To meet responsibilities for ensuring adequate water supplies in the future, the CVWD and DWA initiated planning in the early 1990s. The comprehensive Water Management Plan developed in 2002 guides CVWD and DWA in efforts to eliminate overdraft and prevent groundwater level decline, protect water quality, and prevent subsidence.

The 2002 Water Management Plan clearly identified the significant groundwater overdraft that had occurred over decades and, equally important, the threat of continued overdraft to the Valley's economy and quality of life. It was based on then current projections of growth and corresponding water demand. The Plan identified the actions needed to eliminate overdraft while maintaining the quality of life and avoiding adverse impacts to the environment. The Plan included the Whitewater River Subbasin, Garnet Hill Subbasin and portions of Desert Hot Springs Subbasin, as shown in **Figure ES-1**.

ES-4.1 Goals and Objectives

The goal of the Water Management Plan is to reliably meet current and future water demands in a cost effective and sustainable manner. To meet this goal, four objectives were identified for the 2002 WMP:

1. Eliminate groundwater overdraft and its associated adverse impacts, including:
    - groundwater storage reductions
    - declining groundwater levels
    - land subsidence
    - water quality degradation
2. Maximize conjunctive use opportunities
3. Minimize adverse economic impacts to Coachella Valley water users
4. Minimize environmental impacts

The 2002 WMP included five major elements: 1) water conservation (urban, golf course, and agricultural), 2) substitution of surface water supplies (Colorado River water, SWP water, recycled water) for urban, agricultural, and golf course uses in lieu of pumping groundwater, 3) continued groundwater recharge at the Whitewater Recharge Facility and development of two new groundwater recharge facilities in the East Valley, 4) increasing surface water supplies, and 5) monitoring subsidence and groundwater levels and quality.

Within each element, the 2002 WMP identified specific actions to aid in eliminating overdraft. Many of the elements of the 2002 WMP have been accomplished. These accomplishments are discussed in the next section.

ES-4.2 Accomplishments Since 2002

The actions to eliminate overdraft pursuant to the 2002 WMP taken by CVWD, DWA, other water agencies, municipalities and tribes are summarized below.

ES-4.2.1 Water Conservation

A broad range of water conservation actions were included in the 2002 WMP. Most of those actions have been achieved, some ahead of schedule.

Urban Conservation

CVWD first passed a Landscape Ordinance in 2003. The ordinance was updated in 2007, and minor changes were made in 2009. The ordinance has been adopted by nearly all Valley cities. The ordinance sets a maximum applied water allowance for new developments, requires efficient irrigation systems, specifies the use of climate appropriate plant materials, reduces applied water runoff and overflow, reduces non-recreational turf at golf courses and mandates smart irrigation controllers on all new large landscapes. The ordinance, in combination with other water conservation measures, results in a significant reduction in existing and new water use.

CVWD appointed a water conservation coordinator and established a water conservation office with a full time staff of nine employees. In 2009, CVWD established tiered domestic water pricing for customers based on individual water budgets. A turf buy-out partnership was established with the cities of Cathedral City, La Quinta and Palm Desert. CVWD also provides weather-based irrigation controllers to eligible customers in participating cities. CVWD maintains water efficient demonstration gardens at the CVWD offices in Coachella and Palm Desert and at the University of California Riverside campus. CVWD sponsors well-attended annual landscape workshops and tours, and creates displays for special events. CVWD produces the popular book, "*Lush & Efficient: Gardening in the Coachella Valley,*" and various other publications.

DWA offers large water users (condominiums, public parks and businesses) comprehensive irrigation system water audits at no charge, and assists in implementing recommended improvements. In partnership with CVWD and Cathedral City, DWA furnishes irrigation controllers at cost to customers. Free controllers are provided with new water meter installation. In addition, DWA recently installed artificial turf and recycled water drip-irrigation for xeriscaping at its operations center (DWA website, 2010). The City of Palm Springs also promotes water efficiency programs including landscape water training programs and rebates for water efficient toilets (City of Palm Springs website, 2010).

Agricultural Conservation

The 2002 WMP established a goal of 7 percent agricultural water use reduction through conservation. Based on a comparison with 2000 and 2002 average water use per acre, agricultural water use generally declined about 9.9 percent through 2008. While this estimate may be due in part to variations in weather conditions, crop water needs and crop patterns, it represents a significant decrease in agricultural water use over the period. Agricultural water conservation measures included irrigation scheduling, salinity management and irrigation uniformity evaluation programs for irrigators.

Golf Course Conservation

The 2002 WMP goal was to reduce water demand at existing courses by at least 5 percent by 2010 and for new courses by up to 25 percent compared to historical use by existing courses. Actual use per irrigated acre in the West Valley, where data are available, indicates a reduction of about 14 percent compared to the 2000 to 2002 average. Adoption of the Landscape Ordinance throughout the Valley is expected to reduce water use by new courses by about 22 percent compared to existing courses. CVWD initiated a program of monitoring golf course water use to ensure that maximum water allowances are not exceeded. A symposium for golf course operators to promote golf course water conservation is held each year.

Stakeholder Review and Input

In 2006, CVWD completed, with extensive stakeholder involvement, a Water Management Plan Implementation Program. This effort included review, evaluation, and prioritization of water conservation programs and other elements of the 2002 WMP by stakeholders and recommendations to the CVWD Board (Water Management Plan Implementation Program, 2006). The Board uses the recommendations in the Implementation Program to guide development of annual budgets.

ES-4.2.2 Additional Water Supplies

The 2002 WMP identified the need for CVWD and DWA to acquire additional water supplies to manage current and future groundwater overdraft. Supplies identified included the Colorado River, State Water Project, other transfers, recycled water and desalinated drain water.

Quantification Settlement Agreement

In 2003, CVWD, IID and Metropolitan, along with the State of California and the Bureau of Reclamation, (Reclamation), successfully completed negotiation of the Quantification Settlement Agreement (QSA). The QSA quantifies the Colorado River water allocations of California's agricultural water contractors for 75 years and provides for the transfer of water between agencies. Under the QSA, CVWD has a base allocation of 330,000 AFY. In accordance with the QSA, CVWD has entered into water transfer agreements with Metropolitan and IID that increase CVWD supplies by an additional 159,000 AFY as shown in **Table ES-1**.

As of 2010, CVWD can receive 368,000 AFY of Colorado River water deliveries under the QSA. This includes the base allocation of 330,000 AFY, the Metropolitan/IID transfer of 20,000 AFY, 12,000 AFY of the IID/CVWD First transfer, and 35,000 AFY of Metropolitan/SWP transfer. CVWD's allocation will increase to 459,000 AFY of Colorado River water by 2026. After deducting conveyance and distribution losses, approximately 428,000 AFY will be available for CVWD use.

Table ES-1
CVWD Deliveries under the Quantification Settlement Agreement

Component	2010 Amount (AFY)	2045 Amount (AFY)
Base Allocation	330,000	330,000
1988 Metropolitan/IID Approval Agreement	20,000	20,000
Coachella Canal Lining (to SDCWA)	-26,000	-26,000
To Miscellaneous/Indian PPRs	-3,000	-3,000
IID/CVWD First Transfer	12,000	50,000
IID/CVWD Second Transfer	0	53,000
Metropolitan/SWP Transfer	35,000	35,000
Total Diversion at Imperial Dam	**368,000**	**459,000**
Less Conveyance Losses [1]	-31,000	-31,000
Total Deliveries to CVWD	**337,000**	**428,000**

State Water Project

CVWD and DWA have made significant progress toward meeting the 2002 WMP goal of 140,000 AFY average delivery (100,000 AFY to Whitewater Recharge Facility; 40,000 AFY via Mid-Valley Pipeline) of SWP exchange water in the Whitewater River Subbasin. CVWD's and DWA's SWP Table A[2] Amounts are used to replenish both the Upper Whitewater River and the Mission Creek subbasins. Per an interagency agreement, water for recharge is allocated in proportion to pumping in each subbasin. CVWD's and DWA's Table A water (61,200 AFY) is exchanged with Metropolitan for a like amount of Colorado River water from Metropolitan's Colorado River Aqueduct (CRA).

Under the 2003 Exchange Agreement, CVWD and DWA acquired 100,000 AFY (88,100 AFY and 11,900 AFY, respectively) of Metropolitan's SWP Table A water as a permanent transfer. The water exchanged for Colorado River water is either recharged at the existing Whitewater and Mission Creek spreading facilities or delivered via the Coachella Canal and Mid-Valley Pipeline (MVP) for golf course irrigation in the Palm Desert-Rancho Mirage area of the West Valley. In any given year, the agreement allows Metropolitan to call-back the 100,000 AFY and assume the cost of delivery if it needs the water.

In 2004, CVWD purchased an additional 9,900 AFY of SWP Table A water from the Tulare Lake Basin Water Storage District (Tulare Lake). In 2007, CVWD and DWA made a second purchase of SWP Table A water from Tulare Lake: CVWD purchased 5,250 AFY and DWA purchased 1,750 AFY. In 2007, CVWD and DWA completed the transfer of 16,000 AFY of SWP Table A water (12,000 AFY and 4,000 AFY, respectively) from the Berrenda Mesa Water District (Berrenda Mesa), effective in January 2010. With these transfers, the combined SWP Table A Amounts for CVWD and DWA totals 194,100 AFY, with CVWD's portion equal to

2 Each SWP contract contains a "Table A" exhibit which defines the maximum annual amount of water each contractor can receive excluding certain interruptible deliveries. Table A Amounts are used by DWR to allocate available SWP supplies and some of the SWP project costs among the contractors.

138,350 AFY and DWA's portion equal to 55,750 AFY. **Table ES-2** summarizes CVWD and DWA total allocations of SWP Table A water.

Table ES-2
State Water Project Sources (AFY)

	Original SWP Table A	Tulare Lake Basin Transfer #1	Tulare Lake Basin Transfer #2	Metropolitan Transfer	Berrenda Mesa Transfer	Total
CVWD	23,100	9,900	5,250	88,100	12,000	138,350
DWA	38,100	--	1,750	11,900	4,000	55,750
Total	61,200	9,900	7,000	100,000	16,000	194,100

SWP supplies vary annually due to weather and runoff variations and regulatory limitations on exports from the Delta. Under current conditions, the SWP can only provide about 60 percent of the Table A Amounts indicated in CVWD's and DWA's contracts (DWR, 2009). The current availability of SWP Table A Amounts are presented in **Table ES-3.** In the absence of state and federal actions in the Bay Delta to increase SWP supplies, it is anticipated that long-term SWP reliability (deliveries) could decrease to 50 percent of the Table A Amounts.

Table ES-3
Current SWP Supply Availability (60% Reliabilibty)

SWP Components	Acre-ft/yr [1]
Table A Amount (Base)	194,100
Average Deliveries with Current SWP Reliability (60%) [2]	116,500
Less Average Metropolitan Callback [3]	(32,900)
Net Average SWP Supply [4]	83,600
Whitewater River Subbasin Recharge (93% of net) [5]	77,700
Mission Creek Subbasin Recharge (7% of net)	5,900

1 – Values shown are rounded to nearest 100 AFY.
2 – Current reliability is based on California DWR's 2009 SWP Reliability Report.
3 –Average assumes Metropolitan calls back its 100,000 AFY transfer in 4 wet years during a 10 year period.
4 – Net supply is calculated by deducting the Metropolitan callback from the Table A Amount with current SWP Reliability
5 – Allocation of SWP water to Whitewater River and Mission Creek subbasins is based on production in each basin.

Yuba River

In March 2008, CVWD and DWA entered into separate agreements with DWR for the purchase and conveyance of supplemental SWP water under the Yuba River Accord Dry Year Water Purchase Program. This program provides dry year supplies. The amount of water available for purchase in a given year varies and will be based on DWR's determination of the Water Year Classification. The available water is allocated among participating SWP contractors based on their Table A Amounts. CVWD and DWA may be able to purchase up to 5,600 AFY, and 1,820 AFY, respectively. These agreements provide for the exchange of these supplies with Metropolitan for Colorado River water in accordance with the existing exchange agreements.

CVWD and DWA received a combined total of 5,300 AF of water from this source in 2008 and 2009.

Rosedale-Rio Bravo

In 2008, CVWD executed an agreement with Rosedale-Rio Bravo Water Storage District (Rosedale) in Kern County for a one-time transfer of 10,000 AF of banked Kern River flood water that is exportable to CVWD. Per the Rosedale agreement, deliveries to CVWD began in 2008 and will be completed by December 31, 2010 (CVWD, 2010a).

Desalinated Drain Water

The 2002 WMP recommended that a drain water desalination facility commence operation between 2010 and 2015 with a 4,000 AFY facility to treat agricultural drainage water for irrigation purposes. The facility would be expanded to 11,000 AFY capacity by 2025. Product water would be delivered to the Coachella Canal distribution system for non-potable use.

A brackish groundwater treatment pilot study and feasibility study was completed in 2008 (Malcolm-Pirnie, 2008a and 2008b). Reverse osmosis (RO) was recommended to meet water quality goals and provide additional flexibility in the level of water quality produced should the facility's objectives change in the future. The recommended approach to brine management was to convey the RO concentrate via pipeline to constructed wetlands located at the north shore of the Salton Sea. This study concluded that agricultural drainage water can effectively be treated for reuse as non-potable water and potentially as new potable water.

Recycling of Municipal Effluent

Recycled water usage in the West Valley by CVWD and DWA is approximately 14,000 AFY. Recycled water usage in the East Valley is approximately 700 AFY, mainly for agricultural irrigation, duck clubs and fish farms.

ES-4.2.3 Source Substitution

Source substitution involves the delivery of alternative water supplies, such as Coachella Canal water or recycled water, to replace of groundwater pumping. Significant efforts have been made to implement source substitution projects in the Valley.

Mid-Valley Pipeline (MVP)

In the West Valley, the demand for non-potable water typically exceeds the available supply, especially in the summer months. Golf courses using recycled water currently must supplement that supply with local groundwater to meet their demands. This limits the amount of overdraft reduction that is possible to the available recycled water supply. Groundwater modeling shows a local pumping deficit (overdraft condition) that cannot be remedied by recharge at Whitewater. The MVP is a pipeline distribution system to deliver Colorado River water to the Mid-Valley area for use with CVWD's recycled water for golf course and open space irrigation. This source substitution project will reduce groundwater pumping for these uses. Construction of the first phase of the MVP from the Coachella Canal in Indio to CVWD's Water Reclamation Plant No. 10 (WRP-10) (6.6 miles in length) was completed in 2009.

At WRP-10, Canal water supplements recycled water for delivery to large irrigators. There are eight golf courses and five other users in the West Valley currently connected to the WRP- 9 recycled water system that can receive both recycled water and Canal water via the MVP. When these courses meet at least 90 percent of their irrigation needs with non-potable water, 2,700 AFY of groundwater pumping will be eliminated. There are four golf courses adjacent to the MVP that can be connected to the system with minimal construction, thus making them ideal candidates to receive Canal water through the MVP. Construction of Phase 1 of the MVP included outlets along the pipeline to serve these courses. However, pipeline connections to deliver Canal water from the MVP to each course have yet to be constructed. When all of these courses are connected, about 4,500 AFY of additional pumping could be eliminated. At least ten additional courses will be connected to the MVP downstream of WRP-10 with relatively simple pipeline connections, reducing pumping by about 11,200 AFY.

Pilot Study of Canal Water Treatment for Urban Use

As projected growth occurs in the East Valley and farms are converted to urban land uses, agricultural demand for Canal water will decrease. To avoid increased urban groundwater pumping and to fully use the Valley's allocation of Colorado River water, there will be a need to treat Canal water for urban use. The 2002 WMP anticipated this need and proposed that treatment be provided beginning in the late 2020s and that about 32,000 AFY be treated by 2035. Present projected domestic water demand coupled with reduced agricultural demand is expected to increase this amount substantially. Potable use will require Canal water treatment to meet drinking water standards. In anticipation of constructing potable water treatment facilities, CVWD completed a pilot treatability study for Canal water in 2008 (Malcolm-Pirnie, 2008c). This study investigated alternative approaches to treatment of Colorado River water delivered for urban use. The study recommended that blending treated Colorado River water with local groundwater be further evaluated to ensure customer satisfaction.

ES-4.2.4 Groundwater Recharge

Groundwater recharge is a critical component of basin management that involves putting water directly into the groundwater basin through surface ponds. The 2002 WMP included continuing recharge at the existing Whitewater Recharge Facility in the West Valley, proposed recharge in the East Valley using Colorado River water at Dike 4, now the Thomas E. Levy Groundwater Replenishment Facility (Levy facility), and recommended another major recharge facility at Martinez Canyon.

Whitewater Recharge Facility – West Valley

The 2002 WMP established a future average annual recharge target at this facility of about 100,000 AFY. The Whitewater River Recharge Facility has a recharge capacity in excess of 300,000 AFY. Because this capacity is enough to capture the full SWP Table A amount with additional capacity for supplemental recharge, no recharge capacity expansion is required. The available capacity is valuable for conjunctive use operations by CVWD and DWA as well as

Metropolitan or other interested parties. To reach the 100,000 AFY recharge goal for the Whitewater facility, CVWD and DWA would need to acquire additional SWP Table A Amounts or other imported water sources. Currently, the SWP Exchange supply is expected to provide about 78,000 AFY for the Whitewater facility on average. Under future conditions, it is possible that recharge at Whitewater could be limited to the available future supply of about 61,400 AFY of SWP Exchange, unless it is augmented with other supplies.

Thomas E. Levy Ground Water Replenishment Facility - East Valley

Construction of the full-scale Levy facility was completed in mid-2009. Located on the west side of the Valley in La Quinta, this facility has an estimated average recharge capacity of 40,000 AFY. The current capacity may be limited by hydraulic, water delivery, and maintenance constraints within the Canal water distribution system to an average of about 32,000 AFY. Construction of an additional pipeline to the Levy facility and pumping station from Lake Cahuilla maybe required in the future to reach the 40,000 AFY capacity.

Martinez Canyon Pilot Recharge Facility Feasibility Assessment – East Valley

The Martinez Canyon pilot recharge facility began operation in 2005 and recharges about 3,000 AFY. When this project is expanded to full scale, it is expected to recharge 20,000 to 40,000 AFY.

ES-4.2.5 Groundwater/Subsidence Monitoring

CVWD maintains an extensive ongoing groundwater level and quality monitoring program throughout the Valley. The program includes monitoring of potential salt water intrusion from the Salton Sea. The data are periodically reviewed to determine impacts of management actions on overdraft and water quality. The data are also applied to re-calibrate the groundwater model that assesses the impact of proposed management actions.

The United States Geological Survey (USGS) working with CVWD, completed subsidence monitoring reports for the Coachella Valley in 2001 and 2007. The reports indicated that subsidence was taking place in varying degrees throughout the Valley.

These studies to date have not confirmed the relationship between land subsidence and declining water levels. The USGS Scientific Investigation Report 2007-5251 states, “Although the localized character of the subsidence signals is typical of the type of subsidence characteristically caused by localized ground-water pumping, the subsidence may also be related to tectonic activity in the valley.” This report also concludes additional monitoring is needed to permit meaningful interpretations of the aquifer-system response to water level changes. CVWD’s Board of Directors has approved additional funding to continue these cooperative subsidence studies with the USGS. Future studies include additional monitoring designed to evaluate the potential relationship between declining water levels and land subsidence. Potential land subsidence caused by declining water levels was addressed by mitigation measures described in the 2002 Coachella Valley Water Management Plan Programmatic Environmental Impact Report (CVWMP PEIR).

ES-5 2010 WMP UPDATE

Significant actions have been taken since 2002 to alleviate overdraft in the long term. Changes in internal and external factors mandate new activities and increased levels of current activities to eliminate overdraft and assure reliable long term water supplies to the Valley. These new activities are identified in the 2010 WMP Update.

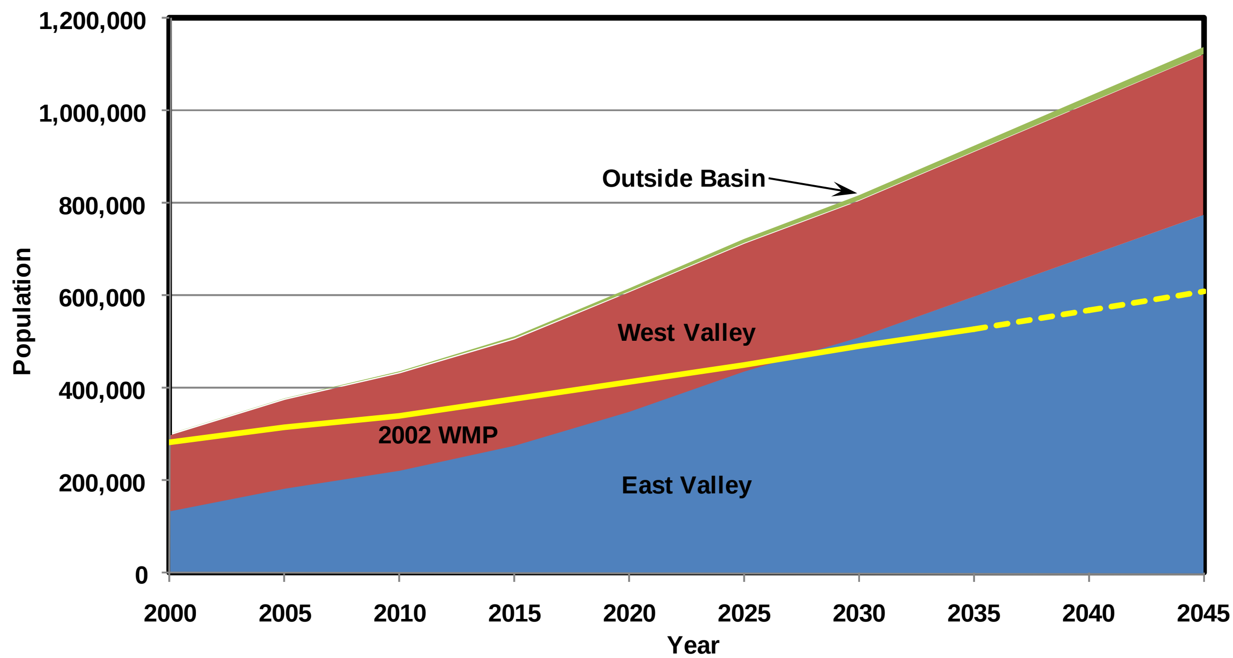
ES-5.1 Population and Water Demand

Since 2002, significant changes have occurred in projections of population and future water demands, including:

- Significantly increased population growth, mainly in the East Valley (**Figure ES-2**);
- Changes in land use from agricultural to urban land use and water demand in terms of both quantity and quality;
- Development on tribal lands and related water demands;
- Potential development located northeast of the San Andreas fault in the spheres of influence (SOI) of the cities of Indio and Coachella;
- Projected urban development outside the 2002 WMP study area and corresponding increases in water demands;
- Uncertainty in the timing of growth and water demands.

Figure ES-2 shows the difference in population projections used in the 2002 WMP and projections used in the 2010 WMP Update. The 2010 WMP Update provides water for approximately 500,000 more people in 2045 than the 2002 WMP.

Figure ES-2
Comparison of Population Projections
for the Coachella Valley



ES-5.1.1 Future Water Demands

Projected water demands for 2045 resulting from projected population growth and associated assumptions regarding land uses and water demands for land uses are shown by economic sector in **Table ES-4**. Water use by new development is expected to be more efficient due to plumbing code requirements and the Landscape Ordinance. Consequently, water demands are expected to be less than projected in the 2002 WMP. Water demand in 2045 is projected to reach about 886,300 AFY. If the growth projection in the 2002 WMP, with assumed water conservation measures, were projected to 2045, the projected demand would be approximately 950,000 AFY. The reduction in projected demand results primarily from the conversion of agricultural lands to urban use and increased water conservation factored into the 2010 WMP Update.

Table ES-4
2045 Water Demand Projections for the Coachella Valley

Component	2045
Agricultural	
Crop Irrigation	166,300
Total Agricultural Demand	**166,300**
Urban	
Municipal	537,000
Industrial	2,300
Total Urban Demand	**539,300**
Golf Course Demand	**169,500**
Fish Farms and Duck Clubs	
Fish Farms	8,500
Duck Clubs	2,000
Total Fish Farms and Duck Clubs	**10,500**
TOTAL DEMAND	**885,400**

ES-5.1.2 Demand Uncertainty

Future water demands are based on the latest approved population growth projections (2006) by Riverside County and assumptions regarding impacts of population growth on land uses, impacts of water conservation on water uses, and resulting water demand associated with each type of land use. There are a number of uncertainties inherent in the demand projections, including:

- Growth forecasts or rates of growth may be too high or too low
- Impacts of economic booms and busts
- Reductions in fish farm operations
- Rates of development on Tribal lands
- Rate of agricultural/vacant land conversion to urban use
- Future water demand factors for various land uses
- Growth outside the Whitewater River subbasin
- Number of future golf courses developed in the East Valley
- Acceptance and effects of water conservation measures

ES-5.2 Water Supply Needs

In addition to changing water demands, changing external factors could affect Valley water supplies:

- SWP allocations fluctuate annually due to drought and environmental needs in the Bay-Delta.
- Recent environmental rulings have restricted the State's ability to move water through the Delta to the SWP, potentially decreasing supply reliability and deliveries. The degree to which the long term supply of the SWP will be affected is uncertain.
- The outcome of efforts underway to prepare the Bay-Delta Conservation Plan (BDCP), which is intended to restore the Delta's ecosystem and improve water supply reliability, is uncertain.
- The QSA has been overturned in court, creating uncertainty in future Colorado River supplies.
- Climate change could affect the long term supplies of both the SWP and Colorado River and water demands within the Valley. Actual impacts and timing are unknown and cannot be reliably projected.

These changing conditions and uncertainties reinforce the need for a flexible long term Plan and for updating the Plan periodically.

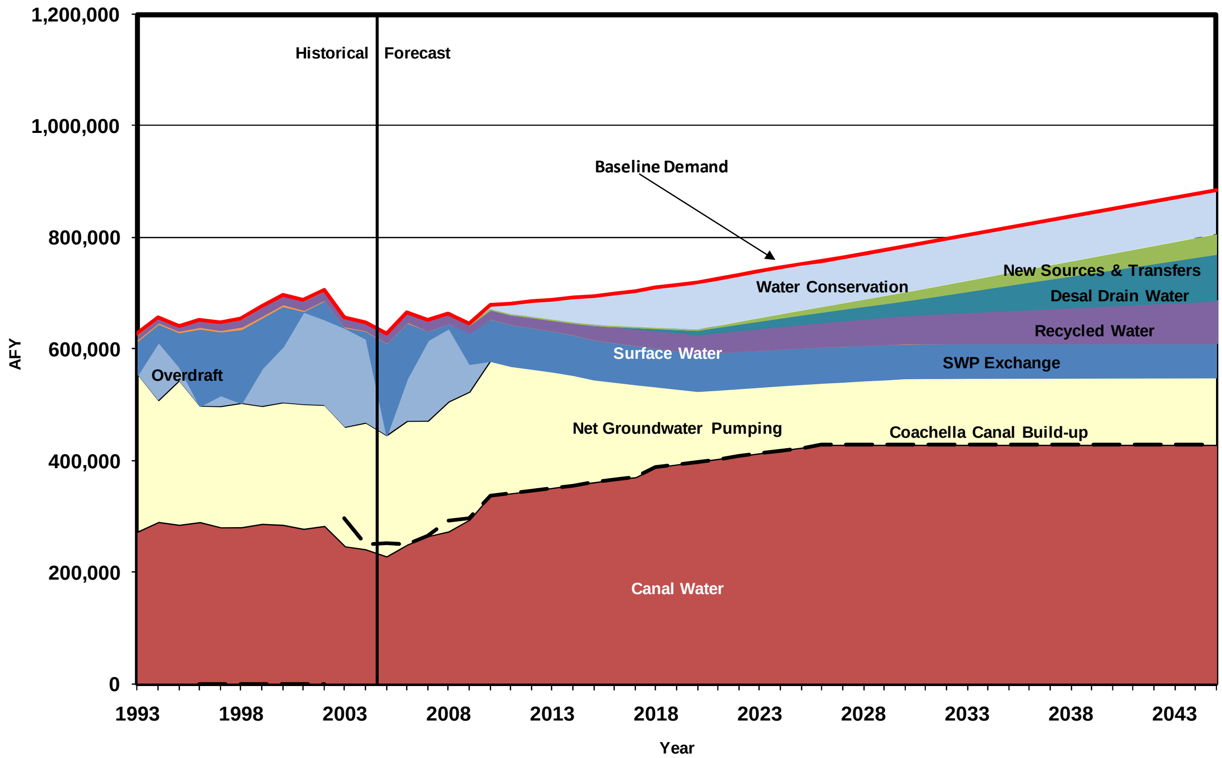
Additional water supplies needed by 2045 under various water supply scenarios range from 276,800 to 436,400 AFY (**Table ES-5**). The four scenarios incorporate the uncertainties associated with current supply sources, with the exception of climate change. The 10 percent demand contingency addresses this and other currently unforeseeable factors affecting future water supplies.

Table ES-5
Water Supply Needs – 2045

Scenario	QSA Validated	Delta Conveyance Improvements	Demand (AFY)	Demand with 10% Buffer (AFY)	Available Supply (AFY)	Additional Supply Required (AFY)
1	Yes	Yes	885,400	974,000	697,200	276,800
2	Yes	No	885,400	974,000	665,600	308,400
3	No	Yes	885,400	974,000	569,200	404,800
4	No	No	885,400	974,000	537,600	436,400

The projected water supplies for 2045 are shown in **Figure ES-3**. These sources are based on implementation of Scenario 2 above, which assumes that the QSA is implemented and that Delta environmental factors limit the SWP water supply to 60,400 AFY. The resolution of Delta environmental issues has the greatest uncertainty at present. This results in a need for new supplies of 309,400AFY by 2045, which falls within the mid range of estimates of 276,800 to 436,400 AFY under the four scenarios. All elements of the 2010 WMP Update would need to be implemented to some degree to achieve the 309,400 AFYneed for new supplies.

Figure ES-3
Water Supply Mix for 2010 WMP Update



ES-5.3 What's New in the 2010 WMP Update?

The 2010 WMP Update identifies proposed ways and means of meeting future water needs in light of changing conditions and uncertainties. To meet future needs, the 2010 WMP Update includes many new features in the areas of water conservation, source substitution, new supplies, and groundwater recharge. The 2010 WMP Update emphasizes enhanced cooperation in Plan implementation.. The 2010 WMP Update incorporates both a 'bookends" approach and a "building block" approach to deal with uncertainties in future demands and supplies.

Bookends on Demands and Supplies: To account for the uncertainty and potential variability in demands, the 2010 WMP Update assigns bookend targets (ranges) for each of the major categories of water supplies (see **Section 6)**. The book-ends represent reasonable minimum and maximum amounts for potential project development. Depending on the actual demands that are encountered in the future, the 2010 WMP Update elements can be implemented within these ranges to meet demands.

Building Block Approach: The 2010 WMP Update incorporates a flexible approach to meeting future needs that reflects uncertainties in supplies, demands and future circumstances by combinations of Plan elements. For example, the 2010 WMP Update includes an aggressive program of water conservation for urban, golf course and agricultural water users. However, there are limits in terms of cost, effectiveness and acceptability of water conservation activities.

As those limits are reached, other Plan elements for meeting future needs also can be adjusted. One source of supply is desalination of drain water, the most expensive alternative for providing new supplies. This approach will only be implemented as other sources of supplies reach practical limits. Therefore, the Plan includes a range of 22,000 to 80,000 AFY from desalination of drain water. The actual amount of water from this source will depend upon how much can be obtained first from other, lower cost sources.

Enhanced Cooperation in Plan Implementation: The Plan emphasizes cooperation among municipalities, local water agencies and tribes in regional planning and implementation. This occurs through the implementation of activities described in the 2010 WMP Update, implementation of related planning activities (see **Section 1.0**), and the development of monitoring and data sharing programs among CVWD, other water agencies, cities, and tribes to better manage Valley water resources.

ES-5.4 2010 WMP Update Elements

In developing the 2010 WMP Update, CVWD evaluated the success of 2002 WMP elements and determined future needs, supplies, and uncertainties. Like the 2002 WMP, the 2010 WMP Update has the same five major elements:

- Water conservation (urban, golf course, and agricultural)
- Increasing surface water supplies for the Valley from outsides sources
- Substitution of surface water supplies for groundwater (source substitution)
- Groundwater recharge
- Monitoring and evaluation of subsidence and groundwater levels and quality to provide the information needed to manage the Valley's groundwater resources

Activities included in the 2010 WMP Update in each of these elements are described below.

ES-5.4.1 Water Conservation

New water conservation targets and actions are included for agriculture, urban, and golf course water users.

Agricultural Conservation

The new agricultural conservation target is a 14 percent savings by 2020 utilizing a phased approach. The first phase will involve low cost voluntary programs. Depending on the success of those programs, more expensive and vigorous programs could be implemented, as needed. If the 14 percent target can be achieved, the agricultural conservation program is expected to save about 39,500 AFY of water in 2020, decreasing to 23,300 AFY by 2045 as agricultural land uses transition to urban uses.

Urban Conservation

The urban water conservation program will be expanded and enhanced in order to meet changing demands and to comply with the State's requirement of a 20 percent reduction in per capita water use by 2020 compared to average per capita usage for the period of 1995 through 2004. This program could save 39,700 AFY by 2020 and achieve a 39 percent demand reduction by 2030 as it is applied to new growth.

Achievement of the state's 20 percent conservation target could result in water savings of 100,000 AFY by 2045 if current growth projections occur compared to use without these measures.

Golf Course Conservation

The golf course conservation target is a savings of 22,000AFY by 2045. For existing courses, the target is a 10 percent reduction in water use through golf course irrigation system audit, soil moisture monitoring services, and reduction to 4 acres of turf per hole and 10 acres for practice areas, consistent with the 2009 Landscape Ordinance. The 2009 Landscape Ordinance will apply to all new golf courses.

Canal Water Loss Reduction

Water losses in the All-American Canal in the first 49 miles of the Coachella Canal may be as high as 10,000 AFY. To increase the amount of water delivered to the Valley, CVWD will determine water lost to leakage in the first 49 miles of the Coachella Canal, evaluate the feasibility of corrective actions to capture the lost water, implement cost effective water saving measures, and work with IID to share losses.

Potential Savings from Water Conservation Programs

The ranges of potential savings from water conservation programs are shown in **Table ES-6.**

Table ES-6
Ranges of Potential Water Conservation Savings – 2045

Type of Conservation	Low Range (AFY)	High Range (AFY)
Urban [1]	43,000	100,000
Agriculture [2]	11,000	23,000
Golf Courses	6,000	22,000
Total	**60,000**	**145,000**

Notes:
1. Low range for domestic conservation represents the amount of additional water saved as a result of currently adopted conservation programs.
2. Agricultural savings decline over time as agricultural land is converted to urban uses

ES-5.4.2 Additional Supplies

Acquisition of Imported Supplies

CVWD will continue to acquire additional imported SWP water supplies by transfer or lease where cost-effective, given Delta environmental restrictions and conveyance capacity limitations.

Increased Recycled Water Use

Recycled water in the West Valley is currently used beneficially, either through direct non-potable use or percolation for wastewater disposal. At least 90 percent of all wastewater generated in the West Valley will be recycled for direct non-potable use. All wastewater generated by new growth in the East Valley will be recycled. All wastewater from development east of the San Andreas fault could be recycled for irrigation or groundwater recharge to meet demands in that area and reduce the need for additional imported water supplies. Up to 30,000 AFY of recycled water could be utilized in the West Valley, up to 33,000 AFY of recycled water could be utilized in the East Valley and up to 12,000 AFY of recycled water could be utilized in the new growth area east of the San Andreas fault for direct non-potable uses by 2045.

Develop Desalinated Drain Water

A demonstration scale facility will be constructed to gain operational experience in desalinating drain water and brine disposal. Between 22,000 and 80,000 AFY of drain water and shallow groundwater will be recovered, desalinated and distributed for non-potable and potable uses in the East Valley. The amount of desalinated water needed will depend upon the resolution of Bay-Delta issues and the resulting amount of SWP water available.

Stormwater Capture

Stormwater capture has been identified as a potential method for increasing local water available for either groundwater recharge or direct use. CVWD will conduct a study to investigate the feasibility of additional stormwater capture in the East Valley. Feasible stormwater capture projects will be developed in conjunction with new flood control facilities as development occurs in the East Valley.

Development of Local Groundwater Supplies for Non-Potable Use

Growth in the areas northeast of the San Andreas fault will create additional demands for both potable and non-potable water. CVWD, the City of Coachella and the City of Indio will jointly conduct an investigation of groundwater in Fargo Canyon Subarea of the Desert Hot Springs Subbasin to determine the available supply and suitability for use in meeting non-potable demands (outdoor irrigation) of development east of the San Andreas fault.

Summary of Additional Supplies

Table ES-7 summarizes the range of additional supplies that will be developed.

Table ES-7
Range of Additional Supplies Through 2045

Action	Low Range (AFY)	High Range (AFY)
Purchase	58,000	140,000
Increased Recycled Water - East and West Valleys	14,000	63,000
Recycled Water Use East of San Andreas Fault	0	12,000
Desalinated Drain Water	22,000	80,000
Stormwater Capture – East Valley	0	5,000
Groundwater for Non-potable Use East of San Andreas Fault	7,000	11,000
Total	**97,000**	**311,000**

ES-5.4.3 Source Substitution

Due to the expected changes in water use patterns from continued development, source substitution will receive increased emphasis in the future to eliminate overdraft and ensure full use of the Valley's available surface water supplies.

Mid-Valley Pipeline

The MVP system delivers Canal water and recycled water to golf courses in lieu of their pumping groundwater. Activities to fully implement the MVP include preparing an MVP system master plan to lay out the future pipeline systems, near-term expansions to connect golf courses along the MVP alignment and extensions of the existing non-potable distribution system, and completion of construction of the remaining phases of the MVP system by 2020 to provide up to 37,000 AFY of Canal water and 15,000 AFY of WRP-10 recycled water on average to West Valley golf courses.

Conversion of Agricultural and Golf Course Use to Canal Water

In the 2010 WMP Update, it is estimated that for existing East Valley golf courses having Canal water access, Canal water use will increase to 90 percent of demand by 2015. Conversion to Canal water by East Valley golf courses will reduce groundwater use by 43,900 AFY.

It is expected that agricultural use of groundwater could decrease from about 66,000 AFY in 2009 to about 7,000 AFY by 2045, a decrease of 59,000 AFY or 89 percent.

The Oasis area distribution system feasibility study, including future conversion to serve urban non-potable water will be updated. Cost-effective facilities will be constructed. If conversion of the Oasis system is feasible, it could deliver up to 27,000 AFY of Canal and desalinated drain water.

Colorado River Water for Urban Use

In light of the projected increase in population and change of land use from agricultural to urban in the East Valley, treated Colorado River water for indoor residential use will be essential. In addition, untreated Colorado River water will be used in the future in large developments in the East Valley for outdoor purposes, i.e., lawn and park irrigation. These measures are necessary to reduce overdraft and to insure continued full use of the Valley's Colorado River water supplies.

This program will offset the reduced Canal water use by agriculture as agricultural land use transitions to urban development in the East Valley. Canal water will be treated to meet future indoor urban water demands in the East Valley. The target for urban indoor use will range from 48,000 and 90,000 AFY by 2045.

Dual source plumbing systems will be a feature of new development in the East Valley to provide outdoor use of untreated Canal water. Untreated canal water should provide 67 percent to 80 percent of the landscape demand for new development. This will result in the utilization of 95,000 to 115,000 AFY of non-potable Canal water by 2045. Where found to be cost-effective, existing developments will be retrofitted with distribution systems to provide for outdoor use of untreated Canal water.

Reduction in Groundwater Pumping by Source Substitution

The ranges of reduction in groundwater overdraft due to source substitution programs are shown in **Table ES-8**.

Table ES-8
Range of Groundwater Pumping Reductions Due To Source Substitution

Action	Low Range (AFY)	High Range (AFY)
Mid-Valley Pipeline	37,000	37,000
Agricultural Canal Water Conversion	5,300	26,000
Oasis Area Conversion to Canal Water	0	27,000
East Valley Golf Course Conversion	43,900	51,700
West Valley Golf Course Conversion	15,200	17,800
Canal Water for Indoor Urban Use-East Valley	48,000	90,000
Canal Water Use for Outdoor Use-East Valley	95,000	115,000
Total	**244,400**	**364,500**

ES-5.4.4 Groundwater Recharge

Groundwater recharge will be expanded to reduce overdraft.

Whitewater Recharge Facility

Operation of the Whitewater Recharge Facility will continue with the goal of recharging an average of at least 100,000 AFY of SWP exchange water over the long-term. Unused SWP water and available desalinated drain water from the QSA will be transferred to the Whitewater Recharge Facility. Additional water acquired by transfer or lease will augment the existing SWP exchange water.

Thomas E. Levy Recharge Facility

The Levy facility will recharge 40,000 AFY on average. A second pumping station and pipeline will be constructed if needed to achieve and sustain 40,000 AFY of deliveries for recharge.

Martinez Canyon Recharge

Siting studies, land acquisition, environmental compliance, design and construction will be conducted for the full-scale Martinez Canyon facility with a capacity of up to 40,000 AFY. Annually 20,000 to 40,000 AFY will be recharged, as available and needed.

Groundwater Recharge in Indio

The City of Indio will evaluate the feasibility of a nominal 10,000 AFY groundwater recharge project in Indio and construct if feasible. The final capacity will be based on pilot studies conducted by Indio.

Investigation of Groundwater Storage Opportunities with IID

CVWD will work with IID to identify options for storing Colorado River water on behalf of IID with currently planned Valley recharge facilities or additional facilities, including facilities to recover the stored water for use by Canal water users if necessary when IID calls for its stored water.

Groundwater Recharge Summary

The ranges of groundwater recharge operations at various facilities under the 2010 WMP Update are shown in **Table ES-9**.

Table ES-9
Range of Groundwater Recharge

Facility	Low Range (AFY)	High Range (AFY)
Whitewater	61,000 [1]	100,000
Levy	40,000	40,000
Martinez Canyon	3,000	40,000
Indio	0	10,000
Total	**104,000**	**190,000**

1 Limited by available supply.

ES-6 WATER QUALITY MANAGEMENT

ES-6.1.1 Additional Groundwater Treatment for Arsenic

CVWD will work with other agencies to assist communities having high levels of arsenic in groundwater supplies to connect to the potable water system. As needed, CVWD will expand its arsenic treatment facilities to allow treatment of additional wells and construct water transmission pipelines as needed to meet future demands.

ES-6.1.2 Development of Salt/Nutrient Management Plan

The State Water Resources Control Board (SWRCB) requires preparation of a salt/nutrient management plan by 2014 as part of the 2009 state Recycled Water Policy. As stated in the Policy, its purpose is to "establish uniform requirements for recycled water use and to develop sustainable water supplies throughout the state" (SWRCB, 2009).. CVWD will work with other Valley water agencies, tribes, and stakeholders to develop a salt/nutrient management plan that meets the State requirements and allows the cost-effective recycling of municipal wastewater in the Valley.

ES-6.1.3 Drainage Control

For both basin management (groundwater level and salt export), as well as the prevention of adverse impacts, the existing drainage system should be maintained, replaced as needed, or expanded as urban development occurs. CVWD will investigate alternative methods for funding the drainage system, conduct an investigation of the improvements needed to continue system operation in the future, and maintain and expand the drainage system.

ES-7 MONITORING AND DATA MANAGEMENT

Monitoring and data management programs aid in evaluating the effectiveness of the water management programs and projects identified in the Plan and to identify needed changes in management strategy and/or implementation.

The existing hydrologic monitoring program of weather data, streamflow data, well data (drilling logs, production, water levels), surface and ground water quality monitoring, and subsidence monitoring should be maintained and expanded. Key features of the expanded program are described below.

ES-7.1 Water Quality

CVWD will work with water agencies, tribes and cities to develop a coordinated water quality monitoring program to ensure that local water quality concerns and state/federal regulatory issues are addressed.

ES-7.2 Subsidence

CVWD will continue the USGS subsidence monitoring/reporting program and construct additional extensometers at critical locations to monitor subsidence, as needed.

ES-7.3 Water Resources Database

CVWD will work with water agencies, cities and tribes to develop shared water resources database. The database could include well ownership data, well logs, groundwater production, water level and water quality data.

ES-7.4 Groundwater Model Update and Recalibration

Prior to the next Plan update, the CVWD groundwater model will be updated, recalibrated and peer reviewed.

ES-7.5 Water Quality Model

CVWD will initiate development of a model capable of simulating the water quality changes in coordination with preparation of the salt/nutrient management plan.

ES-7.6 Water Demand and Conservation Monitoring

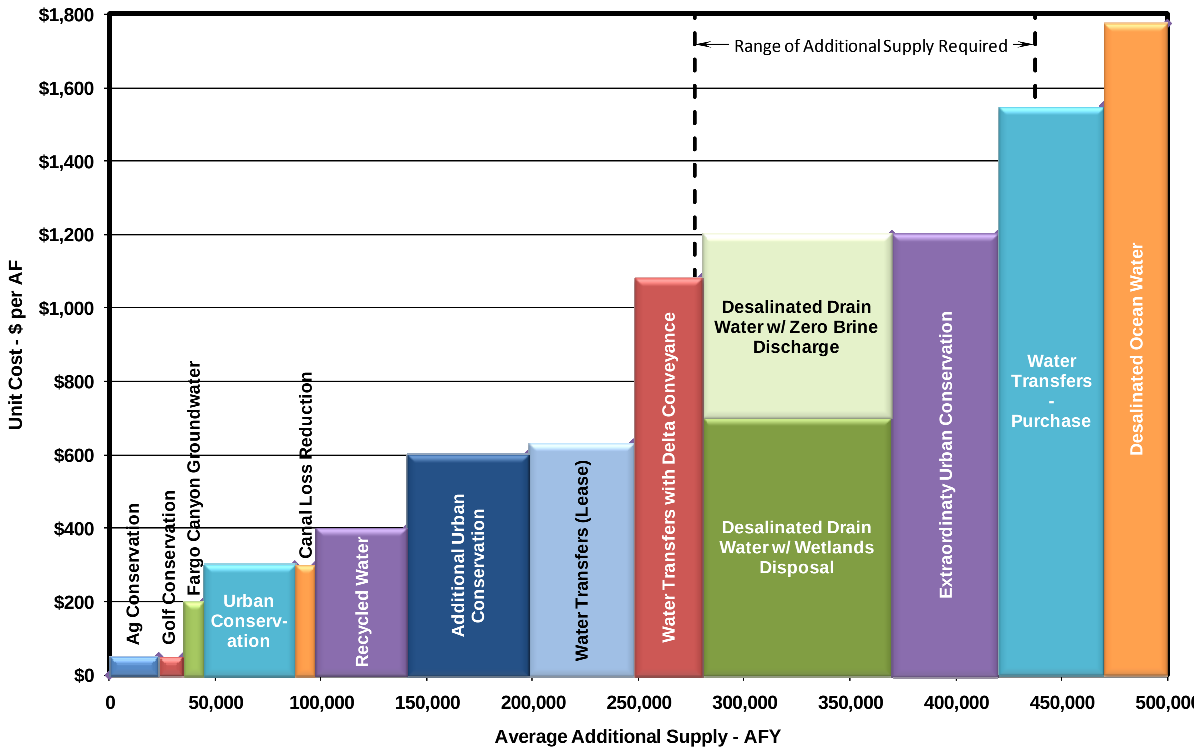
CVWD and DWA will monitor and report demands by water use sector and correlate demands with implementation of water conservation measures to determine the effectiveness of water conservation measures in achieving goals and the need for additional measures.

ES-8 PLAN COSTS

The cost of not eliminating overdraft would be far more than the cost of the actions needed for eliminating overdraft identified in the 2010 WMP Update. Cost of overdraft includes increased subsidence with its impacts on individual homes, commercial structures, and infrastructure (streets, highways, water and sewer lines, and other utilities), water quality degradation, and increased pumping costs. Colorado River supplies would go unused as agricultural land is converted to urban land, and groundwater pumping would increase without alternative sources of supplies. At some point, it would not be possible to demonstrate the availability of water supplies to support new growth.

The estimated costs of Plan elements on a per AF basis to provide new supplies are shown in **Figure ES-4**. The range of new supplies needed is 276,800 to 436,400 AFY (**Table ES-5**).

Figure ES-4
Ranking of Water Source Costs



Agricultural, golf and urban conservation are the least costly sources and should be maximized to the extent feasible.

For purposes of cost estimating, Scenario 2 is used. The water supply sources to meet demands under Scenario 2 are shown in **Figure ES-3**. The estimated cost to implement the 2010 WMP Update is shown in **Table ES-10** for the period 2011 through 2045. Capital, operation and maintenance cost, total cost, and average annual cost are shown for each Plan element in 2010 dollars. These are total costs, not incremental costs, and include the costs of many current activities such as groundwater pumping, acquisition of Colorado River water, current levels of recycling and water conservation, and groundwater recharge. The costs shown are the total costs for the entire Valley.

Table ES-10
Cost by Plan Component
2011-2045

Component	Total Capital Cost $millions	Total O&M Cost $millions	Total Cost $millions	Average Annual Cost $millions
Water Conservation	$ 1	$ 230	$ 231	$ 6.6
Recycled Water	161	153	314	9.0
Colorado River Water		409	409	11.7
SWP Water		1,907	1,907	54.5
Delta Conveyance		472	472	13.5
Desalinated Drain Water	462	277	739	21.1
Groundwater Pumping and Treatment	135	1,950	2,085	59.6
Water Transfers	0	282	282	8.1
Other New Water		262	262	7.5
Source Substitution	1,142	782,	1,924	55.0
Recharge	48	181	229	6.5
Total	**$1,949**	**$6,907**	**$8,856**	**$253.0**
Annual Average	$56	$197	$253	

The total estimated capital cost through 2045 is $1,950,000,000. Total O & M cost is $6, 907,000,000, bringing the total cost of the Plan implementation to $8.7 billion. The average annual cost is $241,973,531. This does not reflect the amortized cost of capital projects that may be bonded over several decades, thus reducing the annual cost of capital projects.

ES-9 Implementation and Implementation Costs

In developing the 2010 WMP Update, CVWD relies on the latest population projections developed by Riverside County. CVWD does not develop population growth projections for use in water management planning. The 2006 Riverside County projections could not have taken into account the current recession, which has slowed growth and will continue to have negative effects on growth in the near term. Over the long term, growth will continue. Future population projections will be adjusted in terms of the timing and magnitude of growth. These realities necessitate adjustment of Plan implementation to meet actual near term needs and continued updates of the Water Management Plan in the future to reflect revised population projections.

Near Term Projects to Meet Water Management Needs

Even with the current recession and lack of growth, continuation of existing projects and a few new projects are needed to reduce overdraft and its adverse affects. Ongoing projects that will be continued include:

- Whitewater Recharge with SWP Exchange Water and SWP purchases

- Implementation of the QSA
- Levy recharge at current levels of 32,000 AFY
- Martinez Recharge at Pilot Level of 3,000 AFY
- Water conservation programs at current levels, including implementation of the Landscape Ordinance
- Recycling in the West Valley
- Increased use of Canal water by golf courses with Canal water connections
- Conversion of East Valley agriculture to Canal water as opportunities arise
- Groundwater level/quality monitoring
- Subsidence monitoring

Assuming that growth remains relative low during the next five years, CVWD will focus on three new or expanded activities to reduce overdraft and comply with state regulations:

- Increased use of the Mid-Valley Pipeline project to reduce overdraft in the West Valley by connecting golf courses and reducing groundwater pumping by those courses.
- Implementation of additional water conservation measures, including the Landscape Ordinance, to meet the State's requirement of 20% conservation by 2020.
- Prepararation of a salt/nutrient management plan for the Valley by 2014 to meet SWRCB Recycled Water Policy requirements

Long Term Projects

Projects to eliminate and control overdraft that are likely to be needed as future growth occurs are described in the 2010 WMP Update. These projects include:

- Additional water conservation.
- Desalinated drain water.
- Additional water transfers.
- Additional recycled water.
- Canal water treatment for urban indoor use.
- Canal water treatment for urban outdoor irrigation.
- Recharge in the Indio area.

As growth ramps up, the projects will be implemented based on cost effectiveness and need.

Implementation Costs

In 2010, Valley water agencies expended approximately $414 million on all water and wastewater management activities. This total cost includes approximately $106 million on activities associated with eliminating overdraft. During the next five years (2011-2015), it is estimated that Valley water agencies will expend an additional $5.4 million on activities to eliminate overdraft, assuming growth remains slow.

As growth occurs, additional projects to control overdraft will be needed. Ultimately, costs associated with growth to eliminate and control overdraft could approach an additional $100 million per year in capital project and annual operations and maintenance costs.

Many of the costs, both capital and operation and maintenance, will not be borne by CVWD. These costs will be borne by developers, other water organizations, and Valley municipalities. Capital costs and operation and maintenance costs associated with new growth will be paid by new growth. For example, the entire cost of systems for treating and delivering Colorado River Canal water for indoor use in East Valley developments and development of dual plumbing systems to provide untreated water to those developments for outdoor use will be paid for by new development.

ES-10 CONCLUSION

Groundwater overdraft is a significant problem in the Coachella Valley. The 2002 Water Management Plan was developed to identify and guide the long term implementation of measures to eliminate groundwater overdraft in the Valley. Since completion of the 2002 Water Management Plan, much has been accomplished by Valley water agencies and agricultural, municipal/residential, and golf course water users to reduce overdraft. Water conservation efforts have expanded, out-of-basin water supplies have increased, surface water and recycled water use is being used in lieu of groundwater, and new groundwater recharge facilities are online and an additional facility is being developed. However, changing future demands and water supply uncertainties require additional actions to eliminate groundwater overdraft in the future, which are identified in the 2010 WMP Update. Continued implementation of the Water Management Plan will result in unavoidable costs for water users and water agencies alike. Each agency, including CVWD, will consider costs, available resources, funding mechanisms and priorities to eliminate overdraft in a timely manner. The success of the Plan to date indicates broad support for eliminating overdraft and the threats to the economy and quality of life in the Coachella Valley.

APPENDIX D
CVWD MODEL LANDSCAPE ORDINANCE

Ordinance No. 1302.1

LANDSCAPE AND IRRIGATION SYSTEM DESIGN CRITERIA

For developers, landscape architects, governmental agencies and property managers

Prepared by:
Coachella Valley Water District
Service Department

Approved by:
Coachella Valley Water District
Board of Directors – August 28, 2007

ORDINANCE NO. 1302.1

AN ORDINANCE OF THE
COACHELLA VALLEY WATER DISTRICT
ESTABLISHING LANDSCAPE AND
IRRIGATION SYSTEM DESIGN CRITERIA

WHEREAS, on July 17, 2007, the Riverside County Board of Supervisors declared a local emergency for Riverside County due to severe drought conditions.

WHEREAS, on July 19, 2007, the governor of the State of California, Arnold Schwarzenegger, declared a State of Emergency in Riverside County due to severe and continuing drought conditions.

WHEREAS, drought conditions in the Colorado River Basin persist, resulting in water levels of Lake Mead and Lake Powell at near-historic lows that could result in reduced water deliveries.

WHEREAS, water supply reliability through the State Water Project and issues associated with the California Bay Delta threaten reduced water deliveries to California State Water Project contractors.

WHEREAS there is an existing water shortage as demonstrated by the continuing overdraft of the groundwater basin.

WHEREAS Sections 31026 and 31027 of the California Water Code state that a district shall have the power to restrict the use of district water during an emergency caused by drought, or other threatened or existing water shortage.

WHEREAS, landscape and outdoor water use account for the vast majority of domestic water use in the Coachella Valley and represent enormous conservation opportunities consistent with the Coachella Valley Water Management Plan.

THEREFORE, BE IT NOW ORDAINED by the Board of Directors of the Coachella Valley Water District that Ordinance No. 1302.1 Landscape and Irrigation System Design Criteria is hereby adopted.

All requirements for landscape design and construction of Ordinance 1302.1 are contained in Attachment A, Landscape and Irrigation System Design Criteria, as revised from time to time.

REPEALS: All other ordinances or parts of ordinances, and codes, in conflict with the provisions of this Ordinance, are hereby expressly repealed.

BE IT FINALLY ORDAINED that is Ordinance shall become effective October 1, 2007.

/s/ Patricia A. Larson
Vice President

REVISIONS TO ORDINANCE 1302.1

No.	Ordinance No.	Section	Date
1	1374	Attachment A	11/24/2009

ATTACHMENT A OF
ORDINANCE 1302.1

LANDSCAPE AND IRRIGATION SYSTEM DESIGN CRITERIA

Sections:

0.00.010 Purpose and Intent

A. The California State Legislature has found:

1. The waters of the state are of limited supply and are subject to ever increasing demands;

2. The continuation of California's economic prosperity is dependent on the availability of adequate supplies of water for future users;

3. It is the policy of the State to promote the conservation and efficient use of water and to prevent the waste of this valuable resource;

4. Landscapes are essential to the quality of life in California by providing areas for active and passive recreation and as an enhancement to the environment by cleaning air and water, preventing erosion, offering fire protection, and replacing ecosystems lost to development;

5. Landscape design, installation, maintenance and management can and shall be water efficient; and

6. Section 2 of Article X of the California Constitution specifies that the right to use water is limited to the amount reasonably required for the beneficial use to be served and the right does not and shall not extend to waste and unreasonable method of use.

B. Consistent with these legislative findings, the purpose of these criteria is to:

1. Promote the values and benefits of landscapes while recognizing the need to invest water and other resources as efficiently as possible;

2. Establish a structure for planning, designing, installing, maintaining and managing water efficient landscapes in new construction and rehabilitated projects;

3. Establish provisions for water management practices and water waste prevention for existing landscapes;

4. Use water efficiently without waste by setting a Maximum Applied Water Allowance (MAWA) as an upper limit for water use and reduce water use to the lowest practical amount; and

5. Promote the benefits of consistent landscape criteria with neighboring local and regional agencies.

C. It is also the purpose of these criteria to implement the requirements of the California Code of Regulations Title 23. Waters Division 2. Department of Water Resources Chapter 2.7. Model Water Efficient Landscape Ordinance, and State of California Water Conservation in Landscaping Act. Authority cited: Section 65593, Government Code, Reference: Sections 65591, 65593, 65596 Government Code.

D. It is the intent of these criteria to promote water conservation through climate-appropriate plant material and efficient irrigation systems, and to create a "Lush and Efficient" landscape theme through enhancing and improving the physical and natural environment.

E. Applicability

1. These criteria shall apply to all of the following landscape projects:

a. New construction and rehabilitated landscapes for public agency projects and private development projects requiring a building or landscape permit, plan check or design review;

b. New construction and rehabilitated landscapes which are developer-installed in single-family and multi-family projects requiring a building or landscape permit, plan check or design review;

c. New construction and rehabilitated landscapes which are homeowner-provided and/or homeowner-hired in single family and multi-family residential projects with a total project landscape area equal to or greater than 5,000 square feet requiring a building or landscape permit, plan check or design review; and

d. Existing landscapes limited to section 0.00.040 (B).

2. These criteria do not apply to:

a. Registered local, state or federal historical sites;

b. Ecological restoration projects that do not require a permanent irrigation system;

c. Mined-land reclamation projects that do not require a permanent irrigation system; or

d. Plant collections, as part of botanical gardens and arboretums open to the public.

0.00.020 Definitions

The words used in this section have the meanings set forth below:

ANTIDRAIN VALVE or CHECK VALVE - A valve located under/in a sprinkler head to hold water in the system to eliminate drainage from the lower elevation sprinkler heads.

APPLICATION RATE - The depth of water applied to a given area, usually measured in inches per hour. Also known as precipitation rate (sprinklers) or emission rate (drippers/microsprayers) in gallons per hour.

APPLIED WATER - The portion of water supplied by the irrigation system to the landscape.

AUTOMATIC CONTROLLER - An electronic or solid-state timer capable of operating valve stations to set the days, time and length of time of a water application.

BACKFLOW PREVENTION DEVICE - A safety device used to prevent pollution or contamination of the water supply due to the reverse flow of water from the irrigation system.

BENEFICIAL USE - Water used for landscape evapotranspiration.

BILLING UNITS - Units of water (100 cubic feet = 1 billing unit = 748 gallons = 1 CCF) for billing purposes. To convert gallons per year to 100 cubic feet per year, divide gallons per year by 748. (748 gallons = 100 cubic feet).

CONVERSION FACTOR (0.62) - A number that converts the Maximum Applied Water Allowance from acre-inches per acre to gallons per square foot. The conversion factor is calculated as follows:

(325,851 gallons/43,560 square feet)/12 inches	= (0.62)
325,851 gallons	= one acre-foot
43,560 square feet	= one acre
12 inches	= one foot

DESERT LANDSCAPE - A desert landscape using native plants spaced to look like a native habitat.

DISTRIBUTION UNIFORMITY - A measure of how evenly sprinklers apply water. The low-quarter measurement method (DULQ) utilized in the irrigation audit procedure is utilized for the purposes of these criteria. These criteria assume an attainable performance level of 75% DULQ for spray heads, 80% DULQ for rotor heads and 85% DULQ for recreational turf grass rotor heads.

DISTRICT – Coachella Valley Water District.

DRIP IRRIGATION - A method of irrigation where the water is applied slowly at the base of plants without watering the open space between plants.

ECOLOGICAL RESTORATION PROJECT - A project where the site is intentionally altered to establish a defined, indigenous, historic ecosystem.

EFFECTIVE PRECIPITATION or USABLE RAINFALL - The portion of total natural precipitation that is used by the plants, usually assumed to be three inches annually. Precipitation or rainfall is not considered a reliable source of water in the desert.

ELECTRONIC CONTROLLERS - Time clocks that have the capabilities of multiprogramming, water budgeting and multiple start times.

EMISSION UNIFORMITY - A measure of how evenly drip and microspray emitters apply water. The low-quarter measurement method (EULQ) utilized in the landscape irrigation evaluation procedure is utilized for the purposes of these criteria. These criteria assume 90% EULQ for drippers, microsprays and pressure compensating bubblers.

EMITTER - Drip irrigation fittings that deliver water slowly from the watering system to the soil.

ESTABLISHED LANDSCAPE - The point at which new plants in the landscape have developed roots into the soil adjacent to the root ball.

ESTABLISHMENT PERIOD - The first year after installing the plant in the landscape.

ESTIMATED TOTAL WATER USE (By hydrozone) - The portion of the estimated annual total applied water use that is derived from applied water to a specified hydrozone.

ESTIMATED ANNUAL TOTAL APPLIED WATER USE (Total of all hydrozones) - The annual total amount of water estimated to be needed by all hydrozones to keep the plants and water features in the landscaped area healthy and visually pleasing. It is based upon such factors as the local evapotranspiration rate, the size of the landscaped area, the size and type of water feature, the types of plants, and the efficiency of the irrigation system. The estimated annual total applied water use shall not exceed the Maximum Applied Water Allowance (MAWA).

EVAPOTRANSPIRATION or ET - The quantity of water evaporated from adjacent soil surfaces and transpired by plants expressed in inches during a specific time.

ET ADJUSTMENT FACTOR - A factor of 0.5 that, when applied to reference evapotranspiration, adjusts for plant factors and irrigation efficiency, two major influences upon the amount of water that needs to be applied to the landscape. A combined plant mix with a site-wide average 0.38 is the basis of the plant factor portion of this calculation. The irrigation efficiency for purposes of the ET adjustment factor is 0.75. Therefore, the ET adjustment factor (0.5) = (0.38/0.75).

FINISHED GRADE – Grade height after surface mulch covering has been installed.

FLOW RATE - The rate at which water flows through pipes, valves and meters (gallons per minute or cubic feet per second).

HARDSCAPE - Concrete or asphalt areas including streets, parking lots, sidewalks, driveways, patios and decks.

HEAD-TO-HEAD COVERAGE - One hundred percent sprinkler coverage of the area to be irrigated, with maximum practical uniformity.

HIGH FLOW CHECK VALVE - A valve located under/in a sprinkler head to stop the flow of water if the spray head is broken or missing.

HYDROZONE - A portion of the landscaped area having plants with similar water needs that are served by a valve or set of valves with the same schedule. A hydrozone may be irrigated or non-irrigated. For example, a naturalized area planted with native vegetation that will not need supplemental irrigation (once established) is a non-irrigated hydrozone.

INFILTRATION RATE - The rate of water entry into the soil expressed as a depth of water per unit of time (inches per hour).

IRRIGATION EFFICIENCY - The measurement of the amount of water beneficially used divided by the amount of water applied. Irrigation efficiency is derived from measurements and estimates of irrigation system characteristics and management practices. The minimum irrigation efficiency for purposes of these regulations is 0.75 or 75 percent. Greater irrigation efficiency can be expected from well-designed and maintained systems.

LANDSCAPE IRRIGATION AUDIT - A process to perform site inspections, evaluate irrigation systems and develop efficient irrigation schedules.

LANDSCAPED AREA - The entire parcel less the building footprint, driveways, non-irrigated portions of the parking lots, hardscapes (such as decks and patios), and other nonporous areas. Water features are included in the calculation of a site's landscaped area.

LATERAL LINE - The water delivery pipeline that supplies water to the emitters sprinklers from a valve.

LOCAL AGENCY – A city, county, or water purveyor responsible for adopting and implementing the ordinance. The local agency is also responsible for enforcement of the ordinance, including, but not limited to, approval of a design review, permit, plan check, or inspection of a project.

MAIN LINE - The pressurized pipeline that delivers water from the water source to a valve or outlet.

MAXIMUM APPLIED WATER ALLOWANCE (MAWA) - For design purposes, the upper limit of annual applied water for the established landscape area as specified in Division 2, Title 23, California Code of Regulations, Chapter 7, Section 702. It is based upon the area's reference evapotranspiration, ET adjustment factor, and the size of the landscaped area. The estimated applied water use shall not exceed the Maximum Applied Water Allowance (MAWA).

MICROIRRIGATION - See drip irrigation.

MULCH - Any organic material such as leaves, bark, straw or inorganic material such as pebbles, stones, gravel, decorative sand or decomposed granite left loose and applied to the soil surface to reduce evaporation.

NATIVE PLANTS - Native plants are low water using plants that are:
1) indigenous to the Coachella Valley and lower Colorado Desert region of California and Arizona, 2) native to the southwestern United States and northern Mexico or 3) native to other desert regions of the world, but adapted to the Coachella Valley.

NATURAL GRADE – Grade height of native soil before application of surface mulch.

OPERATING PRESSURE - The pressure at which an irrigation system's sprinklers, bubblers, drippers or microsprays are designed to operate, usually indicated at the base of an irrigation head.

OVERHEAD SPRINKLER IRRIGATION STATIONS - Sprinklers with high flow rates (spray heads, impulse sprinklers, gear rotors, etc.) that are utilized to apply water through the air to large irrigated areas.

OVERSPRAY - The water which is delivered beyond the landscaped area onto pavements, walks, structures or other non-landscape areas. Also known as hardscape applications.

PLANT FACTOR - A factor that, when multiplied by reference evapotranspiration, estimates the amount of water used by plants. For purposes of these criteria, the average plant factor of very low water using plants ranges from 0.01 to 0.10, for low water using plants the range is 0.10 to 0.30, for moderate water using plants the range is 0.40 to 0.60, and for high water using plants, the range is 0.70 to 0.90. Reference: Water Use Classifications of Landscape Species III (WUCOLS III).

PRESSURE COMPENSATING (PC) BUBBLER – An emission device that allows the output of water to remain constant regardless of input pressure. Typical flow rates for this type of bubbler range between 0.25 gpm to 2.0 gpm.

PRESSURE COMPENSATING SCREENS/DEVICES - Small screens/devices inserted in place of standard screens/devices that are used in sprinkler heads for radius and high pressure control.

QUALIFIED PROFESSIONAL - A person who has been certified by their professional organization or a person who has demonstrated knowledge and is locally recognized as qualified among landscape architects due to longtime experience.

RAIN-SENSING DEVICE - A system which automatically shuts off the irrigation system when it rains.

RECYCLED WATER/RECLAIMED WATER - Treated or recycled wastewater of a quality suitable for nonpotable uses such as landscape irrigation. Recycled water is <u>not</u> for human consumption.

RECORD DRAWING or AS-BUILTS - A set of reproducible drawings which show significant changes in the work made during construction and which are usually based on drawings marked up in the field and other data furnished by the contractor.

RECREATIONAL AREA - Areas of active play or recreation such as golf courses, sports fields, school yards, picnic grounds, or other areas with intense foot or vehicular traffic.

RECREATIONAL TURF GRASS - High traffic turf grass that serves as a playing surface for sports and recreational activities. Athletic fields, golf courses, parks and school playgrounds are all examples of areas having recreational turf grass.

RECREATIONAL TURF GRASS ET ADJUSTMENT FACTOR - A factor of 0.82 that, when applied to reference evapotranspiration, adjusts for the additional stress of high traffic on recreational turf grass and the higher irrigation efficiencies of long-range rotary sprinklers. These are the two major influences upon the amount of water that needs to be applied to a recreational landscape. A mixed cool/warm season turf grass with a seasonal average of 0.7 is the basis of the plant factor portion of this calculation. The irrigation efficiency of long-range sprinklers for purposes of the ET adjustment factor is 0.85. Therefore, the ET adjustment factor is 0.82 = 0.7/0.85.

REFERENCE EVAPOTRANSPIRATION or ETo - A standard measurement of the environmental parameters which affect the water use of plants, using cool season grass as a reference. ETo is expressed in inches per day, month or year and is an estimate of the evapotranspiration of a large field of cool-season grass that is well watered. Reference evapotranspiration is used as a basis of determining the Maximum Applied Water Allowances so that regional differences in climate can be accommodated. For purposes of these criteria, CVWD Drawing No. 29523 will be used for ETo zones.

REHABILITATED LANDSCAPE - Any re-landscaping project in which the choice of new plant material and/or new irrigation system components is such that the calculation of the site's estimated water use will be significantly changed. The new estimated water use calculation must not exceed the Maximum Applied Water Allowance (MAWA) calculated for the site using a 0.5 ET adjustment factor.

RIPARIAN PLANTS - Riparian plants are high water using and water-loving plants that are found growing naturally along flowing rivers and lake shores. They may also be native to wet swampy areas with high water tables or poor drainage.

RUNOFF - Irrigation water which is not absorbed by the soil or landscape to which it is applied and which flows from the planted area.

SERVICE LINE - The pressurized pipeline that delivers water from the water source to the water meter.

SMART CONTROLLER – Weather-based or soil moisture-based irrigation controls that monitor and use information about environmental conditions for a specific location and landscape (such as soil moisture, rain, wind, the plants' evaporation and transpiration rates and, in some cases, plant type and more) to automatically control when to water and when not to, providing exactly the right amount of water to maintain lush, healthy growing conditions.

SOIL MOISTURE-SENSING DEVICE - A device that measures the amount of water in the soil.

SOIL TEXTURE - The classification of soil based on the percentage of sand, silt and clay in the soil.

SPRINKLER HEAD - A device which sprays water through a nozzle.

STATIC WATER PRESSURE - The pipeline or municipal water supply pressure when water is not flowing.

STATION - An area served by one valve or by a set of valves that operate simultaneously.

TURF - A surface of earth containing mowed grass with roots.

VALVE - A device used to control the flow of water in the irrigation system.

WATER FEATURE - Any water applied to the landscape for nonirrigation, decorative purposes. Fountains, streams, ponds and lakes are considered water features. Water features use more water than efficiently irrigated turf grass and are assigned a plant factor of 1.1 for a stationary body of water and 1.2 for a moving body of water.

WATER SYSTEM - The network of piping, valves and irrigation heads.

WUCOLS III - Water Use Classifications of Landscape Species III

0.00.030 Provisions for new or rehabilitated landscapes

A. Submittal and Approval of a Landscape Documentation Package

1. Prior to construction, the project applicant shall:

   a. Submit two copies of a Landscape Documentation Package to the Coachella Valley Water District (District) that conform to this chapter. No water meter will be issued until the District reviews and approves the Landscape Documentation Package.

   b. Submit one copy of the Landscape Documentation Package to the local agency (city/county).

2. Upon receipt of the Landscape Documentation Package, the District shall:

   a. Review the Landscape Documentation Package.

   b. Approve or deny the Landscape Documentation Package.

3. Upon approval of the Landscape Documentation Package, the District will:

   a. Sign and date the approved plans and return them to the project applicant.

   b. Submit a copy of the project's Water Efficient Landscape Worksheet (Appendix B) to the local agency.

4. Upon approval of the Landscape Documentation Package by the local agency, the project applicant shall:

   a. Receive an approval of the landscape design review or plan check.

   b. Finalize the Certificate of Completion, including recording the date of the approval.

   c. File the Certificate of Completion with the District and the local agency, and provide a copy to the property owner or designee.

d. Submit a copy of the approved Landscape Documentation Package, along with the record drawings and any other information, to the property owner or designee.

5. Each Landscape Documentation Package shall include the following elements:

   a. A completed Landscape Documentation Package Checklist (Appendix A), which includes the date, project applicant, and project address information. This checklist serves to verify that the elements of the Landscape Documentation Package have been completed.

   b. Total landscaped area (square feet)

   c. Project type (e.g., new, rehabilitated, public, private, cemetery, homeowner-installed, etc.)

   d. Water Efficient Landscape Worksheet (Appendix B), which may be imbedded in the plan sheets of the Landscape Documentation Package, and include the following:

      i. Hydrozone Information Table (reference Appendix C)

   e. Water Budget Calculations (reference Appendix D) that adhere to the following requirements:

      i. The plant factor used shall be from WUCOLS. The plant factors ranges from 0 to 0.3 for the low use plants, from 0.4 to 0.6 for the moderate use plants, from 0.7 to 1.0 for the high use plants and 1.1 to 1.2 for water features.

      ii. All water features shall be included in the 1.1 to 1.2 hydrozone and temporary irrigated areas shall be included in the low water use hydrozone.. For the calculation of the Maximum Applied Water Allowance (MAWA) and Estimated Total Water Use, a project applicant shall use ETo values from the Reference Evapotranspiration Table, Appendix C. For geographic areas not covered in Appendix C, use data from other cities located nearby in the same reference evapotranspiration zone.

   f. Landscape Design Plan

   g. Irrigation Design Plan

   h. Grading Design Plan (as required)

   i. Soil Management Report (as required)

   j All plans must contain a signature block for both the local agency and the District.

6. The Landscape Documentation Package shall be submitted by the following procedure:

   a. The applicant or applicant's representative may bring, send or ship copies of the Landscape Documentation Package to the District, and the local agency, as applicable. Appropriate fees must accompany the Landscape Documentation Package.

   b. The plans will normally be returned to the applicant or local agency with comments by the District (Water Management Department) within ten working days of receipt.

   c. After noted corrections have been made, the applicant shall re-submit the Landscape Documentation Package to the District for approval and signing by the Water Management Department and Development Services Department for the District.

   d. Signed plans will be held at the District's Palm Desert office for applicant pick up or sent by certified shipping at the applicant's request and expense.

   e. For direct communication:

Telephone No.:	(760) 398-2651 Water Management Department
Mailing Address:	Coachella Valley Water District Attention: Water Management Department Post Office Box 1058 Coachella, California 92236
Hand Delivery or Shipping Address:	Coachella Valley Water District Attention: Water Management Department 85-995 Avenue 52 Coachella, California 92236
Hand Delivery or Shipping Address:	Coachella Valley Water District Attention: Water Management Department 75-525 Hovley Lane East Palm Desert, California 92211

   f. The District will inspect the landscaped area(s) for conformance with the approved Landscape Documentation Package. Landscaping that does not conform to the approved Landscape Documentation Package is subject to penalties as provided in Section 0.00.070.

7. Upon review and approval of the Landscape Documentation Package by the District, the project applicant shall:

a. Submit a copy of the District-approved Landscape Documentation Package and Water Efficient Landscape Worksheet to the local agency.

b. Provide the property owner or site manager a copy of the District-approved Landscape Documentation Package, in addition to the record drawings and any other information normally forwarded to the property owner or site manager.

8. Upon review and approval of the Landscape Documentation Package by the local agency, the project applicant shall:

a. Record the date of the permit on the Certificate of Completion.

b. Provide the property owner or designee a copy of the local-agency approved Landscape Documentation Package, in addition to the record drawings, and any other information normally forwarded to the property owner or designee.

B. Landscape Design Plan

A landscape design plan meeting the following design criteria shall be submitted as part of the Landscape Documentation package. For the efficient use of water, a landscape shall be carefully designed and planned for the intended function of the project.

1. Any plant may be selected for the landscape, providing the Estimated Total Water Use in the landscape area does not exceed the Maximum Applied Water Allowance (MAWA). To encourage the efficient use of water the following is highly recommended:

a. Protection and preservation of native species and natural vegetation;

b. Selection of water-conserving plant and turf species;

c. Selection of trees based on applicable local tree ordinances or tree shading guidelines; and

d. Selection of plants from local and regional landscape program plant lists.

2. Specifications for Landscape Design Plan
The landscape design plan shall be drawn on 36-inch by 24-inch project base sheets at a scale that accurately and clearly identifies the following:

a. Tract name, tract number or parcel map number on cover sheet.

b. Proposed planting areas.

c. Plant material location and size.

d. Plant botanical and common names.

e. Plant spacing, where applicable.

f. Natural features including, but not limited to, rock outcroppings, and existing trees and shrubs that will remain incorporated into the new landscape.

g. Vicinity map showing site location on top sheet or on cover sheet.

h. Title block on each sheet with the name and address of the project, and the name and address of the professional design company with its signed professional stamp, if applicable.

i. Reserve two 6-inch by 3-inch spaces for a) the local agency signature block and b) a District signature block in lower right corner of the cover sheet and on all of the landscape, irrigation design/detail/specification sheets.

j. Show plan scale and north arrow on design sheets.

k. Show graphic scale on all design sheets.

l. Show all property lines and street names.

m. Show all paved areas, such as driveways, walkways and streets.

n. Show all pools, ponds, lakes, fountains, water features, fences and retaining walls.

o. Show locations of all overhead and underground utilities within project area.

p. Provide an index map, as necessary, showing the overall project, including all 1/4 and 1/16 section lines and section numbers.

q. Show a note on each design sheet stating, "Trees, plants, walls, sidewalks and permanent structures of any kind shall not be planted, installed or built in CVWD, USBR and local agency easements or rights-of-way without first obtaining an encroachment permit from CVWD and the local agency."

r. Show Maximum Applied Water Allowance (MAWA) for the proposed project. (See formula in Appendix C and Sample MAWA, Appendix D.)

s. Show total landscaped area in square feet. Separate area square footages by hydrozone. Show the total percentage area of each hydrozone. Include total area of all water features as separate hydrozones of still or moving water. Show Estimated Total Water Use, for each major plant group hydrozone and water feature hydrozone expressed in either seasonal (turf grass) or annual (trees, shrubs, groundcovers and water features) billing units.

t. Show Total Estimated Total Water Use for each major plant group hydrozone and water feature hydrozone expressed in either seasonal (turf grass) or annual (trees, shrubs, groundcovers and water features) billing units.

u. Show Total Estimated Water Use for the entire project. (Formula in Appendix C and on Sample Calculation Estimated Water Use, Appendix D.) The Total Estimated Use shall not exceed the Maximum Applied Water Allowance (MAWA).

v. Designate recreational areas and recreational turf areas.

w. When model homes are included, show the Maximum Applied Water Allowance (MAWA) and Estimated Total Water Use (by hydrozone with totals) for each model unit.

3. Landscape Design Criteria

a. The landscape design must be carefully planned and take into account the intended function of the project.

b. Plants' appropriateness shall be selected based upon their adaptability to the climatic, geologic and topographical conditions of the site.

c. Selection of water-efficient and low-maintenance plant material is required.

d. All planted areas must be a minimum of one inch below adjacent hardscapes to eliminate runoff and overflow.

e. Long, narrow or irregularly shaped turf areas shall not be designed because of the difficulty in irrigating uniformly without overspray onto hardscaped areas, streets and sidewalks. Areas less than 8 feet in width shall not be designed with turf. Turf will be allowed in these areas only if irrigation design reflects the use of subsurface irrigation or a surface flow/wick irrigation system.

f. Turf areas irrigated with spray/rotor systems must be set back at least 24 inches from curbs, driveways, sidewalks or any other area that may result in runoff of water onto streets. An undulating landscape buffer area created by the setback shall be designed with rocks, cobble or decomposed granite and/or can be landscaped with drip irrigated shrubs/accents or covered with a suitable ground cover.

g. Plants having similar water use shall be grouped together in distinct hydrozones.

h. The use of a soil covering mulch or a mineral groundcover of a minimum two-inch depth to reduce soil surface evaporation is required around trees, shrubs and on nonirrigated areas. The use of boulders and cobble shall be considered to reduce the total vegetation area.

i. Annual color plantings shall be used only in areas of high visual impact close to where people can appreciate them. Otherwise, drip irrigated, perennial plantings should be the primary source of color.

j. Native desert plants shall be specified to be planted in a shallow, wide, rough hole two times the root ball width. The root ball will be set on either undisturbed native soil or a firmed native soil. The root ball top will be set even with the finished surface grade or above grade if the soil is poorly drained. The hole must be backfilled with native soil. Extra soil may be used to mound up around plants where the soil is poorly drained.

k. Landscaping must not obstruct or interfere with street signs, lights or road/walkway visibility. Screening may be provided by walls, berms or plantings.

l. Use locally approved plant materials lists in the selection of appropriate plants.

m. Planter islands in parking lots with canopy trees shall be sized to meet local land use agency requirements.

n. A landscape plan in fire-prone areas shall address fire safety and prevention. A defensible space or zone around a building or structure is required per Public Resources Code Section 4291 (a) and (b). Avoid fire-prone plant material and highly flammable mulches.

o. The use of invasive and/or noxious plant species is prohibited.

p. The architectural guidelines of a common interest development, which includes community apartment projects, condominiums, planned developments and stock cooperatives, shall not prohibit or include conditions that have the effect of prohibiting the use of low-water use plants as a group (California Civil Code, Section 1353.8).

D. Grading Design Plan

1. For efficient use of water, grading of a project site shall be designed to minimize soil erosion, runoff and water waste. A grading plan shall be submitted as part of the Landscape Documentation Package. A comprehensive grading plan prepared by a civil engineer for other local agency permits satisfies this requirement.

2. The project applicant shall submit a landscape grading plan that indicates finished configurations and elevations of the landscape area including;

   a. Height of graded slopes;

   b. Drainage patterns;

   c. Pad elevations;

   d. Finish grade; and

   e. Stormwater retention improvements, if applicable.

3. To prevent excessive erosion and runoff, it is highly recommended, and per local agency requirements, that project applicants:

a. Grade so that all irrigation and normal rainfall remains within property lines and does not drain on to non-permeable hardscapes;

b. Avoid disruption of natural drainage patterns and undisturbed soil; and

c. Avoid soil compaction in landscape areas.

4. The grading design plan shall contain the following statement: "I have complied with the criteria of the ordinance and applied them accordingly for the efficient use of water in the grading plan."

5. Turf is not allowed on slopes greater than 25% where the toe of the slope is adjacent to an impermeable hardscape and where 25% means 1 foot of vertical elevation change for every 4 feet of horizontal length (rise divided by run x 100 = slope percent).

6. Slopes greater than 25% shall not be irrigated with an irrigation system with a precipitation rate exceeding 0.75 inches per hour. This restriction may be modified if the landscape designer specifies an alternative design or technology, as part of the Landscape Documentation Package, and clearly demonstrates no runoff or erosion will occur. Prevention of runoff must be confirmed during an irrigation audit.

7. All grading must retain normal stormwater runoff and provide for an area of containment. All irrigation water must be retained within property lines and not allowed to flow into public streets or public rights-of-way. Where appropriate, a simulated dry creek bed may be used to convey storm drainage into retention areas. A drywell shall be installed if the retention basin is to be used as a recreational area.

8. Mounded or sloped planting areas that contribute to runoff onto hardscape are prohibited. Sloped planting areas above a hardscaped area shall be avoided unless there is a drainage swale at toe of slope to direct runoff away from hardscape.

9. Median islands must be graded to prevent stormwater and excess irrigation runoff.

E. Irrigation Design Plan

For the efficient use of water, an irrigation system shall meet all the requirements listed in this section and the manufactures recommendations. The irrigation system and its related components shall be planned and designed to allow for proper installation, management, and maintenance. An irrigation design plan meeting the following criteria shall be submitted as part of the Landscape Documentation Package.

Separate landscape water meters shall be installed for all projects except single family homes. When irrigation water is from a well, the well shall be metered. The irrigation design plan shall be drawn on project base sheets. It should be separate from, but use the same format as, the landscape design plan. The irrigation system specifications shall accurately and clearly identify the following:

1. Specifications for Irrigation Design.

    a. Control valves, manufacturer's model number, size and location.

    b. Irrigation head manufacturer's model number, radius, operating pressure, gallons per minute/gallons per hour (gpm/gph) and location.

    c. Piping type, size and location.

    d. Point of connection or source of water and static water pressure.

    e. Meter location and size (where applicable).

    f. Pump station location and pumping capacity (where applicable).

    g. Power supply/electrical access and location.

    h. Plan scale and north arrow on all sheets.

    i. Graphic scaling on all irrigation design sheets.

    j. Irrigation installation details and notes/specifications.

    k. The irrigation system shall be automatic, constructed to discourage vandalism and simple to maintain.

    l. All equipment shall be of proven design with local service available.

    m. Show location, station number, size, and design gpm of each valve on plan. Control valves shall be rated at 200 psi.

    n. Visible sprinklers near hardscape shall be of pop-up design.

    o. All heads should have a minimum number of wearing pieces with an extended life cycle.

    p. Sprinklers, drippers, valves, etc., must be operated within manufacturer's specifications.

    q. Manual shut-off valves shall be fully ported ball valves or butterfly valves. Manual shut-off valves are required upstream of automatic valve manifolds.

    r. Master valves shall be metal, located as close to the point of connection as possible, and be metal piped between the master valve and the water meter.

    s. High flow sensors that detect and report high flow conditions created by system damage or malfunction shall be specified for all projects excluding single family and multi-family dwellings.

    t. The following statement "I have complied with the criteria of the ordinance and have applied them accordingly for the efficient use of water in the irrigation design plan;" and

    u. The signature of a licensed landscape architect, certified irrigation designer, irrigation consultant, landscape contractor or any other person authorized to design an irrigation system.

2. Specifications for Irrigation Efficiency

The minimum irrigation efficiency shall be 0.75 (75%). Greater irrigation efficiencies are expected from well-designed and maintained systems. The following are required:

a. Design spray head and rotor head stations with consideration for worst wind conditions. Close spacing and low-angle nozzles are required in high and frequent wind areas (ETo Zone No. 5).

b. Spacing of sprinkler heads shall not exceed manufacturer's maximum recommendations for proper coverage. The plan design shall show a minimum of 0.75 (75%) distribution uniformity.

c. Only irrigation heads with matched precipitation rates shall be circuited on the same valve.

d. Valve circuiting shall be designed to be consistent with hydrozones.

e. Individual hydrozones that mix plants that are moderate and low water use may be allowed if:

(i) plant factor calculation is based on the proportions of the respective plant water uses and their plant factor; or

(ii) the plant factor of the higher water using plant is used for the calculations.

f. Individual hydrozones that mix high and low water use plants shall not be permitted.

g. On the landscape design plan and irrigation design plan, hydrozone areas shall be designated by number, letter, or other designation. On the irrigation design plan, designate the areas irrigated by each valve, and assign a number to each valve. Use this valve number in the hydrozone information table. This table can assist with pre-inspection and final inspection of the irrigation system, and programming the controller.

3. Irrigation System Criteria

a. Reduced pressure backflow prevention devices shall be installed behind meter at curb by the District.

b. Show location, station number, size and design gpm of each valve on plan.

c. Smart Controllers shall be specified for all projects. This includes climate based or sensor based controllers, which can automatically adjust for local weather and/or site conditions.

d. High flow check valves shall be installed in or under all heads adjacent to street curbing, parking lots and where damage could occur to property due to flooding, unless controllers with flow sensor capabilities are specified that can automatically shut off individual control valves when excess flow is detected.

e. Pressure compensating screens/devices shall be specified on all spray heads to reduce radius as needed to prevent overthrow onto hardscape and/or to control high pressure misting.

f. All irrigation systems shall be designed to avoid runoff onto hardscape from low head drainage, overspray and other similar conditions where water flows onto adjacent property, nonirrigated areas, walks, roadways or structures.

g. Rotor type heads shall be set back a minimum of 4 feet from hardscape.

h. The use of drip, microirrigation or pressure compensating bubblers or other systems with efficiencies of 90 percent or greater is required for all shrubs and trees. Small, narrow (less than 8 feet), irregularly shaped or sloping areas shall be irrigated with drip, microspray or PC (pressure-compensating) bubbler heads.

i. Trees in turf areas shall be on a separate station to provide proper deep watering.

j. Street median irrigation

   i. No overhead sprinkler irrigation system shall be installed in median strips or in islands.

   ii. Median islands or strips shall be designed with either a drip emitter to each plant or subsurface irrigation. Bubblers used for trees must be fixed-flow pressure compensating type. Adjustable bubblers are prohibited

k. Meter sizing for landscape purposes shall be 33 gpm per planted acre. Maximum design meter flow rates are: 3/4" = 23 gpm, 1" = 37 gpm, 1-1/2" = 80 gpm, 2" = 120 gpm

l. Large projects located outside Improvement District No. 1 of the Coachella Valley Water District shall connect to or provide future connection to recycled water if such water is available. Large projects located inside Improvement District No. 1 may be required to connect to canal irrigation water or recycled water if such water is available. **(See attached boundary map.)**

4. Drip Irrigation System Criteria

a. The drip system must be sized for mature-size plants.

b. The irrigation system should complete all irrigation cycles during peak use in about 12 hours. Normally, each irrigation controller should not have more than four drip stations that operate simultaneously.

c. Field installed below ground pipe connections shall be threaded PVC or glued PVC. Surface laid hose and tubing is prohibited. Polyethylene tubing is allowed only in subsurface installations. Drip emitter installation shall be directly into polyethylene tubing on a ¼ inch thick-walled riser. Multi-port outlet devices and multi-port distribution is prohibited.

d. Proportion gallons per day per plant according to plant size. The following sizing chart is for peak water use. The low to high end of the range is according to the relative water requirements of the plants. The low end is for desert natives and the high end is for medium water use type plants.

Size of Plant	Gallons Per Day
Large trees (over 30-foot diameter)	58+ to 97+
Medium trees (about 18-foot diameter)	21 to 35
Small trees/large shrubs (9-foot diameter)	6 to 10
Medium shrubs (3.5-foot diameter)	.8 to 1.3
Small shrubs/groundcover	.5 or less

e. Plants with widely differing water requirements shall be valved separately. As an example, separate trees from small shrubs and cactus from other shrubs. Multiple emitter point sources of water for large shrubs and trees must provide continuous bands of moisture from the root ball out to the mature drip line plus 20 percent of the plant diameter. See Appendix C for more information on emitter spacing and wetted area.

f. Most plants require 50 percent or more of the soil volume within the drip line to be wetted by the irrigation system. See Appendix C for more information. For additional information on plant watering and plant relative water needs, see the plant list section of the "Lush and Efficient, Landscape Gardening in the Coachella Valley" or a list provided by the local agency.

5. Recycled Water Specifications

a. When a site has recycled water available or is in an area that will have recycled water available as irrigation water, the irrigation system shall be installed using the industry standard purple colored or marked “Recycled Water Do Not Drink” on pipes, valves and sprinkler heads.

b. The backup groundwater supply (well water or domestic water) shall be metered. Backup supply water is only for emergencies when recycled water is not available.

c. Recycled water users must comply with all county, state and federal health regulations. Cross connection control shall require a 6-inch air gap system or a reduced pressure backflow device. All retrofitted systems shall be dye tested before being put into service.

d. Where available, recycled water shall be used as a source for decorative water features.

e. Sites using recycled water are not exempted from the Maximum Applied Water Allowance (MAWA), prescribed water audits or the provisions of these criteria.

f. A Recycled Water Checklist (Appendix G) shall be submitted to the District upon submittal of the first plan check of the landscape design plan and the irrigation design plan.

6. Irrigation Water (Nonpotable) Specifications

a. When a site is using nonpotable irrigation water that is not recycled water (from an on-site well or canal water) all hose bibs shall be loose key type and quick coupler valves shall be of locking type with nonpotable markings to prevent possible accidental drinking of this water.

b. Sites using nonpotable irrigation water are not exempted from the Maximum Applied Water Allowance (MAWA), prescribed water audits or the provisions of these criteria.

7. Groundwater Water Specifications

a. Sites using groundwater irrigation water from wells are not exempted from the Maximum Applied Water Allowance (MAWA), prescribed water audits, or the provisions of these criteria.

8. Golf Course Criteria

a. For all new golf courses and additions or renovations to existing golf courses, the area of irrigated turf used for tees, fairways, greens and practice areas shall be limited. The total turf area of the golf course shall be limited to a maximum of four (4) irrigated acres average per golf hole. Practice areas such as driving ranges and short game areas shall not exceed ten (10) acres of turf. The golf course design shall reflect the natural topography and drainage ways of the site, minimize the clearing of vegetation and be flexible and water efficient in design.

b. All nonturf areas such as ponds, lakes, artificial water courses, bunkers and irrigated landscapes within the golf course project area must not exceed the Maximum Applied Water Allowance (MAWA) calculations set forth within these criteria.

0.00.040 Other Provisions

A. Landscape Audit, Irrigation Survey, and Irrigation Water Use Analysis for New Construction and Rehabilitated Landscapes

1. This section shall apply to new construction and rehabilitated landscape projects installed after January 1, 2010 as described in Section 0.00.030.
2. All landscape irrigation audits shall be conducted by a certified landscape irrigation auditor.
3. The project applicant shall submit an irrigation audit report with the Certificate of Completion to the local agency that may include, but not be limited to, inspection, system tune-up, system test with distribution uniformity, reporting overspray or run-off that causes overland flow, and preparation of an irrigation schedule;
4. The District will administer programs that may include, but not be limited to, irrigation water use analysis, irrigation audits and irrigation surveys for compliance with the Maximum Applied Water Allowance (MAWA).
5. The owner of the landscaped area shall bear the cost of the audit.

B. Irrigation Audit, Irrigation Survey and Irrigation Water Use Analysis for Existing Landscapes

1. This section shall apply to all existing landscapes that were installed before January 1, 2010 and are over one (1) acre in size.
2. The District will administer programs that may include, but not be limited to, irrigation water analysis, irrigation surveys and irrigation audits that verify landscape water use does not exceed the Maximum Applied Water Allowance (MAWA) for existing landscapes. The Maximum Applied Water Allowance (MAWA) for existing landscapes shall be calculated as: MAWA = (.70) (ETo) (LA) (.62/748) unless landscape plans were submitted and approved under a more water conserving ordinance.

C. Water Waste Prevention

1. Water Waste Prevention. Water waste resulting from inefficient landscape irrigation including run-off, low-head drainage, overspray, or other similar conditions where water flows onto adjacent property, nonirrigated areas, walks, roadways, or structures is prohibited. All broken heads and pipes must be repaired within 72 hours of notification. Penalties for violation of these prohibitions are established in Section 0.00.070.
2. Water service to customers who cause water waste may have their service discontinued.
3. Customers who appear to be exceeding the Maximum Applied Water Allowance (MAWA) may be interviewed by the District Water Management Department to verify customer water usage to ensure compliance.

D. Soil Management Report

1. In order to reduce runoff and encourage healthy plant growth, a soil management report shall be completed by the project applicant or designee as follows:

    a. Submit soil samples to a laboratory for analysis and recommendation.

    b. Soil sampling shall be conducted in accordance with laboratory protocol, including protocols regarding adequate sampling depth for the intended plants.

    c. The soil analysis may include:

        i. Determination of soil texture, indicating the available water holding capacity.

        ii. An approximate soil infiltration rate (either) measured or derived from soil texture/infiltration rate tables. A range of infiltration rates shall be noted where appropriate.

        iii. Measure of pH, total soluble salts and percent organic matter.

    d. The project applicant or designee shall comply with one of the following:

        i. If significant mass grading is not planned, the soil analysis report shall be submitted to the local agency as part of the Landscape Documentation Package; or

        ii. If significant mass grading is planned, the soil analysis report shall be submitted to the local agency as part of the Certificate of Completion.

    e. The soil analysis report shall be made available, in a timely manner, to the professionals preparing the landscape design plans and the irrigation plans to make any necessary adjustments to the design plans.

    f. The project applicant or designee shall submit documentation verifying implementation of soil analysis report recommendations to the local agency with the Certificate of Completion.

E. Developer-Provided Documentation

1. The developer/applicant/designee shall provide an approved copy of the Landscape Documentation Package and the following information for the homeowner or irrigation system operator. The package/information shall include a set of drawings, a recommended monthly irrigation schedule, and a recommended irrigation system maintenance schedule as described in Section 0.00.040G.

2. Irrigation Schedules. For the efficient use of water, all irrigation schedules shall be developed, managed, and evaluated to utilize the minimum amount of water to maintain plant health. Irrigation schedules shall meet the following criteria:

a. An annual irrigation program with monthly irrigation schedules shall be required for the plant establishment period, for the established landscape, and for any temporarily irrigated areas. The irrigation schedule shall:

i. Include run time (in minutes per cycle), suggested number of cycles per day, and frequency of irrigation for each station.

ii. Provide the amount of applied water (in hundred cubic feet) recommended on a monthly and annual basis.

iii. Whenever possible, incorporate the use of evapotranspiration data, such as those from the California Irrigation Management Information System (CIMIS) weather stations, to apply the appropriate levels of water for different climates.

iv. Whenever possible, be scheduled between 8:00 p.m. and 10:00 a.m. to avoid irrigating during times of high wind or high temperature.

G. Maintenance Schedules

A regular maintenance schedule satisfying the following conditions shall be submitted as part of the Landscape Documentation Package:

1. Landscapes shall be maintained to ensure water efficiency. A regular maintenance schedule shall include but not be limited to checking, adjusting, cleaning and repairing equipment; resetting the automatic controller, aerating and dethatching turf areas; replenishing mulch; fertilizing; pruning; and weeding in all landscaped areas.

2. Repair of irrigation equipment shall be done with the originally specified materials or their approved equal.

3. A project applicant is encouraged to implement sustainable or environmentally-friendly practices for the overall landscape maintenance.

H. Certificate of Completion

1. The Certificate of Completion (Appendix E) shall include the following:

a. Submittal and Approval Dates of the Landscape Documentation Package and Submittal Date of the Water Efficient Landscape Worksheet

b. Project Name

c. Project Address and Location

d. Applicant Name, Telephone and Mailing Address

e. Property Owners Name, Telephone, and Mailing Address

2. Certification by either the signer of the landscape design plan, the signer of the irrigation design plan, or the licensed landscape contractor that the landscape project has been installed per the approved Landscape Documentation Package.

3. Irrigation scheduling parameters used to set the controller.
4. Landscape and irrigation maintenance schedule.
5. Irrigation audit report.
6. Soil analysis report and documentation verifying implementation of soil report recommendations.
7. The project applicant shall:
    a. Submit the signed Certificate of Completion to both the local agency and the District for review and approval.
    b. Ensure that copies of the Certificate of Completion with all approvals are submitted to the local agency, the District, and property owner or his or her designee.
8. The District and the local agency shall:
    a. Receive the signed Certificate of Completion from the project applicant.
    b. Approve or deny the Certificate of Completion. If the Certificate of Completion is denied, the local agency shall provide information to the project applicant regarding reapplication, appeal or other assistance.

I. Stormwater Management

1. Stormwater management practices minimize runoff and increase infiltration which recharges groundwater and improves water quality. Implementing stormwater best management practices into the landscape and grading design plans to minimize runoff and to increase on-site retention and infiltration are encouraged.
2. Project applicants shall refer to the District, the local agency, and/or Regional Water Quality Control Board for information on any applicable stormwater ordinances and stormwater management plans.
3. Rain gardens and other landscape features that increase rain water capture and infiltration are recommended.

J. Public Education

1. Public education is a critical component to promote the efficient use of water in landscapes. The use of appropriate principles of design, installation, management and maintenance that save water is encouraged in the community.
2. The District and the local agency shall provide information to owners of new, single family residential homes regarding the design, installation, management and maintenance of water efficient landscapes.

0.00.050 Review and Program Monitoring Fees

A. Review and Program Monitoring fees are deemed necessary to review Landscape Documentation Packages and monitor landscape irrigation audits and shall be imposed on the subject applicant, property owner or designee.

B. A Landscape Documentation Package review fee will be due at the time of initial project application submission to the District.

C. The Board of Directors, by resolution, shall establish the amount of the above fees in accordance with applicable law.

0.00.060 Appeals

A. Appeal to General Manager-Chief Engineer. An applicant, property owner or designee of any applicable project may appeal decisions made by the Water Management Department or Service Director other than imposition of penalties (see Sections 0.00.070 – 0.00.090 regarding imposition of penalties) to the General Manager-Chief Engineer, in writing, within fifteen (15) days of notification of decision. The General Manager-Chief Engineer's decision shall become final on the fifteenth (15^{th}) day following service of written notification of said decision unless a timely appeal is filed pursuant to 0.00.060 B.

B. Appeal to Board of Directors. An applicant, property owner or designee of any applicable project may appeal decisions made by the General Manager-Chief Engineer pursuant to Section 0.00.060 A. to the Board of Directors. Said appeal must be written and submitted to the Secretary of the Board of Directors within fifteen (15) days of the date of notification of the General Manager-Chief Engineer's decision. The Board of Directors' decision shall be final upon its adoption.

0.00.070 Penalties

A. Violation of any part of Ordinance No. 1302.1 may result in any or all of the following penalties:

1. Monetary. See Appendix F for schedule of monetary penalties.
2. Termination of Service.

B. Notice. The District shall issue a written notice of imposition of penalty. The notice shall set forth penalty imposed and the reason for imposition of it. The notice shall be served on the customer by registered or certified mail and shall advise that the customer may request review of the imposition of penalty by filing a written request for a hearing pursuant to the provision of Section 0.00.080.

0.00.080 Hearing Regarding Penalties

A. Request for Hearing. Customers who have received notice of imposition of penalty may make a written request for a hearing. The District must receive the request for hearing no later than fifteen (15) days from the date of the notice of imposition of penalty. The request for hearing shall set forth, in detail, all facts supporting the request. Upon District's receipt of a timely request for a hearing, imposition of penalty shall be stayed until the Statement of Decision after hearing becomes final, or, if the Statement of Decision is timely appealed, the Board of Directors' order on appeal is adopted.

B. Notice of Hearing. Within ten (10) days of the District's receipt of the request for hearing, the District shall provide written notice to the customer of the date, time and place of the hearing. The hearing date shall be within thirty (30) days of the mailing of the notice of hearing, unless the parties agree, in writing, to a later date.

C. Hearing. The General Manager-Chief Engineer, or his designee, shall act as the Hearing Officer. At the hearing, the customer shall have an opportunity to respond to the allegations set forth in the notice of imposition of penalty by producing written and/or oral evidence.

D. Statement of Decision. Within ten (10) days following the hearing, the Hearing Officer shall prepare a written Statement of Decision, which shall set forth the facts upon which the decision is based. The Statement of Decision shall be served by personal delivery or registered or certified mail on the customer. The Statement of Decision shall become final on the sixteenth (16^{th}) day after service on the customer unless a request for appeal is timely filed with the Board of Directors pursuant to Section 0.00.090.

0.00.090 Appeal of Penalties

A. Request for Appeal. A customer may appeal a Statement of Decision by filing a written request for appeal with the Board of Directors before the date the Statement of Decision becomes final, i.e., no later than the fifteenth (15^{th}) day following service of the Statement of Decision on the customer. The request for appeal shall set forth, in detail, all the issues in dispute and all facts supporting the request.

B. Notice of Appeal Hearing. No later than thirty (30) days after receipt of the request for appeal, the Board of Directors shall set the matter for a hearing. Written notice of said hearing of appeal shall be served on the appellant by personal delivery or registered or certified mail. The hearing date shall be a date within thirty (30) days of service of the notice of hearing of appeal, unless the parties agree, in writing, to a later date. If the Board of Directors does not hear the appeal within the required time due to acts or omissions of the appellant, the Statement of Decision shall become final on the thirty-first (31^{st}) day after service of notice of hearing of appeal on the customer.

C. Determination and Order on Appeal. After the hearing of appeal, the Board of Directors shall issue an order affirming, modifying or reversing the General Manager-Chief Engineer's decision. The Board of Directors shall set forth its Determination and Order, in writing, and shall serve the Determination and Order to the customer by personal delivery or registered or certified mail within thirty (30) days following the hearing. The Determination and Order of the Board of Directors shall be final upon its adoption.

APPENDIX A

Landscape Documentation Package Checklist

Project Site: ______________________ Tract or Parcel Number: ___________________

Project Assessor's Parcel Number (APN): ______________________________________

Project Location: ____

Landscape Architect/Irrigation Designer/Contractor and Name and Contact Information: ______

____

Included in this Landscape Documentation Package are: (Check to indicate completion)

____ 1. Water Efficient Landscape Worksheet (Appendix B)

WATER BUDGET CALCULATIONS (Appendix D)

____ 2. Maximum Applied Water Allowance (MAWA):

Conventional Landscape: ______ 100 cubic feet/year

+ Recreational Turf grass Landscape: _____ 100 cubic feet/year (if applicable)
Maximum Applied Water Allowance: _________ 100 cubic feet/year

____ 3. Estimated Total Water Use by Hydrozone:
Turf grass Hydrozones: ______ 100 cubic feet/year
Recreational Turf grass Hydrozones: _______ 100 cubic feet/year
Low Plant Hydrozones: _______ 100 cubic feet/year
Medium Plant Hydrozones: _______ 100 cubic feet/year
High Plant Hydrozones: _______ 100 cubic feet/year
Water Features: _______ 100 cubic feet/year
Other ______________________: _______ 100 cubic feet/year
Estimated Total Water Use: _________ 100 cubic feet/year

____ 4. ETWU < MAWA

PLAN SETS

____ 5. Landscape Design Plan

____ 6. Irrigation Design Plan

____ 7. Grading Design Plan

____ 8. Soil Management Report

I agree to comply with the requirements of the water efficient landscape ordinance and submit a complete Landscape Documentation Package.

Date: ___________________ Applicant: ____

APPENDIX B

SAMPLE WATER EFFICIENT LANDSCAPE WORKSHEET

This worksheet is filled out by the project applicant and is a required element of the Landscape Documentation Package.

PROJECT INFORMATION

Project Name		
Name of Project Applicant	Telephone No.	
	Fax No.	
Title	Email Address	
Company	Street Address	
City	State	Zip Code

SECTION A. HYDROZONE INFORMATION TABLE

Please complete the hydrozone table(s) for each irrigation point of connection. Use as many tables as necessary to provide the square footage of landscape area per valve.

Irrigation Point of Connection (P.O.C.) No. __________

Controller No.	**Valve Circuit No.**	**Plant Types(s)***	**Irrigation Method****	**Area (Sq. Ft.)**	**% of Landscape Area**
Total					**100%**

***Plant Type**
Cst = Cool Season Turf
WST = Warm Season Turf
HW = High Water Use Plants
MW = Moderate Water Use Plants
LW = Low Water Use Plants

****Irrigation Method**
MS = Microspray
S = Spray
R = Rotor
B = Bubbler
D = Drip
O = Other

APPENDIX C
ET PROFILE AND PLANT FACTORS

	Jan>	<Feb	Mar	Apr>	<May	Jun	Jul	Aug	Sep>	<Oct	Nov	Dec	Totals	Totals
Monthly ETo (inches)													Inches	Feet
Zone No. 1-Coves	1.71	2.84	4.00	5.70	6.84	7.98	7.98	6.27	5.70	4.00	2.28	1.71	57.01	4.75
Zone No. 2-COD	2.00	3.36	4.68	6.68	8.02	9.35	9.35	7.35	6.68	4.68	2.67	2.00	66.82	5.57
Zone No. 3-EMC	2.25	3.75	5.25	7.50	9.00	10.50	10.50	8.25	7.50	5.25	3.00	2.25	75.00	6.25
Zone No. 4-TH	2.64	4.40	6.16	8.80	10.56	12.32	12.32	9.68	8.80	6.16	3.52	2.64	88.00	7.33
Zone No. 5-I10	2.82	4.68	6.57	9.39	11.27	13.15	13.15	10.33	9.39	6.57	3.76	2.82	93.90	7.83
% Annual ETo per Month	3	5	7	10	12	14	14	11	10	7	4	3		

Zone No. 1 = Most protected cove areas with minimum wind, longest mountain shadows, higher rainfall, Palm Can. to La Q. Cove

Zone No. 2 = Lower cove areas, light winds, long afternoon shadows from mountains, typ. Hwy 111 from Cathedral City to La Quinta

Zone No. 3, 4 = Moderate winds, minimum mountain shadows, some blowing sand and dust; 3) Upper valley predominate wind from northwest, 4) Lower valley has lower elevation and more summer southeast wind

Zone No.5 = Frequent strong northwest winds, heavy blowing sand and dust, typical of I-10 corridor to Washington Street

Maximum Applied Water Allowance (CCF) = ETo (in inches for season) X .50 X Area (in square feet) X .62 / 748

ET Adjustment Factor = .38 Plant Factor / .75 Irrigation System Efficiency = 0.50

.62 = gallons per square foot per inch deep

CCF = 100 cubic feet = 1 billing unit = 748 gallons

Estimated Total Water Use (CCF) = $\frac{\text{ETo (in inches for season) X Plant Factor X Area (in square feet) X 0.62 / 748}}{\text{Irrigation System Efficiency}}$

Target Irrigation Efficiency = .80 Turf Rotor
= .75 Sprayheads
= .90 Drip/Micro/PC Bubbler

Emitters per Plant Estimate = $\frac{\text{Area Of Plant In Square Feet X \% Of Area To Be Wet}}{\text{Square Feet Wet Per Emitter}}$

Soil Type	(inches water holding capacity per inch of depth)		Emitter Wetted Area Square Feet Each	Emitter Spacing
Very Coarse Sand	0.05	Typical of high on an alluvial fan	.75 to 1.75	10"
Blow Sand	0.07	Typical of mid valley ridge area	1.75 to 3	18"
Fine Sand	0.10	Typical of low on alluvial fans from Rancho Mirage to Indian Wells	3 to 5	3'
Very Fine Silty Sand	0.15	Typical of lowest alluvial fans from La Quinta, Indio, & Coachella	5 to 10	4'
Silt Loam	0.17	Typical of lower valley agricultural areas located below sea level	10 to 28	4.5'

Plant Factor (Kc)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg
Cool Turf 100%**	1.00	1.00	1.00	NR	NR	NR	NR	NR	NR	1.00	1.00	1.00	1.00
Warm Turf 100%**	NR	NR	NR	0.80	0.80	0.80	0.80	0.80	0.80	NR	NR	NR	0.80
Cool Turf 80%*	0.80	0.80	0.80	0.70	NR	NR	NR	NR	NR	0.80	0.80	0.80	0.79
Warm Turf 60%*	NR	NR	NR	0.60	0.60	0.60	0.60	0.60	0.60	0.60	NR	NR	0.60
Combined TurfSav*	0.80	0.80	0.80	0.70	0.60	0.60	0.60	0.60	0.60	0.70	0.80	0.80	0.70
Tree/Shrub/GC L*	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Tree/Shrub/GC L**	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
Tree/Shrub/GC M*	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Tree/Shrub/GC M**	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Tree/Shrub/GC H*	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Tree/Shrub/GC H**	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Open WaterFactor	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10

(Approx. Evaporation from a still water surface, higher factor (1.2) with falls and fountains.) Reference; WUCOLS III

CombinedTurfSav =	Combination of cool and warm season turf according to normal management in the Coachella Valley
* =	Normal irrigation level to maintain established planting
** =	Normal irrigation level during plant establishment
GC =	Groundcover
L =	Low water use Kc .1 to .3
M =	Moderate water use Kc .4 to .6
H =	High water use Kc .7 to .9
NR =	Not Recommended

APPENDIX D

SAMPLE CALCULATION/ESTIMATED TOTAL WATER USE (by Hydrozone)

Using the following formula from Appendix C:

ETWU	= (ETo) x (PF) x (LA) x (.62)] / (748) / (IE)
ETWU	= Estimated Water Use (hundred cubic feet)
ETo	= Reference Evapotranspiration (inches) [for period of estimate]
PF	= Plant Factor (Kc)
LA	= Landscaped Area (in square feet)
.62	= Conversion Factor (to gallons per square foot)
748	= Conversion Factor (to hundred cubic feet)
IE	= Irrigation System Efficiency

Project Site Example: Total landscaped area 60,000 square feet in Palm Desert near the intersection of Cook Street and Country Club Drive in Zone No. 3 (75.0" Annual ETo).

- 16,500 square feet of turf grass overseeded with rye grass in winter, irrigated with low angle rotor sprinklers.
- 28,200 square feet of "low" desert native plantings on drip irrigation.
- 15,300 square feet of "moderate" water using plantings on drip irrigation.

See Appendix C for formula factors. ETo is totaled for season. Turf grass plant factors are the average for the season and tree/shrub/groundcover plant factors are considered constant annually.

Plant Factors

Turf Grass	Low Native Plants	Moderate Shrubs
0.70	0.20	0.50

ETWU = [(ETo) x (PF) x (LA) x (.62) / (748)] / (IE) = CCF

Overseeded Turf Grass: Season = 75.0 x .7 x 16,500 x .62 / 748 /.80 = 897 CCF
Seasonal Turf ETWU = 897 CCF

"Low" Native Plants: Annual = 75.0 x .2 x 28,200 x .62 / 748 / .90 = 389 CCF
"Low" Native ETWU = 389 CCF

"Moderate" Shrubs and Ground Cover: Annual = 75.0 x .5 x 15,300 x .62 / 748 / .90 = 528 CCF
"Moderate" ETWU = 528 CCF
Project Total ETWU = 1,814 CCF

APPENDIX D

SAMPLE CALCULATION

Maximum Applied Water Allowance (MAWA)

Using the following formula:

MAWA = [(ETo) x (0.50) x (LA) x (0.62)] / (748)
MAWA = Maximum Applied Water Allowance (CCF or hundred cubic feet)
ETo = Reference Evapotranspiration (inches per year)
0.50 = ET adjustment factor = .38 PF / .75 IE
LA = Landscaped Area (square feet)
0.62 = Conversion Factor (to gallons per square foot)
748 = Conversion Factor (to hundred cubic feet)

Using the project for the Estimated Total Water Use example:

Landscaped area of 60,000 square feet in Palm Desert near the intersection of Cook Street and Country Club Drive in Zone No. 3 (75.0" Annual ETo).

MAWA = 75.0 (ETo) x (0.50) x (LA) x (0.62) / (748)
= [75.0(.50) (60,000) (0.62)] / (748)
MAWA = 1,864 CCF

ETWU total of 1,814 CCF is < the MAWA of 1,865 CCF

APPENDIX E

SAMPLE CERTIFICATE OF COMPLETION

Project Name:____

Parcel Map or Tract No.:_______________ APN:____________________

Project Location:____

Maximum Applied Water Allowance (MAWA):_______________ (in hundred cubic feet)

Estimated Annual Total Applied Water Use:_________________ (in hundred cubic feet)

Preliminary project documentation submitted (initials indicate submittal)

______1. Grading design plan

______2. Landscape design plan

______3. Irrigation design plan

______4. Irrigation schedules

Post Installation inspection (initials indicate completion)

______1. Plants installed as specified

______2. Irrigation System installed as designed

Comments:____

____

____

A copy of this certification has been provided to the owner/developer, the local agency and to the District. I certify the work has been completed in accordance with District Ordinance 1302.1, Landscape and Irrigation System Design Criteria.

____

Landscape Architect/Designee Signature License No. Date

1. Date the Landscape Documentation Package was submitted to the Local Agency: _______

2. Date the Landscape Documentation Package was approved by the Local Agency: _______

3. Date a copy of the Water Efficient Landscape Worksheet (including the Water Budget Calculation) was submitted to the District: _______

APPENDIX F

SCHEDULE OF MONETARY PENALTIES

1. $250 upon receipt of first written Notice of Non-compliance.
2. An additional $250 (for a total of $500) upon receipt of the second Notice of Non-compliance issued thirty (30) days after the receipt of the first Notice of Non-compliance.

APPENDIX G

Recycled Water Checklist

1. Obtain coverage under the general waste discharge requirements for discharge of recycled water for golf course and landscape irrigation Order No. 97-700 or equivalent version of this permit from the California Regional Water Quality Control Board of the Colorado River Basin Region (Regional Board) by submitting a Notice of Intent to the Regional Board and paying application/annual fees.

2. Enter into an agreement with CVWD for receiving nonpotable water for golf course and landscape irrigation. The agreement between discharger and CVWD must be provided to the Regional Board within 90 days of receiving coverage under the permit referenced above in item #1.

3. Landscape and Irrigation system plans must meet regulatory requirements of Order 97-700 or equivalent version of this permit, the State Board's Recycled Water Policy, and California Department of Public Health (CDPH) Statutes and Regulations related to recycled water, such as the Health and Safety Code, the Water Code, Title 17 and Title 22 Code of Regulations. These requirements include but are not limited to the following:

    a. An air-gap separation, a vertically measured distance between supply pipe and receiving vessel must be present and meet the required distance for the size of the supply pipe.

    b. The appropriate type of backflow protection is to be installed for auxiliary water supplies and recycled water.

    c. The required separation distance between recycled water lines and impoundments and application area; and domestic wells and water lines is maintained and approved by CDPH.

    d. The design of the irrigation system shall not cause the occurrence of ponding anywhere in the reuse area, and overspray or mist around dwellings, outdoor eating areas and/or food handling facilities is eliminated. Irrigation runoff shall be confined to the recycled water use area unless authorized by CDPH.

    e. Drinking fountains will be protected from spray, mist or runoff by use of a drinking fountain cover or shelter approved for this purpose.

    f. Hose bibs are not allowed on portions of the recycled water systems accessible to the general public. Quick couplers that differ from those used on the potable water system are allowed.

g. Signs are posted in areas that the public has access to that are no less than 4 inches high by 8 inches wide and include "RECYCLED WATER—DO NOT DRINK" and the international do not drink symbol as indicated in CCR Title 22 Division 4 Chapter 3 Article 4 Section as figure 60310-A. The number and locations of these signs will be approved by CDPH.

h. The recycled water irrigation system is able to be operated during a time of day that will minimize contact with the public.

i. All pipes installed above or below ground on or after June 1, 1993 designed to carry recycled water are to be colored purple or wrapped in purple tape.

j. Golf course pump houses utilizing recycled water are appropriately tagged with warning signs with proper wording of sufficient size to warn the public that recycled water is not safe for drinking. All new and replacement at grade valve boxes shall be purple or appropriately tagged for water reuse purposes. All other appurtenances and equipment used for recycled water must be identified as used for recycled water distribution per the recommendations of CDPH.

4. Prior to construction, landscape and irrigation system plans must be submitted for approval to the following agencies (please allow for a 30 day comment period):
   a. Regional Board Water Quality Control Board,
   b. California Department of Public Health, and
   c. CVWD.

5. Upon approval from the Regional Board and CDPH, the discharger shall provide notification that recycled water will be used for irrigation to people who reside adjacent to the recycled water use area and to golf course patrons though a method approved by the Regional Board's Executive Officer and CDPH at least 30 days prior to use of recycled water.

6. A Use Site Supervisor must be designated and his or her name and contact information must be provided in writing to CVWD and the Regional Board 30 days prior to discharge of recycled water. This person will be available to be contacted and receive periodic education and training on the uses and restrictions of recycled water.

7. A cross-connection control test will be performed on the irrigation and domestic systems prior to the discharge of recycled water and at least once every four years thereafter. This test is to be conducted by an American Water Works Association (AWWA) certified cross-connection control program specialist or equivalent. The results of these tests are to be submitted to CVWD, CDPH, and the Regional Board within 30 days of test completion.

8. "As-Built" plans and specifications showing the domestic and irrigation systems, location of all potable and recycled water connections and location of all on-site and nearby wells to CDPH, as per the CDPH requested time frame.

I, the undersigned Acting Board Secretary of the Coachella Valley Water District, do hereby certify that the foregoing is a true and correct copy of Ordinance No. 1302.1 of said District introduced and passed at meeting of said Board held August 28, 2007, and that said Ordinance was passed by the following vote:

Ayes:	Four
Directors:	Larson, Codekas, Kitahara, McFadden
Noes:	None
Absent:	Nelson

I further certify that said Ordinance was thereupon signed by the Vice President of the Board of Directors of said District.

Grace Gil

Acting Board Secretary

(SEAL)

APPENDIX E
DMM COST-BENEFIT ANALYSES

BMP 02 Simple Cost-Effectiveness Tool

Version 3, Beta

User Warning: This spreadsheet model is still under development. It is currently being tested by members of the R&E committee. This model has not been officially adopted by the CUWCC for benefit-cost analysis of BMP 02.

This spreadsheet tool provides a simple model for evaluating the cost-effectiveness of BMP 02. The model is organized into five data entry steps and one analysis review step, as follows:

Step 1 - Annual Costs: in this step you enter information to calculate the expected annual costs to implement BMP 02.

Step 2 - Customer Water Savings: in this step you enter information to calculate the expected water savings over time from implementation of BMP 02.

Step 3 - Agency Benefits: in this step you enter information to calculate the benefits to your agency from the water savings estimated in Step 2.

Step 4 - Other Benefits and Costs: in this step you enter information to calculate benefits and costs that may accrue to parties other than your agency from implementation of BMP 02.

Step 5 - Discounting Information: in this step you provide discount and cost escalation rates needed for the present value analysis.

Step 6 - Review Results: in this step you review the model results. These results are based on the information you provided in the first five steps.

<u>Cell Color Key</u>

Green Cells are cells that require data from the user.

White Cells are cells that contain formulas used by the model. If you overwrite the formulas in White Cells the model will cease to work properly. Only enter data in Green Cells.

<u>Knowledge Requirements</u>

This model calculates the present value benefits and costs associated with BMP 02. To use this model you should be familiar with the requirements of BMP 02 and basic methods of benefit-cost analysis and present value analysis. BMP 02 is fully described in Exhibit 1 of the MOU. Methods of benefit-cost analysis used by this model are described in the Council's "Guidelines for Preparing Cost-Effectiveness Analyses of Urban Water Conservation Best Management Practices." Both of these documents are available from the Council (www.cuwcc.org). Additionally, Appendix A of the Council's "BMP Costs & Savings Study" provides further review and examples of benefit-cost calculations.

The structure and organization of this model is based on similar worksheets provided in "Water Conservation Guidebook for Small and Medium-Sized Utilities," AWWA Pacific Northwest Section, 1993. This guidebook is available through the CUWCC lending library or may be purchased directly from AWWA.

<u>Data Requirements</u>

This model requires a variety of data, including:

* Implementation costs, including staffing, materials, outside consultants, and marketing costs.

* Estimates of water savings from residential plumbing retrofits, including initial savings and rates of decay.

* Agency water production costs, including source of supply costs, capacity expansion costs, energy costs, and chemical costs.

* Environmental benefits of water saved. In many instances users will not have this information. In these cases the model can be used to conduct "what-if" analysis to determine the effect of environmental benefits on BMP 02 cost-effectiveness.

* Discount rates, both for your agency and for the society.

Much of the date required to implement this model is available in the Council's "BMP Costs & Savings Study." This document provides best available estimates of water savings and program costs for most of the BMPs for which water savings have been quantified.

<u>Variable Units</u>

Model variables represent specific quantities denoted in particular units. These units must be used or the model will provide incorrect results. The called for unit is always indicated for each variable for which you are providing a value. In most cases this will be obvious. Water volumes are mostly denoted in acre-feet (af). In some cases they are denoted in gallons-per-day (gpd). At the bottom of several worksheets a unit conversion calculator for converting water volume into acre-feet is provided.

<u>Scenarios</u>

You can save model scenarios. A scenario consists of all the values you entered for the model variables plus the benefit-cost results for those values. Scenarios are saved on the worksheet "Saved Scenarios." These scenarios can also be loaded back into the model at a later time using the "Load a saved scenario" button located on the "Saved Scenarios" worksheet. With scenarios you can evaluate the sensitivity of the model's results to changes in key variables.

<u>Model Limitations</u>

This model provides a simple representation of program benefits and costs for BMP 02. It is unlikely the model will suit all situations a user wishes to evaluate. Users are free to adapt the model to their particular circumstances. Doing so however may affect the underlying formulas and Visual Basic procedures used by the model. Users should be familiar with programming Excel if they intend to make changes to the model.

BMP 02 Residential Plumbing Retrofit - Annual Program Cost Worksheet

Instructions: Fill in all green cells.

Administration Costs

1. Staff hours to administer the retrofit program	100	hrs/yr
2. Staff hourly rate, including overhead	$ 40.00	/hr
3. Administration costs (Line 1 x Line 2)	$ 4,000	/yr

Field Labor Costs

	Single Family Plumbing Retrofits		Multi Family Plumbing Retrofits	
4. Field labor hours (e.g. kit distribution, direct installation)	-	hrs/yr	-	hrs/yr
5. Field labor hourly rate, including overhead	$ -	/hr	$ -	/hr
6. Field labor cost (Line 4 x Line 5)	$ -	/yr	$ -	/yr

Materials Costs

	Single Family Plumbing Retrofits		Multi Family Plumbing Retrofits	
7. Unit cost of materials (e.g., plumbing retrofit kits, nozzles, etc.)	$ 2.00	/unit	$ 2.00	/unit
8. Number of kits distributed	150	/yr	25	/yr
9. Total materials cost (Line 7 x Line 8)	$ 300	/yr	$ 50	/yr

Publicity Costs

10. Marketing collateral cost (e.g., brochure design, printing, web services)	$ 500	/yr
11. Advertising cost (i.e. newspaper, radio, TV, web)	$ 2,000	/yr
12. Total publicity costs (Line 10 + Line 11)	$ 2,500	/yr

Evaluation and Followup Costs

13. Labor & Consultant costs	$ -	/yr
14. **Total Costs** (Line 3 + Line 6 + Line 9 + Line 12 + Line 13)	$ 6,850	/yr

Program Cost Sharing

15. Cost Share from Others (e.g., other agencies, grants, in-kind contrib.)	$ -	/yr
16. **Net Agency Cost** (Line 14 - Line 15)	$ 6,850	/yr

BMP 02 Residential Plumbing Retrofit - Water Savings Worksheet

Instructions: Fill in all green cells.

	Single Family Plumbing Retrofits		Multi Family Plumbing Retrofits	
1. Reduction in Avg. Use (gallons per day per residential unit)	5.50	gpd	65.00	gpd
2. Savings Decay	30	%/yr	30	%/yr
3. Number of Kits Distributed (from STEP 1 Line 8)	150		25	
4. Percent of Kits Installed	55	%/yr	55	%/yr
5. Lifetime Savings	**1.69**	**AF**	**3.34**	**AF**

Acre-Foot Conversions

Use the calculator below if you need to convert water volume into acre-feet.

325,900.00	CF - Cubic Feet	=	7.48	AF

BMP 02 Residential Plumbing Retrofit - Agency Benefits Worksheet

Instructions: Fill in all green cells that apply.

Avoided Supply Acquisition Costs (include future avoided capital costs as appropriate)

1. Marginal Source of Suppy (List name)	SWP Table A	
2. Avoidable Supply Acquisition Cost	$ 1210	/AF

Avoided Treatment & Distribution Capacity Costs

3. Avoided capacity expansion costs (dollars per AF of water saved by conservation)	$ 0	/AF

Avoided Wastewater Capacity Costs (*if service provided by agency*)

4. Avoided capacity expansion costs (dollars per AF of water saved by conservation)	$ 950	/AF

Avoided Treatment & Distribution Variable Costs *(include wastewater services if provided by agency)*

Avoided chemical costs

5. Total annual chemical costs	$ -	/yr
6. Annual fixed costs for chemicals	$ -	/yr
7. Annual chemical costs not related to water production	$ -	/yr
8. Avoidable chemical costs (Line 5 - Line 6 - Line 7)	$ -	/yr
9. Average annual treated water use	0	AF
10. Unit Cost of Chemicals (Line 8 ÷ Line 9)	$ -	/AF

Avoided energy costs

11. Annual energy costs	$ 28,630,000.00	/yr
12. Annual fixed costs	$ -	/yr
13. Annual energy costs not related to water production (e.g., lighting, heating/cooling)	$ -	/yr
14. Avoidable energy costs (Line 11 - Line 12 - Line 13)	$ 28,630,000.00	/yr
15. Average annual water use (from Line 9 above)	109,500.00	AF
16. Unit Cost of Energy (Line 14 ÷ Line 15)	$ 261.46	/AF
17. Avoided Treatment & Distribution Variab (Line 10 + Line 16)	$ 261.46	/AF
18. Total Supply & Wastewater Benefits (Line 2 + Line 3 + Line 4 + Line 17)	$ 2,421.55	/AF

Environmental Benefits

19. Environmental benefit per AF saved (e.g. value of instream flow, improved water quality, avoided environmental mitigation for supply development or wastewater disposal)	$ 0	/AF

Acre-Foot Conversions

Use the calculator below if you need to convert water volume into acre-feet.

325,900.00	=	=	7.48	AF

BMP 02 Residential Plumbing Retrofit - Other Benefits and Costs Worksheet

Instructions: Fill in all green cells.

OTHER BENEFITS

Avoided Customer Energy Costs		Single Family Plumbing Retrofits	Multi Family Plumbing Retrofits
1. Hot water use as a percent of total plumbing device water s		50 %	50 %
2. Percent of residential hot water heated with gas (can get estimate from local utility or CEC)		100 %	100 %
3. Marginal cost per therm	$ 1.03 /therm		
4. Marginal cost per KWh	$ 0.203 /KWh		
5. Customer Energy Benefit		$ 739.40 /AF	$ 739.40 /AF

Based on energy savings estimates listed in Table 6-3 of Water Conser

	therms/ga	kWh/gal
Showerheads	0.00441	0.10464
	70% effic.	98% effic.

Avoided Wastewater Utility Variable Costs (IMPORTANT: do not include those listed in STEP 3 Agency Benefits)

6. Avoided energy & chemical costs $ 0 /AF of conserved water

Avoided Wastewater Utility Capacity Costs (IMPORTANT: do not include those listed in STEP 3 Agency Benefits)

7. Avoided wastewater capacity expansic $ 0 /AF of conserved water

OTHER COSTS

Customer participation costs	Single Family Plumbing Retrofits	Multi Family Plumbing Retrofits
8. Average customer expenditures per kit installed (e.g., change landscaping, appliances, etc)	$ 20 /kit	20 /kit
9. Number of kits distributed (from Line 8 of STEP 1)	150 /yr	25 /yr
10. Percent of Kits Installed (from Line 4 of STEP 2)	55 %/yr	55 %/yr
11. Total customer costs (Line 8 x Line 9 x Line 10)	$ 1,650 /yr	$ 275 /yr

BMP 02 Residential Plumbing Retrofit - Discounting Information

Instructions: Fill in all green cells.

Discount Rates (required)

1. Agency Discount Rate	5.0	%
2. Social Discount Rate	5.0	%

Annual Escalation Rates (optional)

3. Avoided cost of water and wastewater	-	%/yr
4. Environmental benefits	-	%/yr
5. Energy cost	-	%/yr

BMP 02 Residential Plumbing Retrofit - Summary of Costs & Benefits

Program Present Value Costs	**Agency Perspective**		**Society Perspective**	
1. Total devices distributed	175		175	
2. Total water savings	5.0	AF	5.0	AF
3. Agency program costs	$6,850		$6,850	
4. Customer program costs	NA		$1,925	
5. Cost share	$0		NA	
6. Net Program Cost	$6,850		$8,775	
Program Present Value Benefits				
7. Agency supply & wastewater benefits	$10,963		$10,963	
8. Environmental benefits	$0		$0	
9. Customer program benefits	NA		$3,348	
## Other utility benefits	NA		$0	
## Total benefits	$10,963		$14,311	
## **Net Present Value** (Line 11 - Line 6)	**$4,113**		**$5,536**	
## Benefit-Cost Ratio (Line 11 ÷ Line 6)	1.60		1.63	
## Simple Unit Supply Cost (Line 6 ÷ Line 2)	$1,362	/AF	$1,745	/AF
## Discounted Unit Supply Cost (Line 6 ÷ discounted water savings)	$1,513	/AF	$1,938	/AF

This BMP is cost-effective to implement from the Agency Perspective
This BMP is cost-effective to implement from the Society Perspective

<<< This will save your variables and results as a c
the "Saved Scenarios" Worksheets.

Agency Perspective

	Water Savings			Undiscounted Agency Benefits			Discounted Agency Benefits			
	Single Family	Multi Family	Total	Supply & Wastewater	Environmental	Total	Supply & Wastewater	Environmental	Total	Discounted Supply
Year	AF	AF	AF	$	$	$				AF
0	0.5	1.0	1.5	3,655	-	3,655	3,655	-	3,655	1.5
1	0.4	0.7	1.1	2,558	-	2,558	2,436	-	2,436	1.0
2	0.2	0.5	0.7	1,791	-	1,791	1,624	-	1,624	0.7
3	0.2	0.3	0.5	1,254	-	1,254	1,083	-	1,083	0.4
4	0.1	0.2	0.4	877	-	877	722	-	722	0.3
5	0.1	0.2	0.3	614	-	614	481	-	481	0.2
6	0.1	0.1	0.2	430	-	430	321	-	321	0.1
7	0.0	0.1	0.1	301	-	301	214	-	214	0.1
8	0.0	0.1	0.1	211	-	211	143	-	143	0.1
9	0.0	0.0	0.1	147	-	147	95	-	95	0.0
10	0.0	0.0	0.0	103	-	103	63	-	63	0.0
11	0.0	0.0	0.0	72	-	72	42	-	42	0.0
12	0.0	0.0	0.0	51	-	51	28	-	28	0.0
13	0.0	0.0	0.0	35	-	35	19	-	19	0.0
14	0.0	0.0	0.0	25	-	25	13	-	13	0.0
15	0.0	0.0	0.0	17	-	17	8	-	8	0.0
16	0.0	0.0	0.0	12	-	12	6	-	6	0.0
17	0.0	0.0	0.0	9	-	9	4	-	4	0.0
18	0.0	0.0	0.0	6	-	6	2	-	2	0.0
19	0.0	0.0	0.0	4	-	4	2	-	2	0.0
20	0.0	0.0	0.0	3	-	3	1	-	1	0.0
21	0.0	0.0	0.0	2	-	2	1	-	1	0.0
22	0.0	0.0	0.0	1	-	1	0	-	0	0.0
23	0.0	0.0	0.0	1	-	1	0	-	0	0.0
24	0.0	0.0	0.0	1	-	1	0	-	0	0.0
Total:	1.7	3.3	5.0	12,180	-	12,180	10,963	-	10,963	4.5

Society Perspective

	Water Savings			Undiscounted Program Benefits				Undiscounted Program Benefits				
	Single Family	Multi Family	Total	Supply & Wastewater	Environmental	Customer Energy Benefits	Wastewater Utility Benefits	Supply & Wastewater	Environmental	Customer Energy Benefits	Wastewater Utility Benefits	Discounted Supply
Year	AF	AF	AF	$	$	$	$					AF
0	0.5	1.0	1.5	3,655	-	1,116	-	3,655	-	1,116	-	1.5
1	0.4	0.7	1.1	2,558	-	781	-	2,436	-	744	-	1.0
2	0.2	0.5	0.7	1,791	-	547	-	1,624	-	496	-	0.7
3	0.2	0.3	0.5	1,254	-	383	-	1,083	-	331	-	0.4
4	0.1	0.2	0.4	877	-	268	-	722	-	220	-	0.3
5	0.1	0.2	0.3	614	-	188	-	481	-	147	-	0.2
6	0.1	0.1	0.2	430	-	131	-	321	-	98	-	0.1
7	0.0	0.1	0.1	301	-	92	-	214	-	65	-	0.1
8	0.0	0.1	0.1	211	-	64	-	143	-	44	-	0.1
9	0.0	0.0	0.1	147	-	45	-	95	-	29	-	0.0
10	0.0	0.0	0.0	103	-	32	-	63	-	19	-	0.0
11	0.0	0.0	0.0	72	-	22	-	42	-	13	-	0.0
12	0.0	0.0	0.0	51	-	15	-	28	-	9	-	0.0
13	0.0	0.0	0.0	35	-	11	-	19	-	6	-	0.0
14	0.0	0.0	0.0	25	-	8	-	13	-	4	-	0.0
15	0.0	0.0	0.0	17	-	5	-	8	-	3	-	0.0
16	0.0	0.0	0.0	12	-	4	-	6	-	2	-	0.0
17	0.0	0.0	0.0	9	-	3	-	4	-	1	-	0.0
18	0.0	0.0	0.0	6	-	2	-	2	-	1	-	0.0
19	0.0	0.0	0.0	4	-	1	-	2	-	1	-	0.0
20	0.0	0.0	0.0	3	-	1	-	1	-	0	-	0.0
21	0.0	0.0	0.0	2	-	1	-	1	-	0	-	0.0
22	0.0	0.0	0.0	1	-	0	-	0	-	0	-	0.0
23	0.0	0.0	0.0	1	-	0	-	0	-	0	-	0.0
24	0.0	0.0	0.0	1	-	0	-	0	-	0	-	0.0
Total:	1.7	3.3	5.0	12,180	-	3,719	-	10,963	-	3,348	-	4.5

BMP 06 Simple Cost-Effectiveness Tool

Version 3, Beta

User Warning: This spreadsheet model is still under development. It is currently being tested by members of the R&E committee. This model has not been officially adopted by the CUWCC for benefit-cost analysis of BMP 06.

This spreadsheet tool provides a simple model for evaluating the cost-effectiveness of BMP 06. The model is organized into five data entry steps and one analysis review step, as follows:

Step 1 - Annual Costs: in this step you enter information to calculate the expected annual costs to implement BMP 06.

Step 2 - Customer Water Savings: in this step you enter information to calculate the expected water savings over time from implementation of BMP 06.

Step 3 - Agency Benefits: in this step you enter information to calculate the benefits to your agency from the water savings estimated in Step 2.

Step 4 - Other Benefits and Costs: in this step you enter information to calculate benefits and costs that may accrue to parties other than your agency from implementation of BMP 06.

Step 5 - Discounting Information: in this step you provide discount and cost escalation rates needed for the present value analysis.

Step 6 - Review Results: in this step you review the model results. These results are based on the information you provided in the first five steps.

<u>Cell Color Key</u>

Green Cells are cells that require data from the user.

White Cells are cells that contain formulas used by the model. If you overwrite the formulas in White Cells the model will cease to work properly. Only enter data in Green Cells.

<u>Knowledge Requirements</u>

This model calculates the present value benefits and costs associated with BMP 06. To use this model you should be familiar with the requirements of BMP 06 and basic methods of benefit-cost analysis and present value analysis. BMP 06 is fully described in Exhibit 1 of the MOU. Methods of benefit-cost analysis used by this model are described in the Council's "Guidelines for Preparing Cost-Effectiveness Analyses of Urban Water Conservation Best Management Practices." Both of these documents are available from the Council (www.cuwcc.org). Additionally, Appendix A of the Council's "BMP Costs & Savings Study" provides further review and examples of benefit-cost calculations.

The structure and organization of this model is based on similar worksheets provided in "Water Conservation Guidebook for Small and Medium-Sized Utilities," AWWA Pacific Northwest Section, 1993. This guidebook is available through the CUWCC lending library or may be purchased directly from AWWA.

<u>Data Requirements</u>

This model requires a variety of data, including:

* Implementation costs, including staffing, materials, outside consultants, and marketing costs.

* Estimates of water savings from residential high-efficiency washers, including initial savings and rates of decay.

* Agency water production costs, including source of supply costs, capacity expansion costs, energy costs, and chemical costs.

* Environmental benefits of water saved. In many instances users will not have this information. In these cases the model can be used to conduct "what-if" analysis to determine the effect of environmental benefits on BMP 06 cost-effectiveness.

* Discount rates, both for your agency and for the society.

Much of the date required to implement this model is available in the Council's "BMP Costs & Savings Study." This document provides best available estimates of water savings and program costs for most of the BMPs for which water savings have been quantified.

Variable Units

Model variables represent specific quantities denoted in particular units. These units must be used or the model will provide incorrect results. The called for unit is always indicated for each variable for which you are providing a value. In most cases this will be obvious. Water volumes are mostly denoted in acre-feet (af). In some cases they are denoted in gallons-per-day (gpd). At the bottom of several worksheets a unit conversion calculator for converting water volume into acre-feet is provided.

Scenarios

You can save model scenarios. A scenario consists of all the values you entered for the model variables plus the benefit-cost results for those values. Scenarios are saved on the worksheet "Saved Scenarios." These scenarios can also be loaded back into the model at a later time using the "Load a saved scenario" button located on the "Saved Scenarios" worksheet. With scenarios you can evaluate the sensitivity of the model's results to changes in key variables.

Model Limitations

This model provides a simple representation of program benefits and costs for BMP 06. It is unlikely the model will suit all situations a user wishes to evaluate. Users are free to adapt the model to their particular circumstances. Doing so however may affect the underlying formulas and Visual Basic procedures used by the model. Users should be familiar with programming Excel if they intend to make changes to the model.

BMP 06 High Efficiency Washing Machine Rebate Programs - Annual Program Cost Worksl

Instructions: Fill in all green cells.

Administration Costs

1.	Staff hours to administer the rebate program	100	hrs/yr
2.	Staff hourly rate, including overhead	$ 40.00	/hr
3.	Administration costs (Line 1 x Line 2)	$ 4,000	/yr

Washing Machine Rebate Costs

4.	Rebate (or utility incentive cost)	$ 400	/rebate
5.	Number of rebates distributed	100	/yr
6.	Total rebate cost (Line 4 x Line 5)	$ 40,000	/yr

Rebate Processing Costs

7.	Average rebate processing cost (if not included in Admi	$ -	/rebate
8.	Total rebate processing cost (Line 5 x Line 7)	$ -	/yr

Publicity Costs

9.	Marketing collateral cost (e.g., brochure design, printing, web services)	$ 500	/yr
10.	Advertising cost (i.e. newspaper, radio, TV, web)	$ 2,000	/yr
11.	Total publicity costs (Line 9 + Line 10)	$ 2,500	/yr

Evaluation and Followup Costs

12.	Labor & Consultant costs	$ -	/yr
13.	**Total Costs** (Line 3 + Line 6 + Line 8 + Line 11 + Line 12)	$ 46,500	/yr

Program Cost Sharing

14.	Cost Share from Others (e.g., other agencies, grants, in-kind contrib.)	$ -	/yr
15.	**Net Agency Cost** (Line 13 - Line 14)	$ 46,500	/yr

BMP 06 High Efficiency Washing Machine Rebate Programs - Water Savings Worksheet

Instructions: Fill in all green cells.

	High-Efficiency Washing Machines	
1. Savings per machine (gallons per year per machine)	5,250.00	gpy/machine
2. Useful Life	12.5	yrs
3. Number of Rebates Distributed (from STEP 1 Line 5)	100	
4. Percent Free-riders	5	%/yr
5. Lifetime Savings	**19.13**	**AF**

◉ Use CUWCC Reliable Savings Estimat
○ Use Own Estimate

Acre-Foot Conversions
Use the calculator below if you need to convert water volume into acre-feet.

5,250.00 Gallons = 0.02 AF

BMP 06 High Efficiency Washing Machine Rebate Programs - Agency Benefits Worksheet

Instructions: Fill in all green cells that apply.

Avoided Supply Acquisition Costs (include future avoided capital costs as appropriate)

1. Marginal Source of Suppy (List name)		SWP Table A	
2. Avoidable Supply Acquisition Cost	$	1210	/AF

Avoided Treatment & Distribution Capacity Costs

3. Avoided capacity expansion costs (dollars per AF of water saved by conservation)	$	0	/AF

Avoided Wastewater Capacity Costs (*if service provided by agency*)

4. Avoided capacity expansion costs (dollars per AF of water saved by conservation)	$	950	/AF

Avoided Treatment & Distribution Variable Costs *(include wastewater services if provided by agency)*

Avoided chemical costs

5. Total annual chemical costs	$	-	/yr
6. Annual fixed costs for chemicals	$	-	/yr
7. Annual chemical costs not related to water production	$	-	/yr
8. Avoidable chemical costs (Line 5 - Line 6 - Line 7)	$	-	/yr
9. Average annual treated water use		0	AF
10. Unit Cost of Chemicals (Line 8 ÷ Line 9)	$	-	/AF

Avoided energy costs

11. Annual energy costs	$	28,630,000.00	/yr
12. Annual fixed costs	$	-	/yr
13. Annual energy costs not related to water production (e.g., lighting, heating/cooling)	$	-	/yr
14. Avoidable energy costs (Line 11 - Line 12 - Line 13)	$	28,630,000.00	/yr
15. Average annual water use (from Line 9 above)		109,500.00	AF
16. Unit Cost of Energy (Line 14 ÷ Line 15)	$	261.46	/AF
17. Avoided Treatment & Distribution Variab (Line 10 + Line 16)	$	261.46	/AF
18. Total Supply & Wastewater Benefits (Line 2 + Line 3 + Line 4 + Line 17)	$	2,421.55	/AF

Environmental Benefits

19. Environmental benefit per AF saved (e.g. value of instream flow, improved water quality, avoided environmental mitigation for supply development or wastewater disposal)	$		/AF

BMP 06 High Efficiency Washing Machine Rebate Programs - Other Benefits and Costs Worksheet

Instructions: Fill in all green cells.

H-Axis Washer Energy Savings	Gas (therms/yr)	Electricity (kWh/yr)	$/yr
Water heating	21	371	21.59
Washer motor	NA	53	10.759
Dryer	2.9	84	17.05
			49.40

* Energy savings based on THELMA and Oak Ridge Nat'l Lat

OTHER BENEFITS

Avoided Customer Energy Costs

		High Efficiency Clothes Washer	
1. Percent of residential hot water heated with gas (can get estimate from local utility or CEC)		100	%
2. Percent of residential dryers using gas (can get estimate from local utility or CEC)		0	%
2. Marginal cost per therm of gas	$	1.03	/therm
3. Marginal cost per KWh of electricity	$	0.203	/KWh
5. Customer Energy Benefit	$	49.40	/Yr

Avoided Wastewater Utility Costs (IMPORTANT: do not include those listed in STEP 3 Agency Benefits)

6. Avoided energy & chemical costs	$	0	/AF of conserved water
7. Avoided wastewater capacity expansion	$	0	/AF of conserved water
8. Total avoided wastewater utility costs (Line 6 + Line 7)	$	-	/AF of conserved water

BMP 06 High Efficiency Washing Machine Rebate Programs - Discou

Instructions: Fill in all green cells.

Discount Rates (required)

1. Agency Discount Rate	5.0	%
2. Social Discount Rate	5.0	%

Annual Escalation Rates (optional)

3. Avoided cost of water and wastewater	-	%/yr
4. Environmental benefits	-	%/yr
5. Energy cost	-	%/yr

BMP 06 High Efficiency Washing Machine Rebate Programs - Summary of Costs & Benefits

Program Present Value Costs	**Agency Perspective**		**Society Perspective**	
1. Total rebates distributed	100		100	
2. Total water savings	19.1	AF	19.1	AF
3. Agency program costs	$46,500		$46,500	
4. Customer program costs	NA		NA	
5. Cost share	$0		NA	
6. Net Program Cost	$46,500		$46,500	
Program Present Value Benefits				
7. Agency supply & wastewater benefits	$32,846		$32,846	
8. Environmental benefits	$0		$0	
9. Customer program benefits	NA		$43,784	
## Other utility benefits	NA		$0	
## Total benefits	$32,846		$76,630	
## **Net Present Value** (Line 11 - Line 6)	**($13,654)**		**$30,130**	
## Benefit-Cost Ratio (Line 11 ÷ Line 6)	0.71		1.65	
## Simple Unit Supply Cost (Line 6 ÷ Line 2)	$2,431	/AF	$2,431	/AF
## Discounted Unit Supply Cost (Line 6 ÷ discounted water savings)	$3,428	/AF	$3,428	/AF

This BMP is not cost-effective to implement from the Agency Perspective
This BMP is cost-effective to implement from the Society Perspective

<<< This will save your variables and results as a c
the "Saved Scenarios" Worksheets.

Present Value Benefits - Agency Perspective

	Water Savings		Undiscounted Agency Benefits			Discounted Agency Benefits			
	Rebates	Water Savings	Supply & Wastewater	Environmental	Total	Supply & Wastewater	Environmental	Total	Discounted Supply
Year	Number	AF	$	$	$				AF
0	100.0								
1		1.5	3,706	-	3,706	3,529	-	3,529	1.5
2		1.5	3,706	-	3,706	3,361	-	3,361	1.4
3		1.5	3,706	-	3,706	3,201	-	3,201	1.3
4		1.5	3,706	-	3,706	3,049	-	3,049	1.3
5		1.5	3,706	-	3,706	2,904	-	2,904	1.2
6		1.5	3,706	-	3,706	2,765	-	2,765	1.1
7		1.5	3,706	-	3,706	2,634	-	2,634	1.1
8		1.5	3,706	-	3,706	2,508	-	2,508	1.0
9		1.5	3,706	-	3,706	2,389	-	2,389	1.0
10		1.5	3,706	-	3,706	2,275	-	2,275	0.9
11		1.5	3,706	-	3,706	2,167	-	2,167	0.9
12		1.5	3,706	-	3,706	2,064	-	2,064	0.9
13		-	-	-	-	-	-	-	-
14		-	-	-	-	-	-	-	-
15		-	-	-	-	-	-	-	-
16		-	-	-	-	-	-	-	-
17		-	-	-	-	-	-	-	-
18		-	-	-	-	-	-	-	-
19		-	-	-	-	-	-	-	-
20		-	-	-	-	-	-	-	-
21		-	-	-	-	-	-	-	-
22		-	-	-	-	-	-	-	-
23		-	-	-	-	-	-	-	-
24		-	-	-	-	-	-	-	-
25		-	-	-	-	-	-	-	-
Total:	100.0	18.4	44,471	-	44,471	32,846	-	32,846	13.6

Present Value Benefits - Society Perspective

	Water Savings		Undiscounted Program Benefits				Discounted Program Benefits				
	Rebates	Water Savings	Supply & Wastewater	Environmental	Customer Energy Benefits	Wastewater Utility Benefits	Supply & Wastewater	Environmental	Customer Energy Benefits	Wastewater Utility Benefits	Discounted Supply
Year	Number	AF	$	$	$	$					AF
0	100.0										
1	-	1.5	3,706	-	4,940	-	3,529	-	4,705	-	1.5
2	-	1.5	3,706	-	4,940	-	3,361	-	4,481	-	1.4
3	-	1.5	3,706	-	4,940	-	3,201	-	4,267	-	1.3
4	-	1.5	3,706	-	4,940	-	3,049	-	4,064	-	1.3
5	-	1.5	3,706	-	4,940	-	2,904	-	3,871	-	1.2
6	-	1.5	3,706	-	4,940	-	2,765	-	3,686	-	1.1
7	-	1.5	3,706	-	4,940	-	2,634	-	3,511	-	1.1
8	-	1.5	3,706	-	4,940	-	2,508	-	3,344	-	1.0
9	-	1.5	3,706	-	4,940	-	2,389	-	3,184	-	1.0
10	-	1.5	3,706	-	4,940	-	2,275	-	3,033	-	0.9
11	-	1.5	3,706	-	4,940	-	2,167	-	2,888	-	0.9
12	-	1.5	3,706	-	4,940	-	2,064	-	2,751	-	0.9
13	-	-	-	-	-	-	-	-	-	-	-
14	-	-	-	-	-	-	-	-	-	-	-
15	-	-	-	-	-	-	-	-	-	-	-
16	-	-	-	-	-	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-	-	-	-
19	-	-	-	-	-	-	-	-	-	-	-
20	-	-	-	-	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-	-	-	-	-
23	-	-	-	-	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-	-	-	-	-
Total:	100.0	18.4	44,471	-	59,279	-	32,846	-	43,784	-	13.6

BMP 14 Simple Cost-Effectiveness Tool

Version 3, Beta

User Warning: This spreadsheet model is still under development. It is currently being tested by members of the R&E committee. This model has not been officially adopted by the CUWCC for benefit-cost analysis of BMP 14.

This spreadsheet tool provides a simple model for evaluating the cost-effectiveness of BMP 14. The model is organized into five data entry steps and one analysis review step, as follows:

Step 1 - Annual Costs: in this step you enter information to calculate the expected annual costs to implement BMP 14.

Step 2 - Customer Water Savings: in this step you enter information to calculate the expected water savings over time from implementation of BMP 14.

Step 3 - Agency Benefits: in this step you enter information to calculate the benefits to your agency from the water savings estimated in Step 2.

Step 4 - Other Benefits and Costs: in this step you enter information to calculate benefits and costs that may accrue to parties other than your agency from implementation of BMP 14.

Step 5 - Discounting Information: in this step you provide discount and cost escalation rates needed for the present value analysis.

Step 6 - Review Results: in this step you review the model results. These results are based on the information you provided in the first five steps.

<u>Cell Color Key</u>

Green Cells are cells that require data from the user.

White Cells are cells that contain formulas used by the model. If you overwrite the formulas in White Cells the model will cease to work properly. Only enter data in Green Cells.

<u>Knowledge Requirements</u>

This model calculates the present value benefits and costs associated with BMP 14. To use this model you should be familiar with the requirements of BMP 14 and basic methods of benefit-cost analysis and present value analysis. BMP 14 is fully described in Exhibit 1 of the MOU. Methods of benefit-cost analysis used by this model are described in the Council's "Guidelines for Preparing Cost-Effectiveness Analyses of Urban Water Conservation Best Management Practices." Both of these documents are available from the Council (www.cuwcc.org). Additionally, Appendix A of the Council's "BMP Costs & Savings Study" provides further review and examples of benefit-cost calculations.

The structure and organization of this model is based on similar worksheets provided in "Water Conservation Guidebook for Small and Medium-Sized Utilities," AWWA Pacific Northwest Section, 1993. This guidebook is available through the CUWCC lending library or may be purchased directly from AWWA.

<u>Data Requirements</u>

This model requires a variety of data, including:

* Implementation costs, including staffing, materials, outside consultants, and marketing costs.

* Estimates of water savings from residential toilet replacements including initial savings and rates of decay.

* Agency water production costs, including source of supply costs, capacity expansion costs, energy costs, and chemical costs.

* Environmental benefits of water saved. In many instances users will not have this information. In these cases the model can be used to conduct "what-if" analysis to determine the effect of environmental benefits on BMP 14 cost-effectiveness.

* Discount rates, both for your agency and for the society.

Much of the date required to implement this model is available in the Council's "BMP Costs & Savings Study." This document provides best available estimates of water savings and program costs for most of the BMPs for which water savings have been quantified.

Variable Units

Model variables represent specific quantities denoted in particular units. These units must be used or the model will provide incorrect results. The called for unit is always indicated for each variable for which you are providing a value. In most cases this will be obvious. Water volumes are mostly denoted in acre-feet (af). In some cases they are denoted in gallons-per-day (gpd). At the bottom of several worksheets a unit conversion calculator for converting water volume into acre-feet is provided.

Scenarios

You can save model scenarios. A scenario consists of all the values you entered for the model variables plus the benefit-cost results for those values. Scenarios are saved on the worksheet "Saved Scenarios." These scenarios can also be loaded back into the model at a later time using the "Load a saved scenario" button located on the "Saved Scenarios" worksheet. With scenarios you can evaluate the sensitivity of the model's results to changes in key variables.

Model Limitations

This model provides a simple representation of program benefits and costs for BMP 14. It is unlikely the model will suit all situations a user wishes to evaluate. Users are free to adapt the model to their particular circumstances. Doing so however may affect the underlying formulas and Visual Basic procedures used by the model. Users should be familiar with programming Excel if they intend to make changes to the model.

BMP 14 ULFT Replacement Programs - Annual Program Cost Worksheet

Instructions: Fill in all green cells.

Administration Costs

1. Staff hours to administer the rebate program	75 hrs/yr			
2. Staff hourly rate, including overhead	$ 50.00 /hr			
3. Administration costs (Line 1 x Line 2)	$ 3,750 /yr			

ULFT Costs

	Single-Family	Multi-Family
4. ULFT Cost (or incentive cost)	$ 100 /ULFT	$ 100 /ULFT
5. Number of ULFTs (or incentives) distributed	50 /yr	10 /yr
6. Total ULFT replacement cost (Line 4 x Line 5)	$ 5,000 /yr	$ 1,000 /yr

Incentive Processing Costs

7. Average rebate processing cost (if not included in Adm	$ - /ULFT
8. Total rebate processing cost (Line 5 x Line 7)	$ - /yr

Publicity Costs

9. Marketing collateral cost (e.g., brochure design, printing, web services)	$ - /yr
10. Advertising cost (i.e. newspaper, radio, TV, web)	$ - /yr
11. Total publicity costs (Line 9 + Line 10)	$ - /yr

Evaluation and Followup Costs

12. Labor & Consultant costs	$ - /yr
13. **Total Costs** (Line 3 + Line 6 + Line 8 + Line 11 + Line 12)	$ 9,750 /yr

Program Cost Sharing

14. Cost Share from Others (e.g., other agencies, grants, in-kind contrib.)	$ - /yr
15. **Net Agency Cost** (Line 13 - Line 14)	$ 9,750 /yr

BMP 14 ULFT Replacement Programs - Water Savings Worksheet

Instructions: Fill in all green cells.

	Single-Family		Multi-Family	
1. Avg. Persons Per Household	1.5		1.5	
2. Avg. Savings per ULFT (gallons per day per ULFT)	16.7	gpd	28.8	gpd
3. Toilet Natural Replacement Rate	4.0	%/yr	4.0	%/yr
4. Number of ULFTs Distributed (from STEP 1 Line 5)	50		10	
5. Percent Free-riders	5	%	5	%
6. 25-Year Savings	**14.2**	**AF**	**4.9**	**AF**

◉ Use CUWCC Reliable Savings Estimat
○ Use Own Estimate

Acre-Foot Conversions
Use the calculator below if you need to convert water volume into acre-feet.

5,250.00 Gallons = 0.02 AF

BMP 14 ULFT Replacement Programs - Agency Benefits Worksheet

Instructions: Fill in all green cells that apply.

Avoided Supply Acquisition Costs (include future avoided capital costs as appro

1. Marginal Source of Suppy (List name)		SWP Table A	
2. Avoidable Supply Acquisition Cost	$	1210	/AF

Avoided Treatment & Distribution Capacity Costs

3. Avoided capacity expansion costs (dollars per AF of water saved by conservation)	$	0	/AF

Avoided Wastewater Capacity Costs (*if service provided by agency*)

4. Avoided capacity expansion costs (dollars per AF of water saved by conservation)	$	950	/AF

Avoided Treatment & Distribution Variable Costs *(include wastewater services if pro*

Avoided chemical costs

5. Total annual chemical costs	$	276,400.00	/yr
6. Annual fixed costs for chemicals	$	-	/yr
7. Annual chemical costs not related to water production	$	-	/yr
8. Avoidable chemical costs (Line 5 - Line 6 - Line 7)	$	276,400.00	/yr
9. Average annual treated water use		109,500.00	AF
10. Unit Cost of Chemicals (Line 8 ÷ Line 9)	$	2.52	/AF

Avoided energy costs

11. Annual energy costs	$	12,366,000.00	/yr
12. Annual fixed costs	$	-	/yr
13. Annual energy costs not related to water production (e.g., lighting, heating/cooling)	$	-	/yr
14. Avoidable energy costs (Line 11 - Line 12 - Line 13)	$	12,366,000.00	/yr
15. Average annual water use (from Line 9 above)		109,500.00	AF
16. Unit Cost of Energy (Line 14 ÷ Line 15)	$	112.93	/AF
17. Avoided Treatment & Distribution Variab (Line 10 + Line 16)	$	115.46	/AF
18. Total Supply & Wastewater Benefits (Line 2 + Line 3 + Line 4 + Line 17)	$	2,275.54	/AF

Environmental Benefits

19. Environmental benefit per AF saved (e.g. value of instream flow, improved water quality, avoided environmental mitigation for supply development or wastewater disposa	$		/AF

BMP 14 ULFT Replacement Programs - Other Benefits and Costs Worksheet

Instructions: Fill in all green cells.

OTHER BENEFITS

Avoided Wastewater Utility Costs (IMPORTANT: do not include those listed in STEP 3 Agency Benefits)

1. Avoided energy & chemical costs	$ 0	/AF of conserved water	Included in Step 3
2. Avoided wastewater capacity expansion	$ 0	/AF of conserved water	Included in Step 3
3. Total avoided wastewater utility costs (Line 6 + Line 7)	$ -	/AF of conserved water	Included in Step 3

OTHER COSTS

Customer Participation Costs	Single Family ULFTs	Multi Family ULFTs
4. Average customer expenditures per ULFT (e.g., installation, disposal of old toilet)	$ 100 /ULFT	$ 100 /ULFT
5. Number of ULFTs distributed (from Line 5 of STEP 1)	50	10
6. Percent of Freeriders (from Line 5 of STEP 2)	5 %	5 %
7. Total customer costs (Line 4 x Line 5 x (1 - Line 6))	$ 4,750.00	$ 950.00

BMP 14 ULFT Replacement Programs - Discounting Information

Instructions: Fill in all green cells.

Discount Rates (required)

1. Agency Discount Rate	5.0	%
2. Social Discount Rate	5.0	%

Annual Escalation Rates (optional)

3. Avoided cost of water and wastewater	-	%/yr
4. Environmental benefits	-	%/yr
5. Energy cost	-	%/yr

BMP 14 ULFT Replacement Programs - Summary of Costs & Benefits

Program Present Value Costs	**Agency Perspective**		**Society Perspective**	
1. Total ULFTs distributed	60		60	
2. Total water savings	19.1	AF	19.1	AF
3. Agency program costs	$9,750		$9,750	
4. Customer program costs	NA		$5,700	
5. Cost share	$0		NA	
6. Net Program Cost	$9,750		$15,450	
Program Present Value Benefits				
7. Agency supply & wastewater benefits	$26,958		$26,958	
8. Environmental benefits	$0		$0	
9. Other utility benefits	NA		$0	
## Total benefits	$26,958		$26,958	
## **Net Present Value** (Line 10 - Line 6)	**$17,208**		**$11,508**	
## Benefit-Cost Ratio (Line 10 ÷ Line 6)	2.76		1.74	
## Simple Unit Supply Cost (Line 6 ÷ Line 2)	$511	/AF	$810	/AF
## Discounted Unit Supply Cost (Line 6 ÷ discounted water savings)	$823	/AF	$1,304	/AF

This BMP is cost-effective to implement from the Agency Perspective
This BMP is cost-effective to implement from the Society Perspective

<<< This will save your variables and results as a
the "Saved Scenarios" Worksheets.

Present Value Benefits - Agency Perspective

	Water Savings			Undiscounted Agency Benefits			Discounted Agency Benefits			
	Single Family	Multi Family	Total Water Savings	Supply & Wastewater	Environmental	Total	Supply & Wastewater	Environmental	Total	Discounted Supply
Year	AF	AF	AF	$	$	$				AF
0										
1	0.7	0.3	1.0	2,460	-	2,460	2,343	-	2,343	1.0
2	0.7	0.3	1.0	2,361	-	2,361	2,142	-	2,142	0.9
3	0.7	0.3	0.9	2,267	-	2,267	1,958	-	1,958	0.8
4	0.6	0.3	0.9	2,176	-	2,176	1,790	-	1,790	0.7
5	0.6	0.3	0.9	2,089	-	2,089	1,637	-	1,637	0.7
6	0.6	0.2	0.8	2,006	-	2,006	1,497	-	1,497	0.6
7	0.6	0.2	0.8	1,925	-	1,925	1,368	-	1,368	0.6
8	0.5	0.2	0.8	1,848	-	1,848	1,251	-	1,251	0.5
9	0.5	0.2	0.7	1,774	-	1,774	1,144	-	1,144	0.5
10	0.5	0.2	0.7	1,703	-	1,703	1,046	-	1,046	0.4
11	0.5	0.2	0.7	1,635	-	1,635	956	-	956	0.4
12	0.5	0.2	0.6	1,570	-	1,570	874	-	874	0.4
13	0.4	0.2	0.6	1,507	-	1,507	799	-	799	0.3
14	0.4	0.2	0.6	1,447	-	1,447	731	-	731	0.3
15	0.4	0.2	0.6	1,389	-	1,389	668	-	668	0.3
16	0.4	0.2	0.6	1,333	-	1,333	611	-	611	0.3
17	0.4	0.2	0.5	1,280	-	1,280	558	-	558	0.2
18	0.4	0.2	0.5	1,229	-	1,229	511	-	511	0.2
19	0.3	0.1	0.5	1,180	-	1,180	467	-	467	0.2
20	0.3	0.1	0.5	1,133	-	1,133	427	-	427	0.2
21	0.3	0.1	0.4	1,087	-	1,087	390	-	390	0.2
22	0.3	0.1	0.4	1,044	-	1,044	357	-	357	0.1
23	0.3	0.1	0.4	1,002	-	1,002	326	-	326	0.1
24	0.3	0.1	0.4	962	-	962	298	-	298	0.1
25	0.3	0.1	0.4	923	-	923	273	-	273	0.1
Total:	11.3	4.9	16.2	39,331	-	39,331	24,422	-	24,422	10.1

Present Value Benefits - Society Perspective

	Water Savings			Undiscounted Program Benefits				Discounted Program Benefits				
	Single Family	Multi Family	Total Water Savings	Supply & Wastewater	Environmental	Wastewater Utility Benefits	Total	Supply & Wastewater	Environmental	Wastewater Utility Benefits	Total	Discounted Supply
Year	AF	AF	AF	$	$	$	$	$	$	$	$	AF
0												
1	0.7	0.3	1.0	2,460	-	-	2,460	2,343	-	-	2,343	1.0
2	0.7	0.3	1.0	2,361	-	-	2,361	2,142	-	-	2,142	0.9
3	0.7	0.3	0.9	2,267	-	-	2,267	1,958	-	-	1,958	0.8
4	0.6	0.3	0.9	2,176	-	-	2,176	1,790	-	-	1,790	0.7
5	0.6	0.3	0.9	2,089	-	-	2,089	1,637	-	-	1,637	0.7
6	0.6	0.2	0.8	2,006	-	-	2,006	1,497	-	-	1,497	0.6
7	0.6	0.2	0.8	1,925	-	-	1,925	1,368	-	-	1,368	0.6
8	0.5	0.2	0.8	1,848	-	-	1,848	1,251	-	-	1,251	0.5
9	0.5	0.2	0.7	1,774	-	-	1,774	1,144	-	-	1,144	0.5
10	0.5	0.2	0.7	1,703	-	-	1,703	1,046	-	-	1,046	0.4
11	0.5	0.2	0.7	1,635	-	-	1,635	956	-	-	956	0.4
12	0.5	0.2	0.6	1,570	-	-	1,570	874	-	-	874	0.4
13	0.4	0.2	0.6	1,507	-	-	1,507	799	-	-	799	0.3
14	0.4	0.2	0.6	1,447	-	-	1,447	731	-	-	731	0.3
15	0.4	0.2	0.6	1,389	-	-	1,389	668	-	-	668	0.3
16	0.4	0.2	0.6	1,333	-	-	1,333	611	-	-	611	0.3
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18	0.4	0.2	0.5	1,229	-	-	1,229	511	-	-	511	0.2
19	0.3	0.1	0.5	1,180	-	-	1,180	467	-	-	467	0.2
20	0.3	0.1	0.5	1,133	-	-	1,133	427	-	-	427	0.2
21	0.3	0.1	0.4	1,087	-	-	1,087	390	-	-	390	0.2
22	0.3	0.1	0.4	1,044	-	-	1,044	357	-	-	357	0.1
23	0.3	0.1	0.4	1,002	-	-	1,002	326	-	-	326	0.1
24	0.3	0.1	0.4	962	-	-	962	298	-	-	298	0.1
25	0.3	0.1	0.4	923	-	-	923	273	-	-	273	0.1
Total:	11.3	4.9	16.2	39,331	-	-	39,331	24,422	-	-	24,422	10.1

APPENDIX F
CVWD BOARD RESOLUTION & PUBLICATION AFFADAVITS

RESOLUTION OF THE BOARD OF DIRECTORS OF
COACHELLA VALLEY WATER DISTRICT

RESOLUTION NO. 2011-115

BE IT RESOLVED by the Board of Directors of the Coachella Valley Water District assembled in regular meeting this 12th day of July, 2011, that after making the draft plan available to the public and following a public hearing as required by the Urban Water Management Planning Act and SBx7-7, it hereby adopts the Coachella Valley Water District 2010 Urban Water Management Plan prepared by MWH.

* * * * * * * * * *

STATE OF CALIFORNIA)
COACHELLA VALLEY WATER DISTRICT) ss.
OFFICE OF THE SECRETARY)

I, ISABEL LUNA, Assistant Secretary of the Board of Directors of the Coachella Valley Water District, DO HEREBY CERTIFY that the foregoing is a full, true and correct copy of Resolution No. 2011-115 adopted by the Board of Directors of said District at a regular meeting thereof duly held and convened on the 12th day of July, 2011, at which meeting a quorum of said Board was present and acting throughout. The Resolution was adopted by the following vote:

AYES: Five

NOES: None

ABSTAIN: None

Dated this 12th day of July, 2011.

Isabel Luna

(SEAL) Assistant Board Secretary

The Desert Sun
750 N Gene Autry Trail
Palm Springs, CA 92262
760-778-4578 / Fax 760-778-4731

Certificate of Publication

State Of California ss:
County of Riverside

Advertiser:

CVWD/LEGALS
PO BOX 1058
COACHELLA CA 922361

2000268890

I am over the age of 18 years old, a citizen of the United States and not a party to, or have interest in this matter. I hereby certify that the attached advertisement appeared in said newspaper (set in type not smaller than non pariel) in each and entire issue of said newspaper and not in any supplement thereof on the following dates, to wit:

Newspaper: .The Desert Sun

6/29/2011 7/6/2011

I acknowledge that I am a principal clerk of the printer of The Desert Sun, printed and published weekly in the City of Palm Springs, County of Riverside, State of California. The Desert Sun was adjudicated a newspaper of general circulation on March 24, 1988 by the Superior Court of the County of Riverside, State of California Case No. 191236.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 6th day of July, 2011 in Palm Springs, California.

Declarant's Signature

NOTICE OF PUBLIC HEARING

THE PUBLIC HEARING ORIGINALLY SCHEDULED FOR JUNE 28, 2011 HAS BEEN RESCHEDULED TO JULY 12, 2011

Notice is hereby given, pursuant to Government Code Section 6066 and California Water Code Section 10642, that a public hearing will be held by the Board of Directors of the Coachella Valley Water District (District) at the District's office in Coachella on July 12, 2011, at 9:00 a.m. in the Forbes Auditorium, 85-995 Avenue 52, Coachella, California.

The purpose of the hearing is for the District to receive comments from the public regarding the Coachella Valley Water District Urban Water Management Plan.

A copy of the report entitled "Draft Coachella Valley Water District Urban Water Management Plan" is available for inspection at the District's office located at 85-995 Avenue 52, Coachella, and at the District's Palm Desert office located at 75-525 Hovley Lane East, Palm Desert. Additional information may also be obtained by calling Patti Reyes, Planning and Special Programs Manager, at extension 2270, during regular working hours.

Date: June 24, 2011

/s/ Julia Fernandez
Julia Fernandez
Board Secretary

Published: 6/29, 7/6/11

AFFIDAVIT OF PUBLICATION
(2015.5 C.C.P.)

STATE OF CALIFORNIA

County of Imperial

I am a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interested in the above entitled matter. I am the principal clerk* of the printer of the

IMPERIAL VALLEY PRESS

a newspaper of general circulation, printed and published daily in the City of El Centro, County of Imperial and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Imperial, State of California, under the date of October 9, 1951, Case Number 26775; that the notice, of which the annexed is a printed copy, has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to-wit:

June 29

July 6

all in the year 20 11.

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

SIGNATURE

* Printer, Foreman of the Printer, or Principal Clerk of the Printer

Date 7-6-11
at El Centro, California

This space is for the County Clerk's Filing Stamp:

Proof of Publication of:

NOTICE OF PUBLIC HEARING

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Date: June 24, 2011.

/s/ Julia Fernandez

Julia Fernandez
Board Secretary

L136 Jn29,Jy6

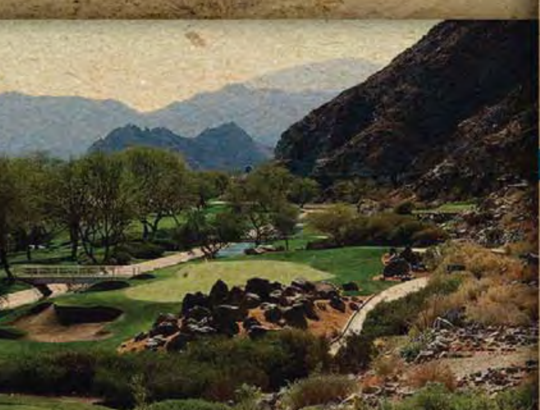
La Entrada Water Supply Assessment

Appendix A
Water Supply Planning Documents

Part 4
Final Coachella Valley Integrated Regional Water Management Plan, December 2010







CVRWMG
Coachella Valley
Regional Water Management Group

FINAL

Coachella Valley Integrated Regional Water Management Plan

Prepared by

Coachella Valley Regional Water Management Group

In collaboration with the Planning Partners

December 2010

City of Coachella
WATER DISTRICT
DESERT WATER
INDIO Water Authority
MSWD Mission Springs Water District

Final

Coachella Valley Integrated Regional Water Management Plan

December 2010

Prepared by:

Coachella Valley Regional Water Management Group

In collaboration with the Planning Partners

With Support from:

and

Coachella Valley Regional Water Management Group

Regional Water Management Group Staff

Coachella Valley Water District

Steve Robbins, General Manager

Jim Barrett, Assistant General Manager

Dan Parks, Assistant General Manager, retired

Patti Reyes, Planning and Special Program Manager

Coachella Water Authority

David Garcia, City Manager

Paul Toor, Director of Public Works

Desert Water Agency

David Luker, General Manager

Mark Krause, Assistant General Manager

David Tate, Associate Engineer

Katie Ruark, Public Information Associate

Indio Water Authority

Debra Kaye, General Manager

Gary Lewis, General Services Manager

Anders Wistrom, Principal Water Engineer

Mission Springs Water District

Arden Wallum, General Manager

Marilyn McKay, Administrative Officer

Regional Water Management Group Consultant Team

RMC Water and Environment

Tom West, P.E., Principal

Rosalyn Prickett, Project Manager

Crystal Mohr, Project Planner

Dawn Flores, Environmental Scientist

Grizelda Soto, Project Planner

Goldy Thach, Technical Assistant

Integrated Planning and Management, Inc.

Daniel Cozad, Principal

Coachella Valley Planning Partners

Coachella Valley Regional Water Management Group

City of Coachella / Coachella Water Authority
Coachella Valley Water District
Desert Water Agency
City of Indio / Indio Water Authority
Mission Springs Water District

Planning Partners

Agua Caliente Band of Cahuilla Indians
Augustine Band of Cahuilla Indians
Cabazon Band of Mission Indians
California Rural Legal Assistance Foundation
City of Cathedral City
City of Desert Hot Springs
City of Indian Wells
City of La Quinta
City of Palm Desert
City of Palm Springs
City of Rancho Mirage
Coachella Valley Association of Governments
Coachella Valley Economic Partnership
Colorado River Regional Water Quality Control Board
County of Riverside
Desert Alliance for Community Empowerment
Friends of the Desert Mountains
Morongo Band of Mission Indians
Myoma Dunes Mutual Water Company
Poder Popular
Representative from Assemblymember Manuel Perez
Representative from Supervisor Marion Ashley
Representative from Supervisor John Benoit
Riverside County Flood Control and Water Conservation District
Salton Community Services District
Torres-Martinez Desert Cahuilla Indians
Twenty-Nine Palms Band of Mission Indians
U.S. Bureau of Indian Affairs
Valley Sanitary District

Executive Summary

This executive summary of the Coachella Valley Integrated Regional Water Management (IRWM) Plan provides an overview of the planning effort.

Overview of IRWM Planning

IRWM planning is a process by which multiple agencies and stakeholders within a region work together to address water management issues through a collaborative process. In this sense, IRWM planning is an efficient method of regional planning that synthesizes previous planning efforts and allows various stakeholders to collaborate more effectively.

IRWM planning enables a region to apply for grants related to the IRWM program led by the California Department of Water Resources (DWR).

Coachella Valley IRWM Plan

This IRWM Plan covers the Coachella Valley Region, which is located in central Riverside County. The Region is generally the same as the Whitewater River watershed, but does not include portions of the watershed that are under the jurisdiction of the San Gorgonio Pass Water Agency.

This IRWM Plan was created by the Coachella Valley Regional Water Management Group (CVRWMG), which is a partnership of the following five Coachella Valley water purveyors: Coachella Water Authority, Coachella Valley Water District, Desert Water Agency, Indio Water Agency, and the Mission Springs Water District.

The Coachella Valley Region is appropriate for integrated regional water management because is all-encompassing and allows for the inclusion of all pertinent agencies and stakeholders interested in water management in the Coachella Valley. The boundary selected also shares a common water supply, wastewater, and flood control infrastructure, making it easier to coordinate and establish regional goals and objectives. The selected regional boundary was formalized by within a Region Acceptance Process in April 2009.

Goals and Objectives

The Coachella Valley Region is facing a variety of water-related issues that can be addressed through the IRWM planning process. Input and discussion by the CVRWMG and regional stakeholders led to the formulation of the following goals for this IRWM Plan:

1. Optimize water supply reliability,
2. Protect or improve water quality,
3. Provide stewardship of water-related natural resources,
4. Coordinate and integrate water resource management, and
5. Ensure cultural, social, and economic sustainability of water in the Coachella Valley.

Following a series of facilitated public workshops and meetings, the CVRWMG and stakeholders developed thirteen specific IRWM Plan objectives to accomplish the five goals. These objectives include:

A. Provide reliable water supply for residential and commercial, agricultural community, and tourism needs.
B. Manage groundwater levels to reduce overdraft, manage perched water, and minimize subsidence.
C. Secure reliable imported water supply, including restoring/improving reliability of State Water Project supply and securing other imported water supplies.
D. Maximize local supply opportunities, including water conservation, water recycling and source substitution, and capture and infiltration of runoff.
E. Protect groundwater quality and improve, where feasible.
F. Preserve and improve surface water quality by maintaining integrity of agricultural drainage systems, protecting the quality of natural runoff used for potable supply, and reducing pollution in stormwater runoff.
G. Preserve the water-related local environment and restore, where feasible.
H. Manage flood risks, including current acute needs and needs for future development.
I. Optimize conjunctive use of available water resources.
J. Maximize stakeholder involvement and stewardship in water resource management.
K. Address water-related needs of local Native American culture.
L. Address water and sanitation needs of disadvantaged communities, including those in remote areas.
M. Maintain affordability of water.

Future IRWM Planning in Coachella Valley

This IRWM Plan is intended to be the first in an ongoing process of regional collaboration that will continue in the Coachella Valley. Subsequent updates are anticipated to involve updating the Plan itself, and also refining the identified stakeholder involvement effort, issues and needs, and other items relevant to water resources planning within the Coachella Valley.

Organization and Contents

The IRWM Plan follows DWR’s IRWM Plan Standards, and is organized as follows.

Chapter 1, Introduction

Chapter 1, Introduction of the IRWM Plan contains background information regarding the Coachella Valley and the Whitewater River watershed. This chapter also provides background information regarding the Coachella Valley Regional Water Management Group (CVRWMG), which is a collaborative group comprised of five water purveyors (City of Coachella, Coachella Valley Water District, Desert Water Agency, Indio Water Authority, and Mission Springs Water District). In addition, Chapter 1 describes various coordination efforts that were taken between CVRWMG and interested parties such as stakeholders, the public, advisory groups, disadvantaged communities (DAC), and Native American Tribes to develop the IRWM Plan.

Chapter 2, Region Description

Chapter 2, Region Description provides a comprehensive overview of the Coachella Valley. This chapter contains detailed information regarding the Valley's watershed, water systems, and water distribution. Specifically, this chapter describes various issues and attributes of the Valley, including the Valley's internal boundaries, regional boundary, water supplies and demand, water quality, social and cultural make-up, major water-related objectives and conflicts, and discusses neighboring and/or overlapping IRWM planning efforts. In addition, this chapter gives information regarding the legislative and policy context of climate change, and incorporates information regarding potential implications that could result from climate change.

Chapter 3, Issues and Needs

Chapter 3, Issues and Needs details the specific issues, needs, and conflicts relevant to water management in the Valley, which were used to develop the IRWM Plan objectives. This chapter covers topics such as water demand, water supply, water quality, flood management, natural resources, and issues specific to DAC and Tribal Issues Groups.

Chapter 4, Objectives

Chapter 4, Objectives builds on information from *Chapter 3, Issues and Needs*, identifying goals and objectives of the IRWM Plan. This chapter also establishes planning targets that will be used in the future to measure the successfulness of meeting objectives within the IRWM Plan. In addition, this chapter provides information regarding the measurability of IRWM Plan objectives, and details how the objectives were prioritized by the CVRWMG, Planning Partners, and stakeholders.

Chapter 5, Stakeholder Involvement

Chapter 5, Stakeholder Involvement provides an overview of the stakeholder involvement process that was developed to allow for continual involvement, engagement, and participation from various stakeholder groups as part of the IRWM planning process. Specifically, this chapter provides information regarding the governance structure that is set in place for the IRWM Plan, including governance for the CVRWMG, Planning Partners, and Issues Groups. This chapter contains information regarding stakeholder composition, including development of the Planning Partners, and the formation of DAC and Native American Issues Groups.

Chapter 6, Resource Management Strategies

Chapter 6, Resource Management Strategies includes information regarding the integration principles and methods that were used to develop the IRWM Plan. This chapter describes the integration approach and its components, including: stakeholder/institutional integration, resource integration, project integration, and strategy integration. Furthermore, this chapter discusses the Resource Management Strategies (RMS) that were considered to achieve the goals and objectives of the IRWM Plan, explains the RMS selection process, and describes each RMS that was selected. Lastly, this chapter includes an evaluation of possible effects of climate change and discusses the potential of various selected RMS to reduce greenhouse gas emissions.

Chapter 7, Project Evaluation and Prioritization

Chapter 7, Project Evaluation and Prioritization discusses information regarding the way in which various projects were selected for inclusion within the IRWM Plan. This chapter provides detailed information regarding the processes for project submittal, project review, and project prioritization, and explains how projects were ultimately selected. Additionally, this chapter explains methods that were created to develop the IRWM Plan, to evaluate project and plan performance, and discusses the supplemental prioritization processes that may be used to identify appropriate projects to be included in future funding applications.

Chapter 8, Agency Coordination

Chapter 8, Agency Coordination provides information regarding coordination activities within the IRWM Region, and describes neighboring and/or overlapping IRWM efforts. This chapter discusses agency coordination between the CVRWMG and various state, federal, and local agencies. Lastly, this chapter provides information regarding the IRWM Plan and its relation to local water planning and local land use planning, and discusses future efforts to establish proactive relationships.

Chapter 9, Framework for Implementation

Chapter 9, Framework for Implementation discusses impacts and benefits associated with implementation of the IRWM Plan and priority projects. This chapter also contains information regarding climate change mitigation and the greenhouse gas reduction potential associated with the IRWM Plan. In addition, this chapter identifies technical analyses used to develop the IRWM Plan, and discusses data management, plan performance/monitoring efforts, and financing/funding mechanisms.



Table of Contents

Appendices

List of Figures

List of Tables

Acronyms

AB 32	Assembly Bill 32
AD	Assessment district
AF	Acre-feet
AFY	Acre feet per year
Basin Plan	Water Quality Control Plan for Plan for the Colorado River Basin – Region 7
BMP	Best management practice
BPO	Basin Plan Objective
BWD	Borrego Water District
CA	California
CalEPA	California Environmental Protection Agency
CARB	California Air Resources Board
CAS	California Climate Adaptation Strategy
CAT	Climate Action Team
CDC	California Department of Conservation
CDPH	California Department of Public Health
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CMP	Consolidated Monitoring Program
CO_2e	CO_2 equivalents
County	County of Riverside
CRA	Colorado River Aqueduct
CUWCC	California Urban Water Conservation Council
CVAG	Coachella Valley Association of Governments
CVCC	Coachella Valley Conservation Commission
CVMSHCP	Coachella Valley Multiple Species Habitat Conservation Plan
CVRWMG	Coachella Valley Regional Water Management Group
CVSC	Coachella Valley Stormwater Channel
CVWD	Coachella Valley Water District
CVWMR	Coachella Valley Water Management Region
CWA	Coachella Water Authority
CWP	California Water Plan
DAC	Disadvantaged communities
DACE	Desert Alliance for Community Empowerment
DEH	Riverside County Department of Environmental Health
DWA	Desert Water Agency
DWR	California Department of Water Resources
EDA	Economic Development Agency

EIR	Environmental Impact Report
EJ	Environmental justice
EO	Executive Order
GHG	Greenhouse gas
gpcd	Gallons per capita per day
HOA	Home Owners Association
IC/ID	Illicit discharge/illicit connection
ID	Improvement District
IID	Imperial Irrigation District
IPCC	Intergovernmental Panel on Climate Change
IRWM	Integrated Regional Water Management
IWA	Indio Water Authority
JPA	Joint Powers Authority
LID	Low impact development
MCL	Maximum containment level
mg/L	Milligrams per liter
mgd	Million gallons per day
MHI	Median Household Income
MOU	Memorandum of Understanding
MS4	Municipal Separate Storm Sewer System
MSWD	Mission Springs Water District
MWA	Mojave Water Agency
MWD	Metropolitan Water District of Southern California
NPDES	National Pollutants Discharge Elimination System
OPR	Governor's Office of Planning and Research
pCi/L	Picocuries per liter
Plan	Coachella Valley Integrated Regional Water Management Plan
ppb	Parts per billion
ppm	Parts per million
QSA	Quantification Settlement Agreement
RAP	Region Acceptance Process
RCFCWCD	Riverside County Flood Control and Water Conservation District
RECI	Water Contact Recreation
RECII	Water Non-Contact Recreation
Region	Coachella Valley Water Management Region
RWQCB	Regional Water Quality Control Board
SB 97	Senate Bill 97
SCAG	Southern California Association of Governments
SCSD	Salton Community Services District

SGPWA	San Gorgonio Pass Water Agency
SSA	Salton Sea Authority
SWMP	Stormwater Management Plan
SWP	State Water Project
SWRCB	State Water Resources Control Board
TDML	Total Maximum Daily Load
TDS	Total Dissolved Solids
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
UWMP	Urban Water Management Plan
Valley	Coachella Valley Water Management Region
VSD	Valley Sanitation District
WET-CAT	Climate Action Team, Water-Energy group
WMWC	Whitewater Mutual Water Company
WRP	Water reclamation plant
WRSC	Whitewater River Stormwater Channel

1 Introduction

The Integrated Regional Water Management (IRWM) program is a local water resources management approach directed by the California Department of Water Resources (DWR). It is aimed at securing long-term water supply reliability within California by first recognizing the inter-connectivity of water supplies, and then encouraging the development and implementation of projects that yield combined benefits for water supplies, water quality, and natural resources. Based on the *California Water Plan Update 2009* (Volume 1, Chapter 7, Objective 1: Expand Integrated Regional Water Management):

> *"The broad purpose of IRWM is to promote a regional planning and implementation framework to comprehensively address water supply, quality, flood, and ecosystem challenges and to implement integrated solutions through a collaborative multi-partner process that includes water managers, tribes, non-governmental organizations, State, federal, and local governments, and disadvantaged communities."*

The Coachella Valley IRWM Plan presents an integrated regional approach for addressing water management issues through a process that identifies and involves water management stakeholders from the Coachella Valley. The Coachella Valley IRWM Plan:

- Defines the Coachella Valley IRWM Region and water systems,
- Identifies regional water management goals and objectives,
- Establishes objectives and measurable targets for the Region,
- Identifies water management issues and needs,
- Clarifies stakeholder involvement and agency coordination processes,
- Identifies and evaluates resource management strategies,
- Assesses the integration of projects based on objectives,
- Establishes a project evaluation and prioritization process based on regional priorities, and
- Establishes a framework for implementation of projects.

While the Plan presents an opportunity to collaborate at a regional level, it does not duplicate previous planning efforts throughout the region, but rather synthesizes them and allows stakeholders to collaborate more effectively.

According to Section 15262 of the California Environmental Quality Act (CEQA) Guidelines, this IRWM Plan qualifies as a planning study that identifies projects and programs for possible future actions, but does not have a legally binding effect of the participating agencies. As such, programmatic environmental analysis under CEQA is not required. Similarly, the IRWM Plan is categorically exempt from CEQA pursuant to Section 15306 (Class 6) because the Plan consists of basic data and information collection and evaluation of water management activities. Prior to construction or implementation of all projects listed within this Plan, environmental review will be performed in accordance with CEQA.

1.1 Background

The Coachella Valley IRWM region is chiefly the same as the Whitewater River watershed, also known as the Coachella Valley (see **Figure 1-1**). The region is about 65 miles long on a northwest-southeast trending axis and covers approximately 1,420 square miles. The area is drained primarily by the Whitewater River that flows southward to the Salton Sea at an elevation of approximately 220 feet below sea level. The region's watershed boundaries to the north and northwest are the rugged and barren mountain ranges of the Colorado Desert, the San Bernardino Mountains, Little San Bernardino Mountains, and Mecca Hills. The watershed boundaries to the east and south are Mortmar, the Salton Sea, and Travertine Rock. This eastern boundary is defined by the watershed that encloses all surface drainage emptying into the north end of the Salton Sea. The Salton Sea is not within the IRWM region. The southernmost boundary turns west from the Salton Sea and follows the CVWD political boundary to the watershed divide. The watershed boundaries to the south and west are the high, precipitous Santa Rosa Mountains and San Jacinto Mountains, which create an effective barrier against the easterly moving coastal storms. The western boundary is composed of a political line that separates Desert Water Agency and Mission Springs Water District from San Gorgonio Pass Water Agency.

The Coachella Valley IRWM region currently faces multiple potential water supply and quality issues, including rapid population and water demand growth; significant reliance on imported water supply; groundwater degradation; habitat loss; flooding; and water quality issues from a variety of sources including agriculture, urban runoff, and failing septic systems (see *Chapter 3 Issues and Needs* for a more detailed description of each issue). Thus, the IRWM Plan promotes collaborative water management efforts and outlines strategies for addressing the current water management issues within the Coachella Valley.

1.2 Regional Water Management Group

The Coachella Valley IRWM program is led by the Coachella Valley Regional Water Management Group (CVRWMG), whose purpose is to foster collaboration among water resource managers, develop and implement the IRWM Plan, and to enable the Coachella Valley region to apply for grants tied to DWR's IRWM program. The CVRWMG is a partnership composed of the five Coachella Valley water purveyors (see **Figure 1-2**). Each of the water purveyors and their statutory authority over water is described below.

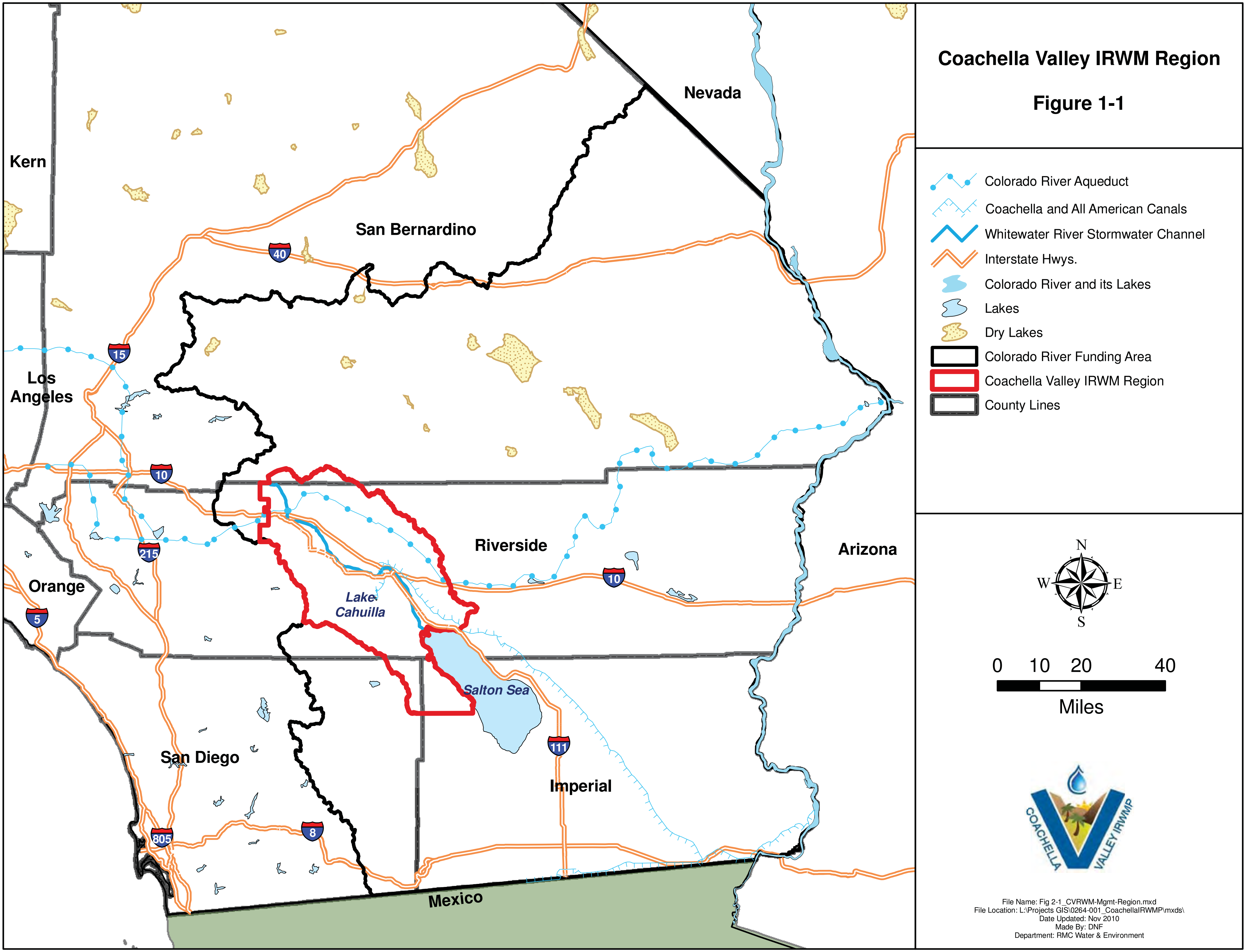
- **Coachella Water Authority (CWA)** is a joint powers authority formed as a component of the City of Coachella and Redevelopment Agency of the City of Coachella. CWA has statutory authority over water supply.

- **Coachella Valley Water District (CVWD)** is a public agency of the State of California organized and operating under County Water District Law, California Water Code §30000, et. seq. and Coachella District Merger Law, Water Code §33100, et seq. CVWD is a State Water Project contractor and Colorado River contractor empowered to import water supplies to its service area. CVWD has statutory authority over water supply.

- **Desert Water Agency (DWA)** is an independent special district created by a special act of state legislature contained in Chapter 100 of the appendix of the California Water Code. DWA is also a State Water Project contractor empowered to import water supplies to its service area, replenish local groundwater supplies, and collect assessments necessary to support a groundwater replenishment program as provided for in the Desert Water Agency Law. DWA has statutory authority over water supply.

Coachella Valley IRWM Region

Figure 1-1



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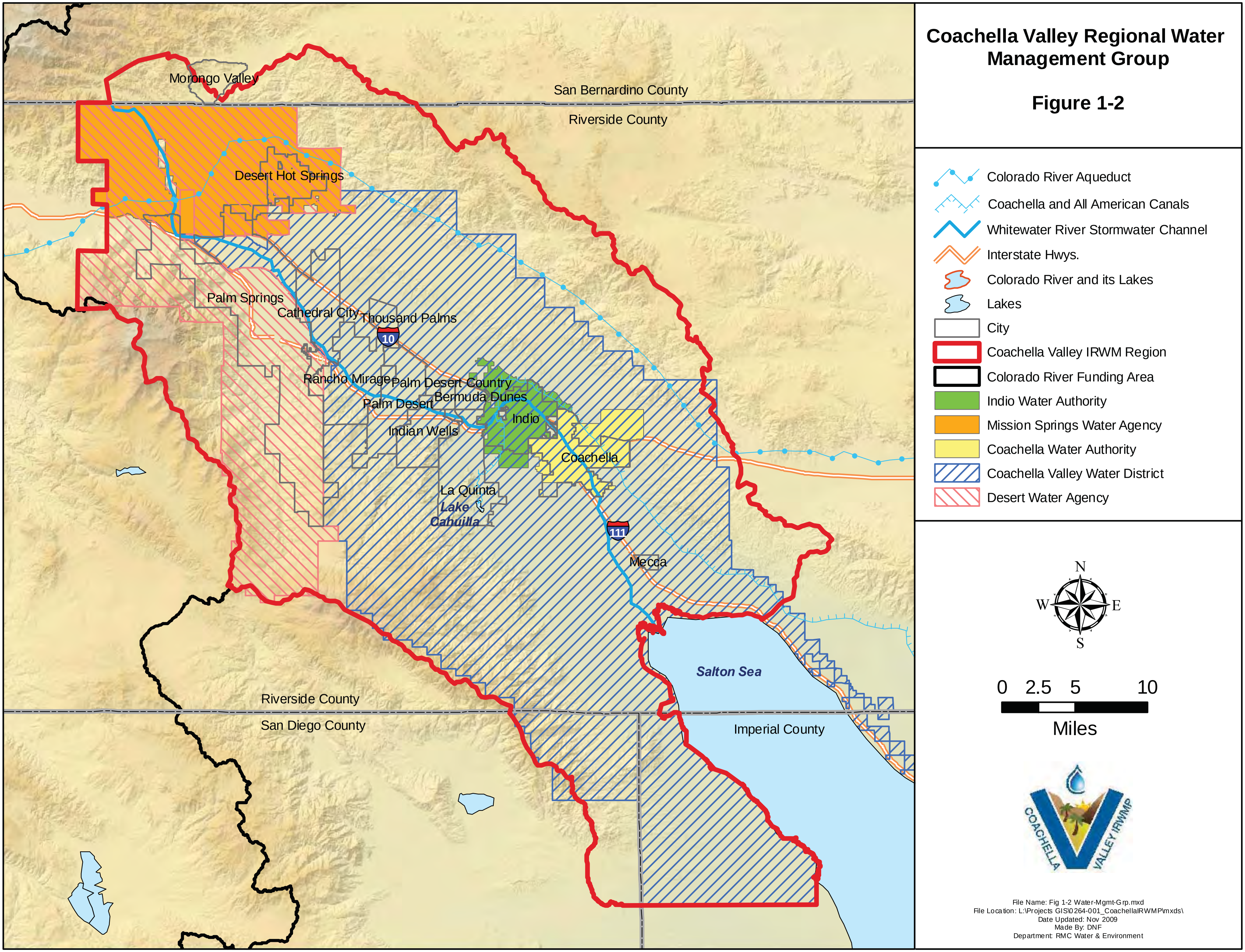
Coachella Valley Regional Water Management Group
Figure 1-2
Colorado River Aqueduct
Coachella and All American Canals
Whitewater River Stormwater Channel
Interstate Hwys.
Colorado River and its Lakes
Lakes
City
Coachella Valley IRWM Region
Colorado River Funding Area
Indio Water Authority
Mission Springs Water Agency
Coachella Water Authority
Coachella Valley Water District
Desert Water Agency
Morongo Valley
San Bernardino County
Riverside County
Desert Hot Springs
Palm Springs
Cathedral City
Thousand Palms
10
Rancho Mirage
Palm Desert Country
Bermuda Dunes
Palm Desert
Indio
Indian Wells
Coachella
La Quinta
Lake Cahuilla
111
Mecca
Salton Sea
Riverside County
San Diego County
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Made By: DNF
Department: RMC Water & Environment

- **Indio Water Authority (IWA)** is a joint powers authority formed as a component of the City of Indio and Redevelopment Agency of the City of Indio. IWA has statutory authority over water supply.
- **Mission Springs Water District (MSWD)** is a County Water District formed under §30000 et seq. of the California Water Code. MSWD has statutory authority over water supply.

The five partners signed a Memorandum of Understanding (MOU) in September 2008 for the purpose of coordinating water resources planning activities and developing and adopting an IRWM Plan (see **Appendix E** of this IRWM Plan). Members of CVRWMG articulated their intent in Section 3 of the MOU:

> *"3.1.1 This MOU is to memorialize the intent of the Partners to coordinate and share information concerning water supply planning programs and projects and other information, and to improve and maintain overall communication among the Partners involved. It is anticipated that coordination and information sharing among the Partners will assist the agencies in achieving their respective missions to the overall well-being of the region."*

The MOU, as well as the formalization of the Coachella Valley as an approved region through the 2009 Region Acceptance Process (RAP), qualify the CVRWMG as a RWMG in accordance with §10539 of the California Water Code (CWC).

1.3 Overview of Stakeholder Involvement

Building understanding and support for the Coachella Valley IRWM Plan and grant application processes among key stakeholders, as well as the general public, was critical to ensuring the Plan reflects the local needs, promotes the formation of partnerships, and encourages coordination with state and federal agencies. A proactive approach to implementing public outreach and information dissemination by the CVRWMG generated broad-based support for the IRWM Plan. This section presents an overview of the variety of outreach mechanisms used to improve the general awareness of the Coachella Valley IRWM program (see *Chapter 5 Stakeholder Involvement* for detailed information)

1.3.1 Stakeholder Coordination and Public Involvement

The goal of the stakeholder coordination effort is to provide a means for the region's various entities with interests and/or authority over water management in the region to maintain an active level of involvement in the IRWM program and implementation of the IRWM Plan. *Chapter 5, Stakeholder Involvement* contains a detailed description of the various stakeholders involved in the IRWM program.

The goal of public involvement is to increase awareness, understanding, and support for the Coachella Valley IRWM planning effort among the general public. The benefits of keeping the general public informed of the IRWM program and subsequent IRWM Plan implementation include educating constituents and politicians about the importance and interrelation of water management strategies, increased regional as well as local support for projects, and generating broad-based support for continued regional coordination.

Various outreach activities were done to solicit public involvement in the development of the Coachella Valley IRWM Plan. These outreach activities are described in detail in *Chapter 5, Stakeholder Involvement, Section 5.5, Balanced Access and Opportunity for Participation.*

Planning Partners

One of the first steps for the Coachella Valley IRWM program was to identify the Planning Partners who would serve an advisory role for the development of the IRWM Plan and grant applications. This was done through exploratory meetings held by the CVRWMG with other water resource agencies in the Valley. This led the CVRWMG to identify areas of mutual interests and opportunities for collaboration on the Coachella Valley IRWM Plan. A list of the Planning Partners can be found in *Chapter 5, Stakeholder Involvement*, Table 5-3: Coachella Valley Planning Partners. The Planning Partners include representatives from local cities, County of Riverside, tribal governments, disadvantaged community (DAC) representatives, and other local water management stakeholders.

The Planning Partners support the CVRWMG with the following tasks:

- Reviewing and contributing to draft issues identification, goals and objectives, project prioritization criteria, long-term governance, implementation framework, and other Plan deliverables;
- Providing guidance on how to outreach to key stakeholders, including disadvantaged communities and tribes;
- Contributing to agenda and content for public workshops; and
- Reviewing and contributing to funding application content.

Issues Groups

One of the roles of the Planning Partners and the CVRWMG is to identify issues that will require specific stakeholders groups, called Issues Groups, to properly address. To date, two Issues Groups have formed: Disadvantaged Communities (DAC) Outreach and Tribal Outreach. These Issues Groups work to identify the water management issues associated with these specific populations, discuss goals and objectives that can be established to address those issues, and identify solutions (projects and programs) that work toward meeting those objectives. More information regarding the formation, outreach, and involvement of Issues Groups as part of the IRWM program can be found in *Chapter 5, Stakeholder Involvement, Section 5.3.1 Group Membership and Participation.* Formation of additional Issues Groups will occur as the IRWM process continues forward and new topics and needs are identified by stakeholders.

The goal of disadvantaged communities (DAC) outreach is to identify and obtain input from groups that may be otherwise limited from participating in the IRWM planning and implementation efforts due to financial or other constraints. Through targeted outreach, the CVRWMG identified the major water-related concerns facing these groups (see *Chapter 3, Issues and Needs, Section 3.1.8 Issues Groups* for the identified issues). Numerous local and State-wide DAC organizations were targeted during outreach for the Coachella Valley IRWM program.

Environmental justice (EJ) is defined by the USEPA as "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and environmental of environmental laws." Outreach to organizations also involved with EJ issues ensures that water management activities implemented under the Coachella Valley IRWM program do not unduly burden DACs (e.g., through location of facilities).

Various outreach activities were conducted to solicit DAC members to participate in the development of the Coachella Valley IRWM Plan. These outreach activities are described in detail in *Chapter 5, Stakeholder Involvement, Section 5.6 Disadvantaged Communities Outreach.*

1.3.2 Tribal Outreach and Coordination

The goal of engaging the Valley's tribal governments is to better understand their critical water resources issues and needs. Through targeted outreach, the CVRWMG learned more about the major water-related concerns facing the tribes such that long-term implementation of the IRWM Plan was responsive to those needs. The following six Native American tribes in the region were engaged during outreach for the IRWM program (Note: Though the Morongo Band of Mission Indians Reservation does not lie directly within the Coachella Valley Region boundary, the tribe was invited to participate in regional planning efforts because it does draw from the underlying groundwater basin and has a vested interest in the Region):

- Agua Caliente Band of Cahuilla Indians
- Augustine Band of Mission Indians
- Cabazon Band of Mission Indians
- Morongo Band of Mission Indians
- Torres-Martinez Desert Cahuilla Indians
- Twenty-Nine Palms Band of Mission Indians

Additionally, meetings included the Bureau of Indian Affairs and other tribal coordinating agencies and groups when appropriate.

Various outreach activities were conducted to solicit Tribal members in the development of the Coachella Valley IRWM Plan. These outreach activities are described in further detail in *Chapter 5, Stakeholder Involvement, Section 5.7 Tribal Outreach and Coordination.*

1.4 IRWM Plan Development

The IRWM Plan was developed by various stakeholders in collaboration with the CVRWMG, Planning Partners, and consulting team. Through a series of meeting and public workshops, water resource needs, issues, and conflicts were identified, regional goals and objectives were established, and projects that contribute to Plan objectives were identified.

This IRWM Plan is organized in accordance with IRWM Plan Standards established in **Appendix C** of DWR's IRWM Grant Program Guidelines (August 2010). **Table 1-1** cross-references the IRWM Plan Standards with relevant sections of the Coachella Valley IRWM Plan. **Figure 1-3** provides a conceptual graphic illustrating the Coachella Valley IRWM Plan framework.

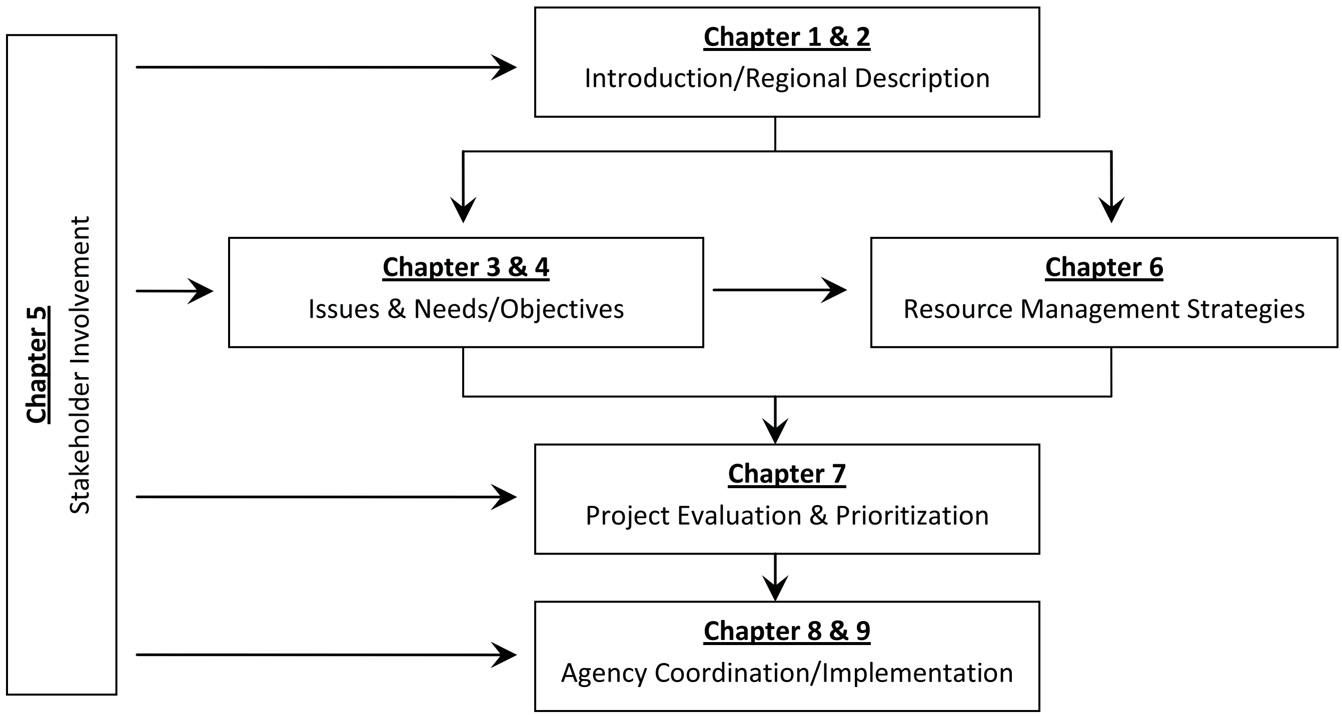
The overall direction and development of the IRWM Plan was provided by the CVRMWG and Planning Partners. The CVRMWG were assisted in preparing plan documents by:

- RMC Water and Environment
- Integrated Planning and Management, Inc.

Table 1-1: Organization of IRWM Plan

IRWM Plan Standards	Location in Coachella Valley IRWM Plan
Governance	Stakeholder Involvement (Chapter 5) Agency Coordination (Chapter 8) Framework for Implementation (Chapter 9)
Region Description	Region Description (Chapter 2) Agency Coordination (Chapter 8)
Objectives	Issues and Needs (Chapter 3) Objectives (Chapter 4)
Resource Management Strategies	Resource Management Strategies (Chapter 6)
Integration	Resource Management Strategies (Chapter 6)
Project Review Process	Project Review and Prioritization Process (Chapter 7) Appendix B: Coachella Valley IRWM Project List
Impact and Benefit	Framework for Implementation (Chapter 9)
Plan Performance and Monitoring	Framework for Implementation (Chapter 9)
Data Management	Framework for Implementation (Chapter 9)
Finance	Framework for Implementation (Chapter 9)
Technical Analysis	Issues and Needs (Chapter 3)
Relation to Local Water Planning	Agency Coordination (Chapter 8)
Relation to Local Land Use Planning	Agency Coordination (Chapter 8)
Stakeholder involvement	Stakeholder Involvement (Chapter 5)
Coordination	Stakeholder Involvement (Chapter 5) Agency Coordination (Chapter 8)
Climate Change	Region Description (Chapter 2) Resource Management Strategies (Chapter 6)

Figure 1-3: IRWM Plan Framework/Schematic



2 Region Description

*This chapter complies with the **Region Description Standard** by documenting that the IRWM planning region is defined by the combination of the water systems being managed; common water issues; and that there is sufficient variety of interested parties included in the planning region.*

This chapter provides a comprehensive overview of the Coachella Valley IRWM region, building from the information submitted as part of the Region Acceptance Process (RAP). This chapter also describes climate change in a legislative context, and discusses potential implications of climate change.

The Coachella Valley IRWM region is chiefly the same as the Whitewater River watershed, also known as the Coachella Valley (refer to Figure 1-1). The Region's watershed boundaries to the north and west are the rugged, barren mountain ranges of the Colorado Desert, San Bernardino Mountains, Little San Bernardino Mountains, and Mecca Hills. The watershed boundaries to the east are Mortmar, the Salton Sea, and Travertine Rock. The eastern boundary is defined by the watershed that encloses all surface drainage emptying into the north end of the Salton Sea. The Salton Sea is not within the IRWM region. The southernmost boundary turns west from the Salton Sea and follows the CVWD political boundary to the watershed divide. The watershed boundaries to the south and west are the high precipitous Santa Rosa Mountains and San Jacinto Mountains, which create and effective barrier against the easterly moving coastal storms. The western boundary is composed of a political line that separates DWA and MSWD from San Gorgonio Pass Water Agency.

Coachella Valley is located in central Riverside County. The Coachella Valley IRWM region is about 65 miles long on a northwest-southeast trending axis and covers approximately 1,420 square miles. The area is drained primarily by the Whitewater River that flows southward to the Salton Sea at an elevation of approximately 220 feet below sea level. The Coachella Valley is characterized by low precipitation and high summer daytime temperatures. Water bodies in the Coachella Valley include the Salton Sea, Whitewater River, and a collection of small ephemeral streams and creeks.

The Coachella Valley is comprised of nine city jurisdictions and unincorporated areas with a total 2010 projected population of approximately 477,900 (CVAG 2008). The largest city is Indio with a population of nearly 78,000 (CVAG 2008). In spite of its dry conditions and intense temperatures, the Coachella Valley generates $576M worth of crop value annually through its agricultural sector. Coachella Valley is known for producing a variety of fruits and vegetables, but most notably famous for dates and the origination of the Coachella grapefruit. Coachella Valley's underground aquifer has allowed extensive economic growth. Widespread water availability through aquifer pumping has supported high caliber golf and country clubs making Coachella Valley a premier destination for both golf and tourism; tourism has become major contributor to regional revenue.

The Coachella Valley region is appropriate for integrated regional water management because of its geologic proximity, interconnected economies and inclusion within the Whitewater River watershed. The selected regional boundary falls under the Colorado River Basin RWQCB jurisdiction, multiple political authorities, and several water purveyors.

2.1 Selection of Regional Boundary

The IRWM regional boundary was selected because it is all-encompassing and allows for the inclusion of all pertinent agencies and stakeholders interested in water management in the Coachella Valley. The boundary selected also shares a common water supply, wastewater, and flood control infrastructure, making it easier to coordinate and establish regional goals and objectives. Because it includes the service areas of the five CVRWMG partners, each of the partners indicated their individual intent to adopt the IRWM Plan and the regional boundary determined through stakeholder processes.

The western political boundary controlled by the San Gorgonio Pass Water Agency (SGPWA) just east of the Whitewater River watershed boundary was omitted from the IRWM regional boundary, because the groundwater basins of SGPWA are separated from the Coachella Valley Groundwater Basin (CVGB) by geological features near Fingal Point. The regions do share surface water drainage, but surface water flow only occurs during infrequent extreme, prolonged rain events. As such, their water supplies are independent of the Coachella Valley's water supplies. In addition, the two planning areas are separated by a political boundary, do not share customers, and their stakeholder groups do not overlap. SGPWA is mostly outside of the Colorado River Funding Area (as defined by DWR for the Statewide IRWM program), and is actively participating in the Upper Santa Ana Water Resources Association, which is developing an IRWM Plan.

On April 28, 2009, the CVRWMG submitted a Region Acceptance Process (RAP) application to DWR for establishment of the Coachella Valley IRWM Region. DWR approved the Region in November 2009. Further information regarding neighboring and/or overlapping IRWM efforts and an explanation of the planned working relationship that promotes cooperation between IRWM regions can be found in *Chapter 8 Agency Coordination, Section 8.1.2 Neighboring and/or Overlapping IRWM Efforts*.

2.2 Watershed and the Water Systems

This section includes a description of Watersheds/Water Systems within the Coachella Valley Region.

2.2.1 Watershed

The Coachella Valley IRWM Region is essentially comprised of the Whitewater River watershed, with the western edge formed by the DWA and MSWD political boundaries and the southern edge formed by the CVWD political boundary (as described in *Chapter 1 Introduction, Section 1.1 Background).* Groundwater basins that underlie the watershed are further subdivided as described below in *Section 2.2.2, Groundwater.*

The U.S. Geological Survey (USGS) and Colorado River Regional Water Quality Control Board (RWQCB) (2006) describe the Whitewater Hydrologic Unit as beginning 1.5 miles north of Whitewater and 3.5 miles upstream from San Gorgonio River. The drainage area of the watershed is approximately 57.5 mi^2. The watershed consists of sparsely populated mountains, desert, and agricultural lands. The Whitewater River is the primary drainage course in the area, spanning the entire Coachella Valley. The River has perennial flow north of Palm Springs, becoming dry as water percolates into the groundwater basin or is diverted for recharge at Whitewater Spreading Area. The Whitewater River is ephemeral downstream of the Whitewater Spreading Area and flows are rare. The River is fed by several ephemeral tributaries. The Whitewater River is also the main stormwater channel in the Coachella Valley.

2.2.2 Water Systems and Distribution

The Coachella Valley's water supply systems are made up primarily of three sources:

- Groundwater pumped from the Whitewater River Basin;
- Imported Colorado River water supplies obtained by CVWD and DWA; and
- Natural surface water from mountain streams.

Wastewater, recycled water, conservation, desalinated water, stormwater, and flood management are also important components of the regional water system; these components are discussed further below.

Groundwater

Groundwater is the largest source of water supply for the Coachella Valley IRWM region. The Coachella Valley Groundwater Basin has an estimated storage capacity of 39 million acre-feet of water. DWR's *Bulletin 118: California's Groundwater* (2004) defines the Coachella Valley Groundwater Basin (No. 7-21) as residing within the Colorado River Hydrologic Region. DWR divides this basin into the following four sub-basins, Indio (No. 7-21.01), Mission Creek (No. 7-21.02), Desert Hot Springs (No.7-21.03), and San Gorgonio Pass (No. 7-21.04). The location of the Coachella Valley Groundwater Basin and subbasins are shown in **Figure 2-1**.

DWR's Bulletin 118 divides the Coachella Valley Groundwater Basin into several basins with respect to local geographic and geologic conditions, including the large and active faults that constitute the San Andreas Fault system. The largest of these subbasins is the Indio Subbasin (No. 7-21.01), which is further divided into upper and lower portions. The upper and lower portions of the Indio Subbasin are also referred to as the Upper and Lower Whitewater River Subbasins in local planning documents, including the Coachella Valley Water Management Plan (CVWD 2002) and IWA's Water Resources Development Plan (IWA 2008). Geographically, the Lower Whitewater River Subbasin is southeast of a line extending from Washington Street and Point Happy northeast to the Indio Hills near Jefferson Street, and the Upper Whitewater River Subbasin is northwest of this line.

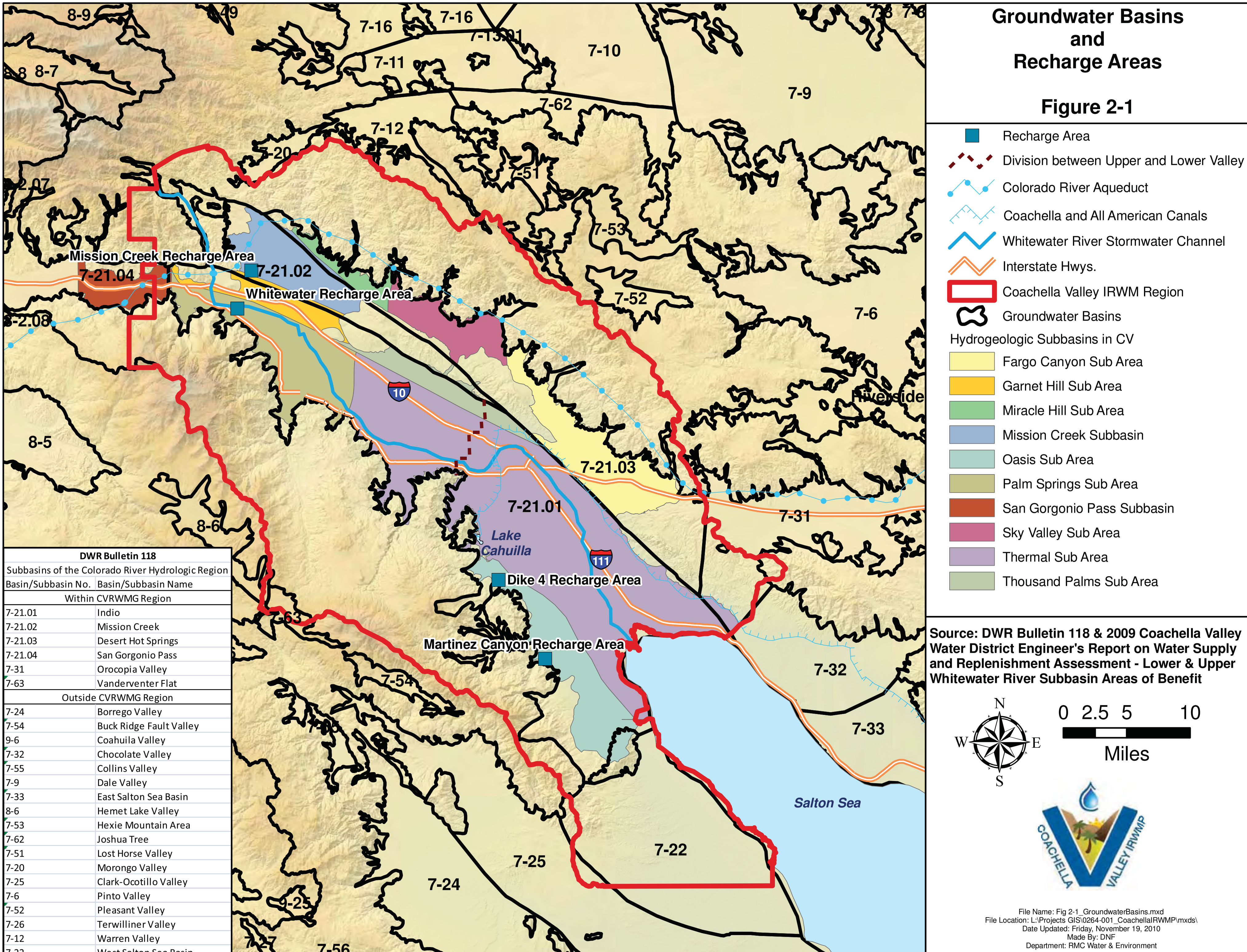
DWR's *Bulletin No. 108: Coachella Valley Investigation* (1964) provides a detailed description of the physical characteristics of the Coachella Valley Groundwater Basin and its subdivisions, and contains an inventory of the surface and underground water resources within the basin.

Basin inflows include natural recharge from mountain runoff, artificial recharge with Colorado River water, flows from outside the groundwater basin, return flows from urban over-irrigation, agricultural drainage, and non-consumptive return. Basin outflows include groundwater pumping (largest outflow according to Bulletin 118), evapotranspiration, flows to the Salton Sea, and flows to subsurface drains (which also flow to the Salton Sea).

Almost all domestic water served by the local water purveyors is obtained locally from wells drilled into the Coachella Valley's vast groundwater basin. All five CVRWMG water purveyors, Myoma Dunes Mutual Water Company, and other pumpers share the basin. Myoma Dunes Mutual Water Company is a private water company that provides domestic water services to a portion of the Bermuda Dunes community.

Groundwater Basins and Recharge Areas

Figure 2-1



DWR Bulletin 118	
Subbasins of the Colorado River Hydrologic Region	
Basin/Subbasin No.	Basin/Subbasin Name
Within CVRWMG Region	
7-21.01	Indio
7-21.02	Mission Creek
7-21.03	Desert Hot Springs
7-21.04	San Gorgonio Pass
7-31	Orocopia Valley
7-63	Vanderventer Flat
Outside CVRWMG Region	
7-24	Borrego Valley
7-54	Buck Ridge Fault Valley
9-6	Coahuila Valley
7-32	Chocolate Valley
7-55	Collins Valley
7-9	Dale Valley
7-33	East Salton Sea Basin
8-6	Hemet Lake Valley
7-53	Hexie Mountain Area
7-62	Joshua Tree
7-51	Lost Horse Valley
7-20	Morongo Valley
7-25	Clark-Ocotillo Valley
7-6	Pinto Valley
7-52	Pleasant Valley
7-26	Terwilliner Valley
7-12	Warren Valley
7-22	West Salton Sea Basin

Source: DWR Bulletin 118 & 2009 Coachella Valley Water District Engineer's Report on Water Supply and Replenishment Assessment - Lower & Upper Whitewater River Subbasin Areas of Benefit

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Date Updated: Friday, November 19, 2010
Made By: DNF
Department: RMC Water & Environment

Average pumping by water purveyor is as follows (CVRWMG 2009 RAP; IWA 2005 UWMP; MSWD 2005 UWMP; City of Palm Desert 2004 Water, Sewer and Utilities Element):

- CVWD: 132,000 AFY from approximately 115 wells
- DWA: 38,700 AFY from 27 wells
- IWA: 20,200 AFY from 18 wells
- MSWD: 9,200 AFY from 14 wells
- CWA: 8,400 AFY from 8 wells
- Myoma Dunes: 4,775 AFY from 5 wells

Prior to 1949, water levels steadily declined because of agricultural pumping. The Coachella branch of the All American Canal (Coachella Canal) was completed in 1949 and the first deliveries of the Colorado River water to the Coachella Valley began in that year. As a result, groundwater pumping was significantly reduced from 1950 to the early 1980s, water levels rose in the eastern Coachella Valley. However, since the 1980s, increased pumping has caused water levels in the eastern Coachella Valley to decline despite Colorado River imports. CVWD (2000) estimates the decrease in freshwater in storage in the Coachella Valley Groundwater Basin for 1999 to be 136,700 acre-feet, of which the Indio subbasin is the largest part.

Whitewater Spreading Area at Windy Point

Recharge Areas

Natural recharge to the groundwater basin is attributed to surface runoff and subsurface inflow. Natural recharge in the area is estimated to be only a fraction of the annual pumping – about 50,000 AFY. The bulk of groundwater recharge takes place through artificial means (CVWD 2002). There are four recharge areas in the Coachella Valley IRWM region (see **Figure 2-1** and **Table 2-1**):

- **Whitewater Spreading Area** recharges Colorado River Water and captures stormwater, with historical peak recharge of 288,000 acre-feet in 1986,
- **Mission Creek Spreading Facility** recharges Colorado River Water and has a recharge capacity of 30,000 to 40,000 AFY,
- **Thomas E. Levy Recharge Facility** recharges water obtained from the Coachella Canal and has a recharge capacity of approximately 30,000 to 40,000 AFY, and
- **Martinez Canyon Pilot Recharge Project** recharges Coachella Canal water and currently has capacity of about 2,000 AFY.

SWP and Colorado River allotments delivered by the Colorado River Aqueduct and the Coachella Canal help reduce the CVGB overdraft. These recharge facilities could provide conjunctive use opportunities with other agencies.

Overdraft Conditions

Despite the large amount of artificial groundwater recharge, the local groundwater basin has not been in balance since the 1930's. The overdraft was estimated to be about 137,000 AFY in 1999, with a cumulative overdraft of nearly 4.8 million acre-feet between 1936 and 1999 (CVWD 2002 WMP). This means that 4.8 million more acre-feet of freshwater were withdrawn from the basin than was recharged (see **Figure 2-2**).

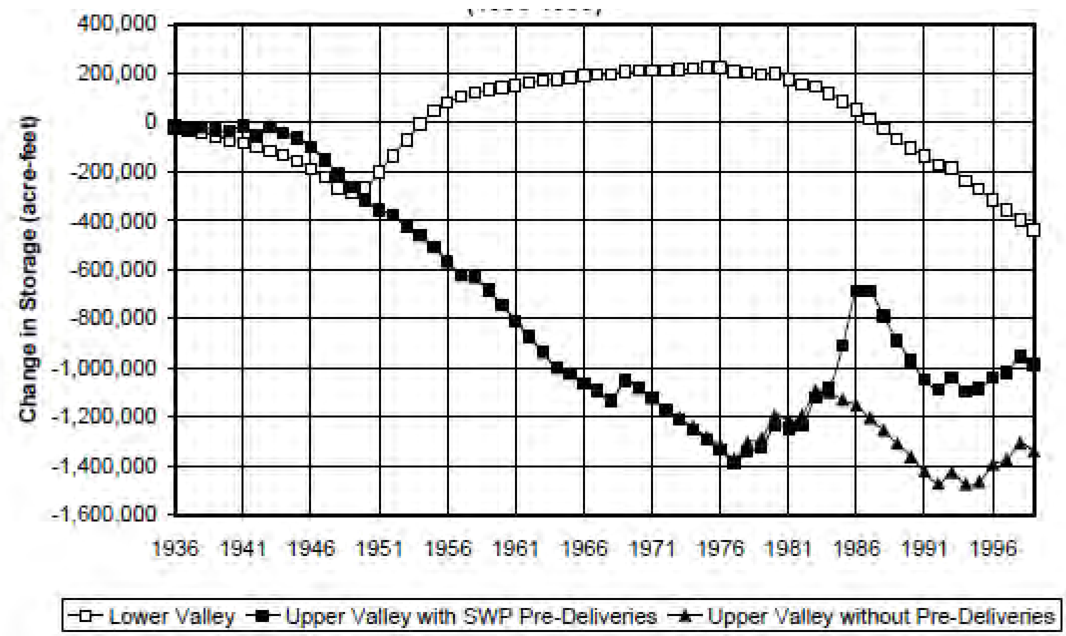
Table 2-1: Groundwater Subbasins and Corresponding Recharge Areas

Bulletin 118 Basin Name (Basin No.)	Subbasins	Groundwater Storage Capacity (AF)*	Recharge Areas
Indio (7-21.01), aka Whitewater River	Garnet Hill Sub Area	1,000,000	Being Studied
	Palm Springs Sub Area	4,600,000	Whitewater Recharge Area
	Thousand Palms Sub Area	1,800,000	Whitewater Recharge Area
	Oasis Sub Area	3,000,000	Thomas E. Levy Recharge Area Martinez Canyon Pilot Recharge
	Thermal Sub Area	19,400,000	Thomas E. Levy Recharge Area Martinez Canyon Pilot Recharge
Mission Creek (7-21.02)	Mission Creek	2,600,000	Mission Creek Recharge Area
Desert Hot Springs (7-21.03)	Fargo Canyon Sub Area Miracle Hill Sub AreaSky Valley Sub Area	4,100,000	N/A

*Source: CVWD UWMP (2005)

Groundwater overdraft has caused groundwater levels to decrease more than 60 feet in portions of the East Valley and raised significant concern about water quality degradation and land subsidence in this area. Recently, however, reduced pumping in the East Valley along with recharge at the Thomas E. Levy Facility has resulted in a partial return to artesian flow in the vicinity of Mecca. Groundwater levels in the West Valley have decreased substantially, except in the areas near the Whitewater Spreading Facility where artificial recharge has successfully raised water levels.

Figure 2-2: Cumulative Change in Groundwater Basin Storage (1936-1999)



Source: CVWD 2002 WMP

Continued overdraft would have significant consequences for the Coachella Valley, including:

- increased costs to pump water and deepen wells;
- land subsidence in some areas with resultant potential for ground fissures and damage to buildings, homes, sidewalks, streets, wells, and buried pipelines; and
- water quality degradation in some areas, which includes increased salinity from Salton Sea intrusion and perched water intrusion.

Imported Water

Due to the potentially significant consequences caused by groundwater overdraft, the Region has developed imported water supplies to supplement and replenish groundwater supplies. CVWD and DWA obtain imported water supplies through two primary sources: 1) State Water Project supply via exchange with Metropolitan Water District of Southern California (MWD) for delivery through the Colorado River Aqueduct and 2) Colorado River supply via the Coachella Canal. CVWD and DWA also continually seek new opportunities to purchase imported water supplies from SWP contractors and other sources.

Figure 2-3 provides a Statewide map of imported water aqueducts.

State Water Project Supply via Colorado River Aqueduct

CVWD and DWA are State Water Project (SWP) contractors, but they have no direct physical connection to SWP water. Therefore, they receive their SWP deliveries via MWD's Colorado River Aqueduct, which originates near Parker Dam at Lake Havasu on the Colorado River and terminates at Lake Matthews. The aqueduct traverses the Coachella Valley IRWM region and has two turnout locations in the Coachella Valley for recharge of the groundwater basin. The first turnout is located near Highway 62 at the Mission Creek Spreading Area for recharge of the Mission Creek Subbasin. The second is located just north of the intersection of the Whitewater River and Interstate 10 for recharge of the aquifer at the Whitewater Spreading Area, which outflows to the Whitewater River Subbasin.

CVWD and DWA have entered a series of exchange and delivery agreements with MWD to receive SWP deliveries via the Colorado River Aqueduct. These agreements are explained in the following paragraphs.

In 1973, CVWD and DWA entered into an Exchange Agreement with MWD for delivery of SWP water to replenish groundwater in the Whitewater River Sub-basin of the Upper CVGB. The same agencies executed an Advance Delivery Agreement in 1983, which allows MWD to store up to 600,000 acre feet of water in the Whitewater River Sub-basin. The agreement was updated in 2003. MWD assigned 11,900 acre feet of its annual Table A allocation to DWA and 88,100 acre feet of its annual Table A allocation to CVWD for a total of 100,000 acre feet (Table A is an entitlement schedule set forth by the SWP on an annual basis). MWD retained the option to call-back or recall a portion of the assigned water allocations at a cost, in accordance with specific conditions. To date, MWD has only exercised this option one time.

CVWD and DWA executed the Mission Creek Groundwater Replenishment Agreement in April 2003, which also allowed for storage of advanced deliveries from MWD. CVWD, MSWD, and DWA are currently working together on development of a Mission Creek-Garnet Hill Water Management Plan (Mission Creek-Garnet Hill WMP) to address sub-basin issues.

CVWD and DWA have also been actively acquiring additional Table A amounts to their respective SWP Table A allotments. The combined CVWD and DWA Table A allotment is now 194,100 AFY (refer to **Table 2-2** below).

MWD, CVWD, and DWA are currently studying the feasibility of extending the California Aqueduct to deliver SWP supplies to the Coachella Valley. However, capital costs associated with an aqueduct extension may be prohibitive.

Table 2-2: Table A Allotments

	Original SWP Table A	Tulare Lake Basin Transfer #1	Tulare Lake Basin Transfer #2	MWD Transfer	Berrenda Mesa Transfer	Total
CVWD	23,100	9,900	5,250	88,100	12,000	138,350
DWA	38,100	0	1,750	11,900	4,000	55,750
Total	61,200	9,900	7,000	100,000	16,000	194,100

Colorado River Supply via Coachella Canal

To secure its Colorado River water supplies, CVWD entered into the Quantification Settlement Agreement (QSA) and twelve related agreements with Imperial Irrigation District, MWD, San Diego County Water Authority, the State of California, and the U.S. Department of the Interior. The QSA enables California to reduce its historic overdependence on Colorado River water to its 4.4 million acre-foot basic annual apportionment through agriculture-to-urban water transfers and other water supply programs. The QSA secures CVWD's Colorado River water allotment of 459,000 AFY by 2026.

Statewide Imported Water Systems

Figure 2-3

- Aqueducts
- River
- Water Bodies
- CVRWMG Management Region
- Colorado River Funding Region Boundary

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Date Updated: July 2010
Made By: DNF
Department: RMC Water & Environment

The Coachella Canal originates 20 miles west of Yuma, Arizona at “Drop 1” of the All American Canal and conveys Colorado River water 123 miles northwest along the western boundary of the Coachella Valley IRWM region to a man-made storage reservoir, Lake Cahuilla. The Coachella Canal conveys flow by gravity and is concrete-lined to prevent seepage loss. Along its route, the Coachella Canal distributes non-potable Colorado River water for irrigation to approximately 73,000 acres of agricultural land in the eastern Coachella Valley through nearly 500 miles of buried delivery laterals. Total agricultural water demand in 1999 was 358,700 AFY, primarily in the East Valley. The Coachella Canal also provides non-potable irrigation water to several Coachella Valley golf courses. Lake Cahuilla, at the terminus of the Coachella Canal, was built by CVWD in 1968 to provide operational storage for imported Colorado River water.

Surface Water

Surface waters of the Coachella Valley IRWM region consist of the Whitewater River Stormwater Channel (WRSC) and principal tributaries to the WRSC, including the San Gorgonio River, Snow Creek, Falls Creek, Chino Creek, Mission Creek, Morongo Creek, Tahquitz Creek, Andreas Creek, Palm Canyon Wash, Deep Canyon Creek, and the Palm Valley Channel. The WRSC and the majority of its tributaries are ephemeral streams, and are normally dry. Surface water from the above-mentioned creeks and rivers is almost entirely put to a beneficial use, such as groundwater recharge.

DWA receives about 5% of its water supply (or 2,500 AFY) through surface water sources, including Chino Creek, Snow Creek, and Falls Creek. These creeks are all tributary to the Whitewater River. CVWD also diverts mountain runoff from the Whitewater River Canyon near Windy Point to the Whitewater Spreading Facility for groundwater recharge. In addition, the Agua Caliente Band of Cahuilla Indians may divert surface water supplies from Tahquitz Creek, Andreas Creek, and the Whitewater River. Surface water that is not diverted by the tribe is put to beneficial use, such as groundwater recharge.

Distribution Systems

Water supply for the Coachella Valley is generally pumped from subbasins of the CVGB. Water is pumped from many wells around the region into each agency’s distribution system. Each of the five water purveyors of the CVRWMG operates its own distribution system. Below is a breakdown of the water supplied by each water purveyor (CVRWMG RAP 2009):

- **CVWD** provides approximately 132,000 acre feet per year to 280,000+ residents through 106,000 active meters. The system has about 30 pressure zones. It is made up of approximately 115 deep wells, 2,000 miles of pipe and 120 million gallons of reservoir storage in 59 reservoirs.
- **DWA** pumps water with 27 active wells in the system. The system is made up of 12 pressure zones. DWA domestic service includes about 22,000 active services through 369 miles of pipeline and serves about 71,000 people. The agency utilizes 28 reservoirs with the capacity of 59 million gallons. Annual production of DWA is about 38,700 acre feet.
- **CWA** is a domestic water system that provides 8,400 AFY of potable groundwater to over 40,000 residents in the City of Coachella. The pressurized pipeline distribution system has 2 pressure zones and consists of approximately 8 deep wells and 10.1 million gallons of reservoir storage in 3 enclosed, welded-steel reservoirs.
- **IWA** has about 21,000 active connections within its system. The system consists of 4 pressure zones and 7 reservoirs with a capacity of 19 million gallons of storage, 20 wells, 6 pumping plants and 350 miles of distribution pipelines.

- **MSWD** provides water to residential and commercial customers through three independent distribution systems that include 14 active wells. Water is distributed to about 12,500 connections through 239 miles of pipeline. There are 26 reservoirs that have storage capacity of 23 million gallons.

2.2.3 Wastewater

The Coachella Valley IRWM Region encompasses five sanitation service areas, with a total of eleven wastewater treatment plants. Of the eleven wastewater treatment plants, four of these plants recycle water. Recycled water usage in the Valley has increased from about 500 acre-ft/year in 1965 to more than 14,000 acre-ft/year currently (CVRWMG 2009 RAP). However, a portion of the customers within the Region are still on septic systems. The Coachella Valley IRWM region boundary sanitation service areas are shown on **Figure 2-4**.

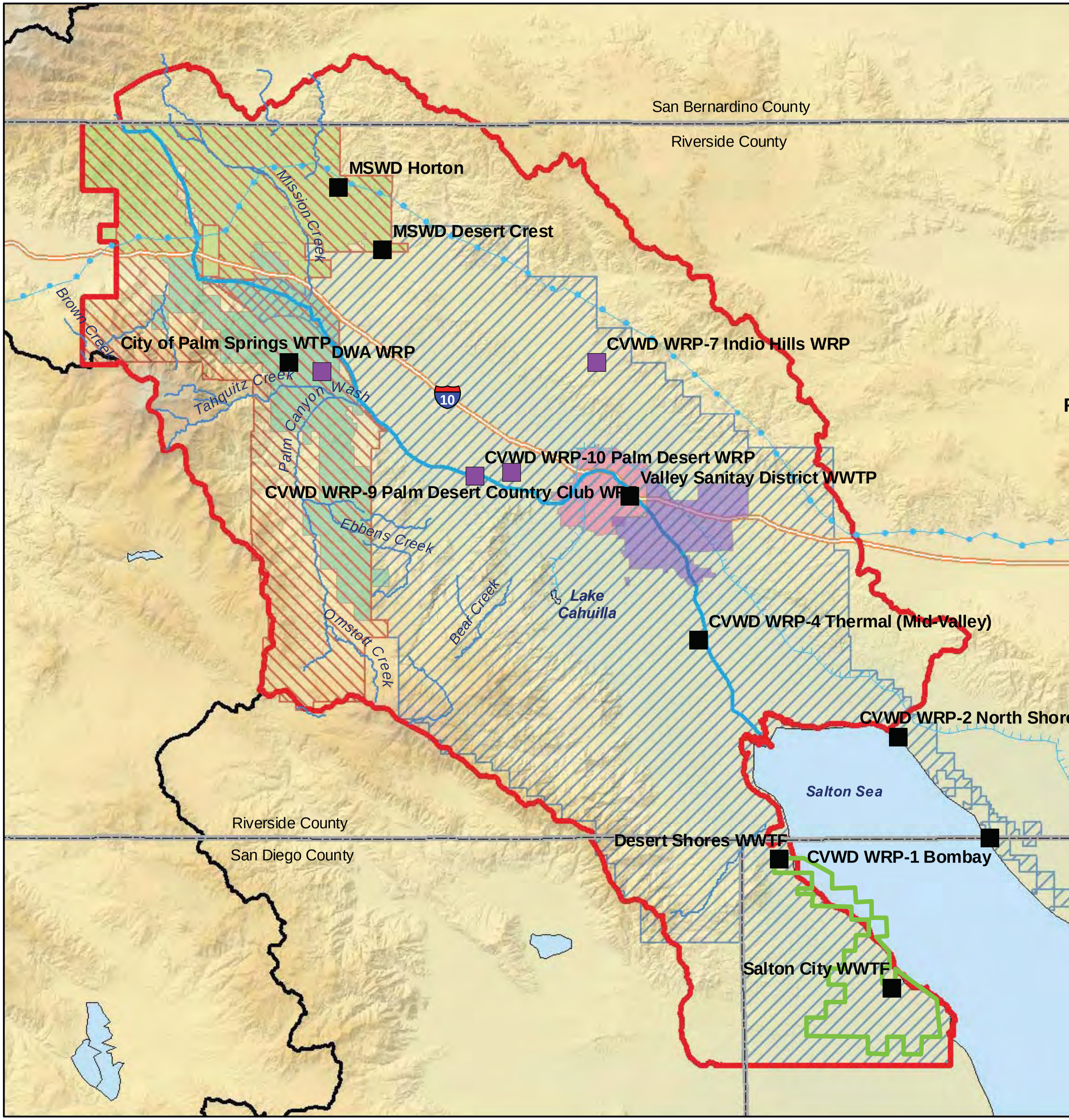
The five sanitation service areas and wastewater treatment facilities that serve Coachella Valley residents include (CVRWMG 2009 RAP; CVWD 2005 UWMP; MSWD 2005 UWMP):

- **City of Coachella** (Coachella Sanitation District) operates a 4.5 million gallons per day (mgd) wastewater treatment plant and discharges effluent to the WRSC.
- **City of Palm Springs** operates a sewer collection system and a 10.9 mgd treatment facility. Treated effluent is transferred to DWA's reclamation plant where it is recycled.
- **DWA** operates an 11 mgd reclamation plant which distributes recycled water for landscape irrigation. DWA operates a sewer collection system in Palm Springs and discharges to the City of Palm Spring's collection system. DWA also operates a sewer collection system in the southeastern area of Cathedral City and discharges to CVWD's sewer collection system.
- **CVWD** operates a total of six treatment plants with a total capacity of 30.6 mgd. CVWD operates three water reclamation plants (WRP-7, WRP-9 and WRP-10) which treat to tertiary levels and distribute approximately 8 mgd of recycled water. One wastewater treatment plant (WRP-4) discharges effluent to the WRSC. Two small plants (WRP-1 and WRP-2) discharge effluent to percolation ponds.
- **MSWD** operates two wastewater treatment plants (Horton Wastewater Plant and Desert Crest Wastewater Plant) with a combined capacity of 2.7 mgd. Effluent from both plants is discharged to percolation ponds.
- **Valley Sanitary District** (VSD) operates a wastewater treatment plant that services the majority of IWA customers, and discharges effluent to the WRSC. The plant generates 6.5 mgd which is primarily diverted to the Coachella Valley Stormwater Channel.
- **Salton Community Services District (SCSD)** operates the Salton City Wastewater Treatment Facility, which serves the unincorporated community of Salton City and has the capacity to treat 0.25 mgd. SCSD also operates the Desert Shores Wastewater Treatment Facility, which serves the unincorporated community of Desert Shores and has the capacity to treat 0.20 mgd. Both of these facilities dispose of effluent through evaporation and percolation.

Several of the local wastewater treatment facilities discharge effluent to percolation ponds. CVWD and the City of Palm Springs discharge secondary treated recycled water to percolation ponds in the West Valley when the demand for recycled water is low in winter months, while MSWD and SCSD discharge secondary treated effluent to percolation ponds for final disposal. In the East Valley, CVWD, CWA, and VSD discharge secondary treated effluent which has been chlorinated and then dechlorinated to the Coachella Valley Stormwater Channel (CVSC).

Wastewater and Recycled Water

Figure 2-4



Wastewater Treatment Plants
Wastewater Reclamation Plants
Colorado River Aqueduct
Coachella and All American Canals
Whitewater River Stormwater Channel
River or Creek
Interstate Hwys.
Lakes
Coachella Valley IRWM Region
Colorado River Funding Area
Salton Community Services District Boundary
County Lines
City of Palm Springs
Coachella Valley Water District
Desert Water Agency
Mission Springs Sanitation District
Valley Sanitary District
Coachella Sanitary District

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Date Updated: Nov 2010
Made By: DNF
Department: RMC Water & Environment

Wastewater Treatment

The City of Coachella currently operates one secondary-treatment wastewater facility, although the City is currently completing a cost-benefit analysis that will determine the feasibility of upgrading this facility for tertiary treatment (CWA 2008).

The City of Palm Springs's wastewater treatment plant was built in 1960, and as such is in need of various retrofits. In April 2010, the Palm Springs City Council approved various actions relating to the City's wastewater treatment plant, including approval of the City of Palm Springs Wastewater Treatment Plant Capital Repair and Rehabilitation Plan (Palm Springs 2010).

DWA currently operates one water reclamation plant that provides tertiary treatment for recycled water. The agency operates a sewer collection system, but transfers collection to CVWD and the City of Palm Springs for treatment.

CVWD's major wastewater treatment facility, the Mid-Valley WRP (WRP-4) located near Thermal, became operational in 1986 and allows the District to serve communities from La Quinta to Mecca. Currently, this plant, along with similar facilities near Palm Desert, Thermal, North Shore, Bombay Beach, and Thousand Palms, allows the District to provide sanitation service to most of the areas that it serves with domestic water.

MSWD operates two plants, the Horton Wastewater Treatment Plant and Desert Crest Wastewater Treatment Plant that provide secondary treated wastewater. The Horton Wastewater Treatment Plant has been expanded four times and its current capacity is 2 mgd. Desert Crest Wastewater Treatment Plant produces much less, in the dry summers the plant can produce as low as 35,000 gallons and in the winter up to 70,000 gallons per day due to reduced population in the hot summer months (MSWD 2010). Both of these wastewater treatment plants distribute water to percolation ponds providing recharge.

VSD's wastewater plant, located in Indio, treats water on a secondary level at a rate of 6.5 mgd. Post-treatment water is diverted to the Coachella Valley Channel and small portions of the treated wastewater are used for neighboring tribal lands and irrigation (VSD 2010). IWA and VSD recently entered into an MOU for a joint effort to develop a water reclamation facility for recycled water use to include landscape irrigation.

SCSD renovated the Salton City Wastewater Treatment Facility in 2008 in response to increases in the amount of wastewater flows in SCSD's service area. SCSD intends to compose a Master Sewer Plan to address future projected wastewater flows, and could potentially expand the Salton City Wastewater Treatment Facility to 0.5 mgd to address future wastewater needs in its service area.

Many Valley residents, however, are still using septic systems for wastewater treatment. Failing septic systems or a high density of septic systems have the potential to contaminate the local groundwater basin. MSWD recently approved the formation of a $58 million sewer assessment district (AD12), which is designed to remove existing septic tank systems and finance the costs of additional improvement to the sewer system. Within DWA's service area, the City of Cathedral City has secured grants and assessment districts to fund the costs of septic to sewer conversions for the Dream Home and Cathedral City Cove areas. These projects were completed in summer of 2010. **Figure 2-5** demonstrates the location of septic-to sewer conversion projects that were submitted for the Coachella Valley IRWM Plan as of September 30, 2010.

Table 2-3: Summary of Wastewater Treatment Plants

Facility	Agency	Location	Secondary Treatment (mgd)
Coachella	Coachella Sanitation District	Coachella	2.4
WRP-1	CVWD	Bombay Beach	0.15
WRP-2	CVWD	North Shore	0.03
WRP-4	CVWD	Thermal (Mid-Valley)	7.0
Horton	MSWD	Desert Hot Spring	2.0
Desert Crest	MSWD	Unincorporated, County land	0.7
VSD	VSD	Indio	6.5
Palm Springs	City of Palm Springs	Palm Springs	10.9
Salton City	SCSD	Salton City	0.25
Desert Shores	SCSD	Desert Shores	0.20
Total			**30.13**

Sources- http://www.cvwd.org/news/publicinfo/2005_12_29_CVMWD_UWMP.pdf
http://www.palmsprings-ca.gov/index.aspx?page=877

2.2.4 Recycled Water

Recycled water has been used in the Coachella Valley IRWM region since 1965, mainly for irrigation of golf courses. Water recycling has the potential to provide a reliable non-potable water supply to the Region. Water recycling has the potential to save energy and reduce costs in the region as recycled water production requires only a quarter of the energy necessary to pump groundwater from deep wells. The use of reclaimed water also protects the local water supply by reducing the amount of nitrates which could reach the groundwater basin. At present, recycled water rates are subsidized as an incentive to encourage customers to maximize their use of recycled water.

In the West Valley, municipal wastewater is the only potential source of recycled water. In the East Valley, three sources of recycled water have been identified for potential use: fish farm effluent (dependent on one fish farming business operation), agricultural drainage flows, and municipal recycled water from CVWD and VSD water reclamation plants. The primary use for recycled water in the Coachella Valley IRWM region is golf course irrigation. In winter months, when demand for recycled water is low, wastewater facilities discharge secondary effluent to percolation ponds where it eventually becomes part of the groundwater.

Recycled water usage has increased from about 500 AFY in 1965 to over 14,000 AFY currently (CVRWMG RAP Submittal 2009). CVWD owns and/or operates three WRPs (WRP-7, WRP-9, and WRP-10) which generate reclaimed water for golf courses and large landscape areas. Flows from the western part of CVWD are generally directed to WRP-9 and WRP-10. The Palm Desert Regional WRPs (WRP-9 and WRP-10) serves the communities of Indian Wells, Palm Desert, and Rancho Mirage as well as a portion of Cathedral City. The Cities of Coachella and Palm Springs, and VSD each operate a WRP.

DWA also has a recycling program using wastewater effluent from the City of Palm Springs. DWA operates a 10 mgd water reclamation plant which distributes recycled water for irrigation uses. DWA began its recycled water program with the opening of the reclamation plant in 1988. Wastewater first goes to the City of Palm Springs wastewater treatment plant where it is initially treated, before DWA's recycling facility receives it and performs tertiary treatment for distribution.

MSWD has conducted both an assessment study and a feasibility study on recycled water for its service area. Design plans are complete for an expansion of MSWD's Horton Wastewater Treatment Plant to include the capability to treat wastewater to tertiary levels.

Table 2-4: Summary of Water Reclamation Plants

Facility	Agency	Location	WRP Secondary Treatment (mgd)	WRP Tertiary Treatment (mgd)
WRP-7	CVWD	Indio Hills	5.0	2.5
WRP-9	CVWD	Palm Desert Country Club	0.40	0.0
WRP-10	CVWD	City of Palm Desert	18.0	15.0
DWA	DWA	City of Palm Springs/DWA	10.9*	10.0
Total			**28.9**	**27.5**

Source- http://www.cvwd.org/news/publicinfo/2005_12_29_CVMWD_UWMP.pdf

*Note: This reflects the amount of water that Palm Springs has initially treated at the primary level. This water is subsequently delivered to DWA for tertiary treatment.

Potential uses for recycled water in the region can be divided into four major categories:

- Surface irrigation, especially for golf courses and greenbelt areas;
- Impoundments for recreation, fish hatcheries, landscape ponds;
- Cooling for industrial and commercial applications; and
- Other uses, such as toilet flushing, drain trap priming, fire fighting, decorative fountains, commercial laundries, industrial boiler feed, soil compaction, mixing concrete, and dust control on roads and streets.

CVWD Recycled Water Pump Station

Table 2-5 lists existing recycled water users for CVWD and DWA's reclamation plants. Currently, CVWD produces about 6,900 AFY of recycled water for irrigation use and approximately 2,000 AFY for in-plant water use. In addition to these users, CVWD delivers Coachella Canal water to a number of golf courses in the Lower Valley. DWA produces roughly 3,500 AFY of recycled water for a uses which include irrigation and landscaping.

Table 2-5: Existing Recycled Water Users

User	Use	Source	Usage (AFY)
CVWD Recycled Water			
Mountain Vista Golf Club	36 Hole Golf Course	WRP-7	1,867
Shadow Hills Country Club	18 Hole Golf Course	WRP-7	294
Palm Desert Country Club	27 Hole Golf Course	WRP-9	200
Casa Blanca HOA[3]	32 Acre HOA Greenbelt	WRP-10	116
Desert Willow	36 Hole Golf Course	WRP-10	962
Indian Ridge	36 Hole Golf Course	WRP-10	354
Marriott's Desert Springs	36 Hole Golf Course	WRP-10	695
Mountain View Falls HOA	21 Acre HOA Greenbelt	WRP-10	82
Palm Desert Greens	18 Hole Exec. Course	WRP-10	450
Palm Desert High School	20 Acre Athletic Fields	WRP-10	45
Portola Country Club	9 Hole Exec. Course	WRP-10	134
Toscana Country Club	Two 18 Hole Exec. Courses	WRP-10	862
Santa Rosa Country Club	18 Hole Golf Course	WRP-10	425
Silver Sands Racquet Club	75 Acre HOA Greenbelt	WRP-10	235
The Golf Center	9 Hole Exec. Course	WRP-10	156
Vista del Montañas HOA	25 Acre HOA Greenbelt	WRP-10	98
DWA Recycled Water			
N/A[1]	Park Irrigation	DWA[2]	348
N/A[1]	Combined Golf Course Irrigation	DWA	3,002
N/A[1]	Roadway Median	DWA	9
N/A[1]	Municipal Landscaping #1	DWA	15
N/A[1]	Municipal Landscaping #2	DWA	10
N/A[1]	Sports Field Irrigation #1	DWA	26
N/A[1]	Sports Field Irrigation #2	DWA	25
N/A[1]	Sports Field Irrigation #3	DWA	26
N/A[1]	Sports Field Irrigation #4	DWA	24
Total			**10,401**

Sources- http://www.cvwd.org/news/publicinfo/2005_12_29_CVMWD_UWMP.pdf
CVWD 2009 Non-Potable Water Report

[1]-DWA was unable to specify user due to a confidentiality agreement between their clients.

[2] -DWA denotes the DWA Water reclamation plant. They only have one facility.

[3]-HOA = Home Owners' Association

CVWD just completed Phase 1 of the Mid-Valley Pipeline Project, a $75 million non-potable pipeline distribution system that will expand its recycled water/Colorado River water distribution system to serve approximately 50 golf courses that currently use groundwater. The Mid-Valley Pipeline will deliver Coachella Canal water and recycled water to the expanded recycled water system as a secondary source of supply. This project will help maximize the use of recycled water and will reduce groundwater pumping by as much as 50,000 AFY. Desert Water Agency operates a recycling program using sewer effluent from the City of Palm Springs. IWA recently identified secondary wastewater from VSD's wastewater treatment plant as an undeveloped resource and has partnered with VSD to design tertiary treatment to meet Title 22 requirements. The Coachella Sanitary District, managed by the City of Coachella, operates a 2.4 mgd secondary treatment wastewater facility and has plans to expand the treatment plant to include a recycled water system in the future.

2.2.5 Water Conservation

All five water purveyors within the Coachella Valley recognize that water is a limited resource and that water conservation and use efficiency should be actively pursued. Each agency implements a variety of irrigation and/or domestic water conservation measures, including model landscape ordinances, buried agricultural irrigation distribution pipelines, water-efficient irrigation controls, water efficient plumbing, water-wise landscaping programs, conservation outreach and education, conservation pricing of water rates, and water audits (CVWD 2005 UWMP; DWA 2005 UWMP; IWA 2010, UWMP; MSWD 2005 UWMP). The Valley's water conservation efforts are anticipated to reduce overall water demand by 20 percent by 2020, as mandated by the State.

CWA

On November 2, 2000, the City of Coachella became signatory to the Urban Water Conservation MOU with the California Urban Water Conservation Council (CUWCC). CWA currently implements the following water conservation programs: residential water audits (in partnership with Coachella Valley Resources Agency), residential plumbing retrofits, large landscape conservation incentives, outreach and education, and a model landscape ordinance.

The City also promotes water conservation and other resources in coordination with CVWD, Imperial Irrigation District (IID), and other energy utilities. The City distributes public information through bill inserts, brochures, and community events.

CVWD

Although CVWD is not currently a signatory to the CUWCC MOU, the District has had a water conservation program since the 1960s. Conservation is a key element of CVWD's 2002 Coachella Valley Water Management Plan (CVWMP). CVWD recognizes the importance of conserving water in order to reduce pressure on the groundwater supply. Water conservation programs currently in place include the Model Landscape Ordinance, the Lush and Efficient Landscape Gardening Guide, landscape plan checking, tiered water rates, water wise landscape workshops and seminars, and water wise landscape rebate programs.

Several water conservation and management activities are also incorporated into CVWD's agricultural irrigation distribution system. CVWD's irrigation distribution system was built to include conservation measures unheard of in the 1940s. Unique to that initial system was a pipeline distribution system, a pipeline drainage system, and metered deliveries to every farm. Currently, CVWD has an agricultural conservation program in its CVWMP.

IWA

The City of Indio is a signatory to the CUWCC MOU. Water conservation programs, which address most of the CUWCC BMPs, include a Landscaping and Water Conservation Ordinance, a Water Conservation Master Plan that addresses SBx7-7, a water smart landscaping rebate program, landscape audits, tracking of water wasters, education and outreach programs to schools, smart controller rebate program, and a residential plumbing retrofit program. Since the water smart landscaping rebate program was implemented in July 2008, IWA has converted a total of 80,000 square feet of turf to water-efficient landscape and has issued a total of $57,000 in rebates (IWA 2010).

DWA

DWA is a signatory to the CUWCC MOU. The Agency's signed MOU is dated October 15, 1991. As a member of the CUWCC, DWA has complied with all BMP Targets outlined in the MOU that have been determined appropriate for the conditions within its service area (DWA UWMP 2005). Water conservation programs currently underway by DWA include landscape water audits, trainings and audits for homeowners associations (which are large water users), smart irrigation controller cost-share program, water wise tips and tools, and a hospitality conservation program.

MSWD

MSWD recognizes water use efficiency as an integral component of current and future water strategy for the service area. Although the District is not a signatory to the CUWCC MOU, MSWD has made State-mandated BMPs the cornerstone of its 2004 Water Conservation Master Plan and a key element in the overall regional water resource management strategy for the region. The Water Conservation Master Plan defines a series of sensible water conservation activities that complement the unique water resource characteristics of the District's service area (MSWD 2005). MSWD is currently implementing the following water conservation program elements: Water Efficient Landscape Guidelines, water wise tips and tools, and outreach and education.

2.2.6 Agricultural Water

The majority of agricultural land within the Coachella Valley is irrigated with water that originates from the Colorado River; some irrigation water is pumped from local groundwater. The water originating from the Colorado River is diverted from the river at the Imperial Dam, which is owned by the U.S. Bureau of Reclamation (USBR) and operated by IID. After the water is diverted from the Colorado River, it flows 159 miles through the All-American and Coachella Canals before it reaches Lake Cahuilla, an operational storage reservoir. The Coachella Canal and Lake Cahuilla are maintained by CVWD. CVWD is responsible for distributing the water to farmers within the Improvement District No. 1 boundary through an underground pipeline system that reaches every 40-acre agricultural parcel.

Typical methods of irrigation in the Coachella Valley include: furrow irrigation, border strip irrigation, micro-sprinkler irrigation, drip irrigation, and sprinkler irrigation. Irrigation methods are usually chosen based on crop type or performance objectives, but more than 60 percent of area farms use water efficient drip or other micro-irrigation techniques.

Desalinated Water

Desalination processes are being developed for reuse of agricultural drainage flows in Coachella Valley. The Coachella Valley has a large network of drains and open channels that transport irrigation drainage flows and stormwater. In the agricultural area of the East Valley, a high perched groundwater table and concentration of salts in irrigated soils makes this system a requirement. CVWD operates and maintains the drainage system consisting of 166 miles of buried pipe and 21 miles of open channels. The system receives flows from on-farm drainage lines. In most areas the drainage system flows to the CVSC. In areas near the Salton Sea some open channels flow directly into the sea. The Salton Sea serves as a drainage reservoir for irrigation return water and stormwater from the Coachella Valley, Imperial Valley, Borrego Valley and Mexicali Valley (Mexico).

CVWD plans to begin desalting agricultural drainage to a quality equivalent to Canal water and delivering it for irrigation use by 2023 (CVWD 2005 UWMP). In 1997, CVWD filed an application with the State Water Resources Control Board to appropriate all waters in the CVSC. The application was submitted with the intent to protect local water resources. The submittal required that initial diversions must take place by 2013, building up to full diversion in 2063. The CVWMP (CVWD 2002) envisions that the submitted project will be able to divert and filter approximately 13.6 mgd of drain water prior to desalination. This will allow 11,000 AFY of agricultural drain water to be desalted to a quality equivalent to Canal water and delivered for irrigation use. The desalination facility would have a 10 mgd capacity that will produce about 7.5 mgd of product water. Approximately 3.5 mgd of the flow would be bypassed and blended with the product water to produce the desired quality. Because the CVSC contains water of wastewater origin, this supply is not suitable for potable uses even if treated. Therefore, the water will most likely be delivered where the downstream demand is for agricultural irrigation. Since this water is nonfederal, it is not subject to the contractual restrictions regarding use of Canal water within CVWD's Improvement District-1 (ID-1) service area (see **Figure 2-6**). The District anticipates that an equal amount of Canal water can be delivered to golf courses or the portion of the Oasis system outside ID-1. No specific location for the plant has been identified to date.

The treatment process would produce about 2.6 mgd of filter backwash and brine waste. Preliminary studies have considered both on-site and off-site evaporation ponds for brine disposal. On-site evaporation ponds would require about 530 acres of surface area due to the relatively low total dissolved solids (TDS) of the brine. Alternatively, the brine could be conveyed to the Salton Sea either in the CVSC or a parallel brine outfall. Evaporation ponds located near the sea could remove an equivalent amount of salt by evaporating Salton Sea water. CVWD is currently conducting a pilot treatment study to evaluate the feasibility of various desalination processes.

2.2.7 Stormwater and Flood Management

The mean seasonal precipitation in the Coachella Valley IRWM region averages approximately 3 inches per year. The region is subject to general storms from coastal regions that result in heavy precipitation over large areas and can last several days. The region is also subject to local thunderstorms that cover smaller areas and result in high-intensity precipitation of short duration.

Riverside County Flood Control and Water Conservation District (RCFCWCD) and CVWD are the Region's flood control districts (see **Figure 2-7**). They operate and maintain a series of regional flood control facilities throughout the Valley. These facilities carry mountain and surface runoff to the Salton Sea. Local cities and the County of Riverside manage localized urban drainage systems that drain to these facilities. The back bone of this system is the Region's 49-mile Whitewater River/Coachella Valley Stormwater Channel. West of Washington Street, it is a naturally occurring wash, which has been improved to carry storm flows and is called the Whitewater River Stormwater Channel (WRSC); east of Washington Street, it's called the Coachella Valley Stormwater Channel (CVSC).

Septic to Sewer Conversion Projects in the IRWM Plan

Figure 2-5

Legend

- Proposed Septic to Sewer Projects
- Colorado River Aqueduct
- Coachella and All American Canals
- Whitewater River Stormwater Channel
- Interstate Hwys.
- Lakes
- Coachella Valley IRWM Region
- Coachella Sanitary District
- Colorado River Funding Area
- County Lines
- City of Palm Springs
- Coachella Valley Water District
- Desert Water Agency
- Mission Springs Sanitation District
- Valley Sanitary District

This figure contains submitted septic-to-sewer conversion projects for the Coachella Valley IRWM Plan as of September 30, 2010.

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Miles

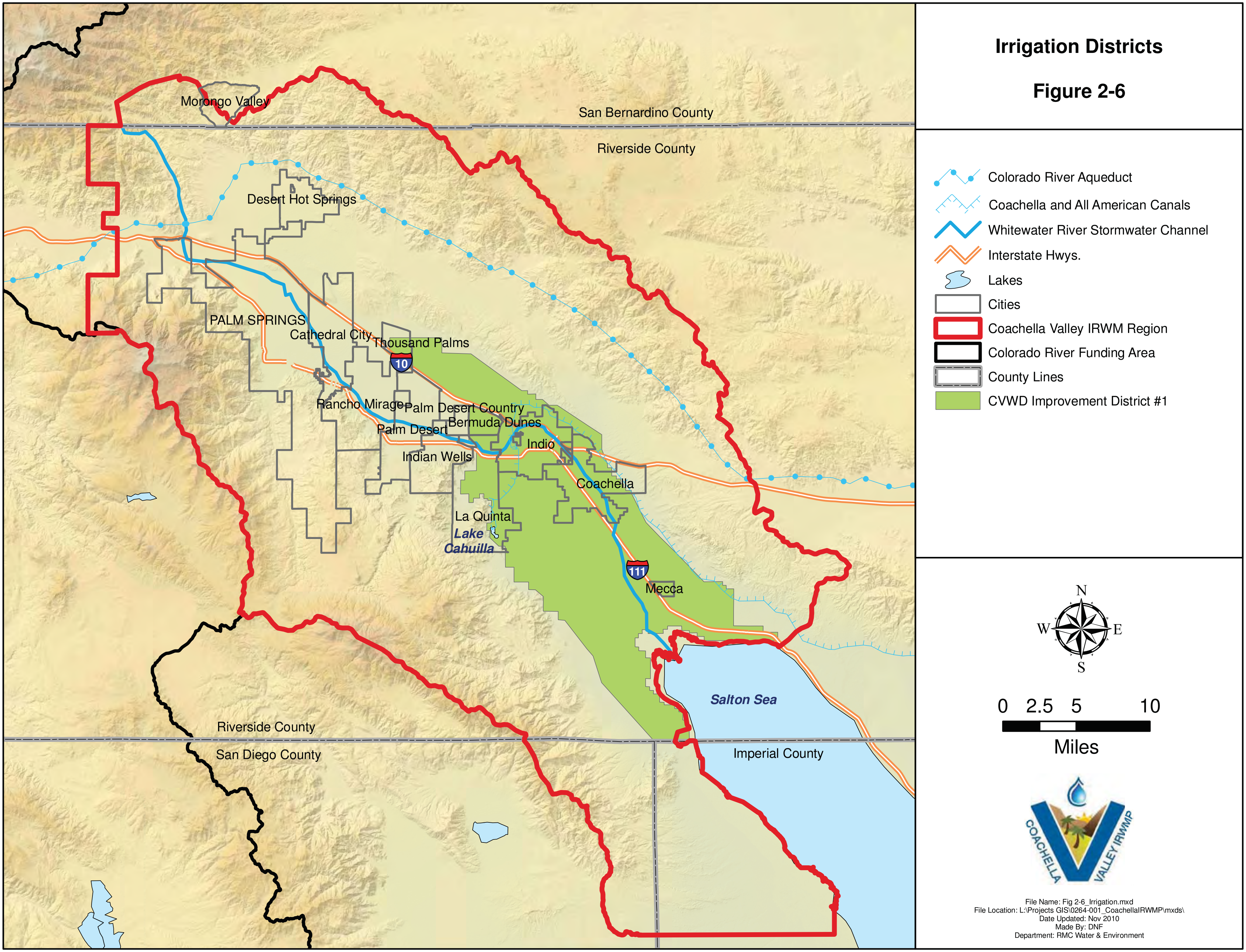
COACHELLA VALLEY IRWMP

File Name: Fig 2-5 SeptictoSewer.mxd
File Location: L:\Projects GIS\0264-001_CoachellaIRWMP\mxds\
Date Updated: November 2010
Made By: GS
Department: RMC Water & Environment

L:\Projects GIS\0264-001_CoachellaIRWMP\mxds\Fig 2-5 Septic to Sewer_112910 JD.mxd

Irrigation Districts

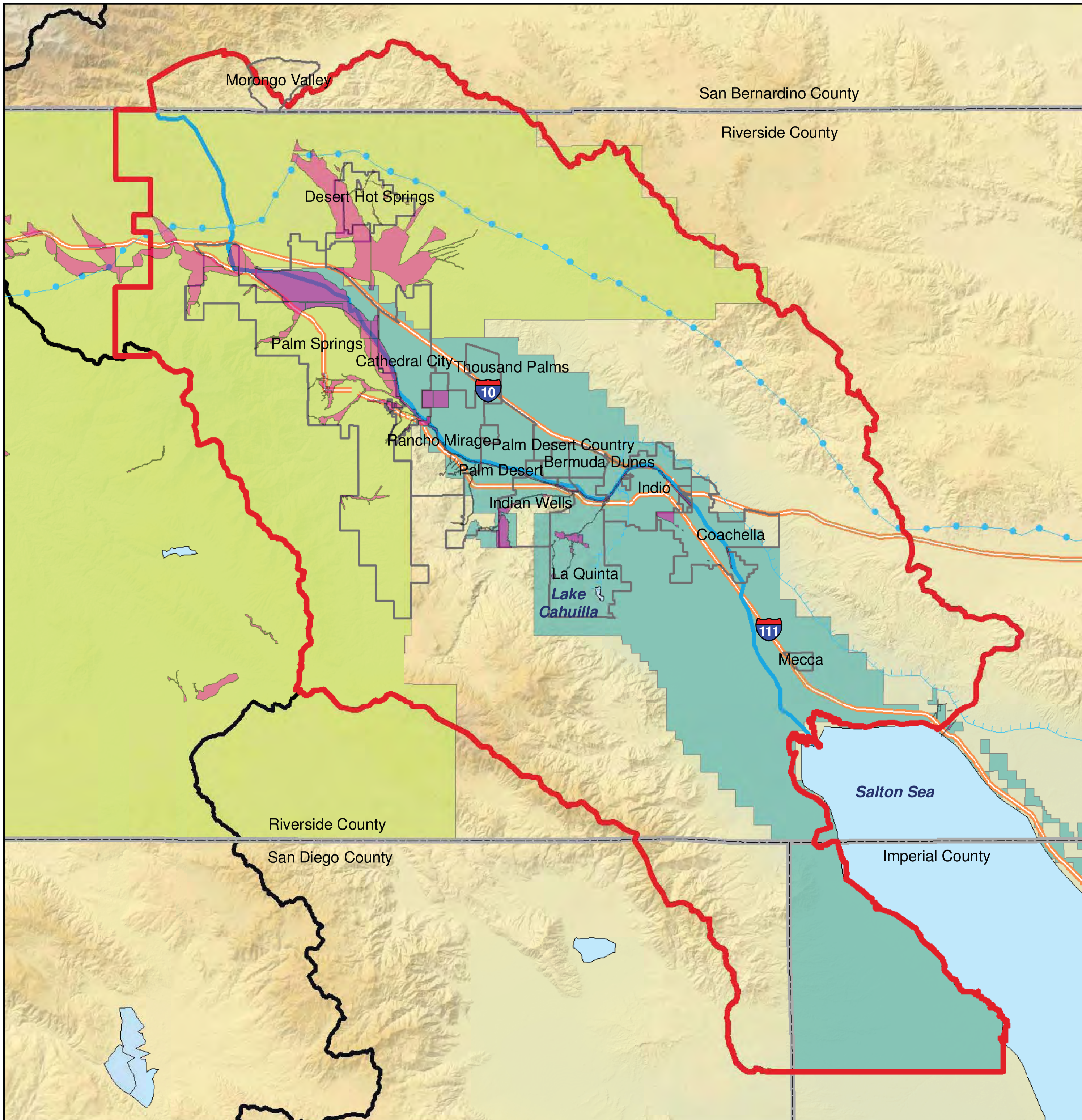
Figure 2-6



File Name: Fig 2-6_Irrigation.mxd
File Location: L:\Projects GIS\0264-001_CoachellaIRWMP\mxds\
Date Updated: Nov 2010
Made By: DNF
Department: RMC Water & Environment

Stormwater Management

Figure 2-7



- Colorado River Aqueduct
- Coachella and All American Canals
- Whitewater River Stormwater Channel
- Interstate Hwys.
- Lakes
- FEMA High Risk Flood Zone
- City
- Coachella Valley IRWM Region
- Colorado River Funding Area
- County Lines
- Coachella Valley Water District
- Riverside County Flood Control and Water Conservation District

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File Name: Fig 2-7_Stormwater Management.mxd
File Location: L:\Projects GIS\0264-001_CoachellaIRWMP\mxds\
Date Updated: Nov 2010
Made By: DNF
Department: RMC Water & Environment

Stormwater Channels

CVWD's and RCFCWCD's regional flood control systems consist of a series of debris basins, levees, and stormwater channels that divert floodwaters from the mountains and alluvial fans surrounding the Coachella Valley to the WRSC. The WRSC is the backbone of the Region's flood control system. The channel is designed according to the Standard Project Flood measurement of 85,000 cubic feet per second. Local cities and the County divert runoff from storm events to the WRSC. Each city in the Valley provides local drainage control via a system of storm drains, retention basins and dry wells, some of which discharge to CVWD's regional flood control system. Three wastewater treatment plants (VSD, Coachella, and WRP-4) also discharge effluent to the WRSC.

Flash Flooding Results in Property Damage

The WRSC is both naturally-occurring and engineered. It originates on the slopes of the San Bernardino Mountains and flows generally southeast through the region to the Salton Sea. Downstream of the Indian Wells/La Quinta boundary, the channel was constructed and later improved to convey storm flows to approximately Avenue 52 in Coachella. From Avenue 52 to the Salton Sea, the channel lacks bank stabilization and is in a levee condition meaning that the estimated surface elevation of Standard Project Flood is higher than the elevation of adjacent properties.

CVWD's flood control systems consist of a series of debris basins, levees, and 16 stormwater channels that divert floodwaters from the canyons and alluvial fans surrounding the Coachella Valley to the WRSC. Many of these structures were built or restructured in the 1970s in cooperation with cities and other agencies following severe floods. Coachella provides local drainage control via a system of storm drains, retention basins and dry wells, some of which discharge to CVWD's regional flood control system. City of Indio/IWA local drainage control is via a system of storm drains, retention basins, and dry wells.

Localized Flood Hazards

The local area is subject to alluvial-fan flash flooding from the surrounding mountain ranges and severe flooding has been frequently recorded beginning as early as 1825. In the late 70's, severe flood damage occurred to homes and businesses in several of the region's cities. As a result, flood control infrastructure was constructed in the early 1980's with the help of U.S. Army Corps of Engineers (USACE) and local funding. The WRSC and its tributary channels protect the Valley cities from Palm Springs to Coachella from flooding. However, there are still several areas of the Coachella Valley IRWM region that lack flood control facilities and are vulnerable to devastating alluvial and riverine flooding. These areas include the following:

- Areas adjacent to Mission Creek in the Desert Hot Springs area
- Sky Valley and Indio Hills
- Thousand Palms

- Portions of Indio north of Interstate 10
- The Oasis community extending from Avenue 66 to Avenue 86
- Areas adjacent to the CVSC south of Avenue 52
- Highway 111 between Palm Springs and Cathedral City
- Valley roadways that cross the Whitewater River

USACE's Thousand Palms Flood Control Project proposes a system of levees to go east from Rio del Sol Road to Washington Street. A plan to control flooding in the East Valley is a priority, as the South Valley Implementation Plan has been abandoned.

A wide range of regional flood control improvements, including dams, debris basins, and concrete-lined channels, have been constructed throughout the Coachella Valley in an effort to protect life and property from flooding hazards, particularly the 100-year flood. Smaller-scale improvements have been constructed to protect specific neighborhoods and communities from flood flows and to convey mountain runoff to the Whitewater River.

The current lack of flood control in the East Valley prevents higher-density housing from being developed. In the City of Desert Hot Springs, alluvial flooding issues coupled with MSHCP requirements make development very difficult. As there appears to be a relationship between flood control and the ability to accommodate housing growth, the need for affordable housing may help drive flood control projects.

2.2.8 Natural Communities and Habitats

The Coachella Valley contains 27 species of plants and animals that are threatened or facing extinction, including the Desert tortoise, Burrowing owl, and Palm Springs pocket mouse. The San Andreas Fault zone has created a unique corridor of desert fan palm oases stretching along the southern side of the Indio Hills where water is forced to or near the surface by the damming action of the fault. Mesquite hummocks and mesquite bosques are also associated with the fault in some areas (MSHCP 2007). **Figure 2-8** provides mapping of the natural communities located within the Coachella Valley IRWM region, including semi-desert chaparral, Sonoran creosote bush scrub, Upper Sonoran mixed chaparral, ephemeral sand fields, and Chamise chaparral.

Habitat Conservation

The Coachella Valley Multiple Species Habitat Conservation Plan (CVMSHCP) is a regional conservation plan that aims at protecting 240,000 acres of open space and 27 species, ensuring the survival of endangered species, and enhancing regional infrastructure without causing environmental conflicts. The CVMSHCP addresses issues regarding water needs for habitat preservation. Specifically, the CVMSHCP attempts to avoid groundwater draw down, which can potentially impact the ability of certain plants to hold and release sand.

In terms of regional water demand, ecological and habitat preservation constitutes a relatively small amount of demand. Despite this fact, many of the agencies involved in the IRWM Plan have addressed this demand by becoming or applying to become signatories to the CVMSHCP. Current signatories include the City of Indio (IWA), CVWD, City of Coachella (CWA), County of Riverside, Cathedral City, Indian Wells, La Quinta, Palm Desert, Palm Springs, Rancho Mirage, and Imperial Irrigation District. MSWD and the City of Desert Hot Springs have applied to be signatories.

The CVMSHCP reports that the largest threat to desert-floor biological resources is constant urban and resort development. The protection of wildlife water sources will be essential to freshwater-wetland, riparian and marsh habitat survival. **Figure 2-9** provides an overview of the CVMSHCP conservation areas. Below is a summary of conservation objectives in regards to the preservation of their water sources:

- **Whitewater Floodplain Conservation Area:** Conserve at least 435 acres in the fluvial (water-borne) sand transport area in the Riverside County portion of the area; maintain the current capacity for fluvial sand transport in the Whitewater River; and conserve at least 107 acres of existing Sonoran cottonwood-will riparian forest natural community, which provides habitat for riparian birds and other covered species.
- **Snow Creek/Windy Point Conservation Area:** Conserve at least 838 acres of the fluvial and aeolian sand transport in the City of Palm Springs and at least 1,482 acres in the unincorporated portion of the area; maintain the current capacity for fluvial sand transport in San Gorgonio River floodplain; and conserve the Whitewater Floodplain Biological Corridor.
- **Stubbe and Cottonwood Canyons Conservation Areas**: Conserve at least 1,129 acres in the fluvial (water-borne) sand transport area; maintain the current capacity for fluvial sand transport in Stubbe Canyon Wash; and conserve at least 25 acres of Sonoran cottonwood-willow riparian forest and natural community.

2.3 Internal Boundaries

This section contains a description of internal boundaries within the Region.

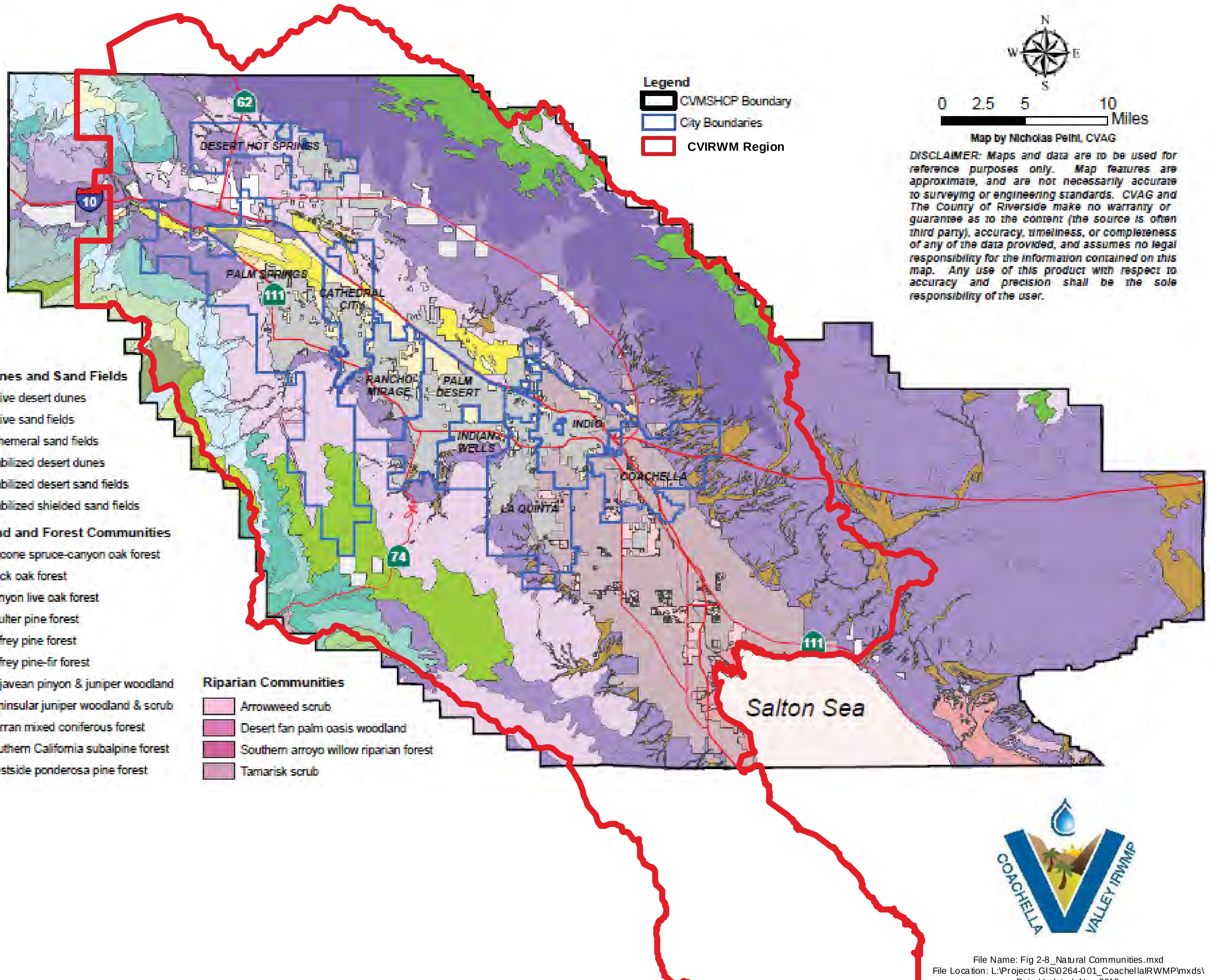
Jurisdictional boundaries of the Coachella Valley IRWM region include the nine Coachella Valley cities, the service areas of the five CVRWMG partners, and eleven Coachella Valley Community Councils. In addition to the information within this section, further information regarding internal boundaries can be found as follows: Figure 1-2 shows boundaries of the CVRWMG water purveyors; Figure 2-4 shows the boundaries of the local sanitation districts; Figure 2-5 shows the boundaries of CVWD's irrigation district; and Figure 2-7 shows the location of stormwater management and flood districts.

2.3.1 Land Use Agencies

There are a predicted 477,900 residents in Coachella Valley in 2010 (CVAG 2008). About 75 percent of Valley residents lived in one of the nine incorporated cities, while the other 25 percent lived in unincorporated portions of the Valley. Palm Springs is the largest city with respect to land area, while Indio is the most populated of the Coachella Valley cities with a population of nearly 78,000 residents. The other seven incorporated cities include Cathedral City, Coachella, Desert Hot Springs, Indian Wells, La Quinta, Palm Desert, and Rancho Mirage (see **Figure 2-10** and **Table 2-6**). Please note that the 2010 population estimate given by CVAG for the Coachella Valley includes unincorporated areas within the CVAG jurisdiction, but not within the Coachella Valley IRWM Region; these population additions are likely minimal.

Natural Communities

Figure 2-8



Legend

- CVMSHCP Boundary
- City Boundaries
- CVIRWM Region

N W E S

0 2.5 5 10 Miles

Map by Nicholas Pelhl, CVAG

DISCLAIMER: Maps and data are to be used for reference purposes only. Map features are approximate, and are not necessarily accurate to surveying or engineering standards. CVAG and The County of Riverside make no warranty or guarantee as to the content (the source is often third party), accuracy, timeliness, or completeness of any of the data provided, and assumes no legal responsibility for the information contained on this map. Any use of this product with respect to accuracy and precision shall be the sole responsibility of the user.

Chaparral Communities
- Chamise chaparral
- Interior live oak chaparral
- Mixed montane chaparral
- Northern mixed chaparral
- Red shank chaparral
- Scrub oak chaparral
- Semi-desert chaparral
- Upper Sonoran manzanita chaparral
- Upper Sonoran mixed chaparral

Desert Alkali Scrub Communities
- Desert saltbush scrub
- Desert sink scrub

Desert Scrub Communities
- Blackbrush scrub
- Mojave mixed steppe
- Mojave mixed woody scrub
- Riversidean desert scrub
- Sonoran creosote bush scrub
- Sonoran mixed woody and succulent scrub

Developed Areas
- Agriculture
- Lake
- Landfill
- Quarry
- Reservoir
- Rural
- Urban
- Wind energy

Dry Wash Woodland and Mesquiite Communities
- Desert dry wash woodland
- Mesquite bosque
- Mesquite hummocks

Marsh Communities
- Cismontane alkali marsh
- Coastal and valley freshwater marsh

Sand Dunes and Sand Fields
- Active desert dunes
- Active sand fields
- Ephemeral sand fields
- Stabilized desert dunes
- Stabilized desert sand fields
- Stabilized shielded sand fields

Woodland and Forest Communities
- Bigcone spruce-canyon oak forest
- Black oak forest
- Canyon live oak forest
- Coulter pine forest
- Jeffrey pine forest
- Jeffrey pine-fir forest
- Mojavean pinyon & juniper woodland
- Peninsular juniper woodland & scrub
- Sierran mixed coniferous forest
- Southern California subalpine forest
- Westside ponderosa pine forest

Riparian Communities
- Arrowweed scrub
- Desert fan palm oasis woodland
- Southern arroyo willow riparian forest
- Tamarisk scrub

COACHELLA VALLEY IRWMP

File Name: Fig 2-8_Natural Communities.mxd
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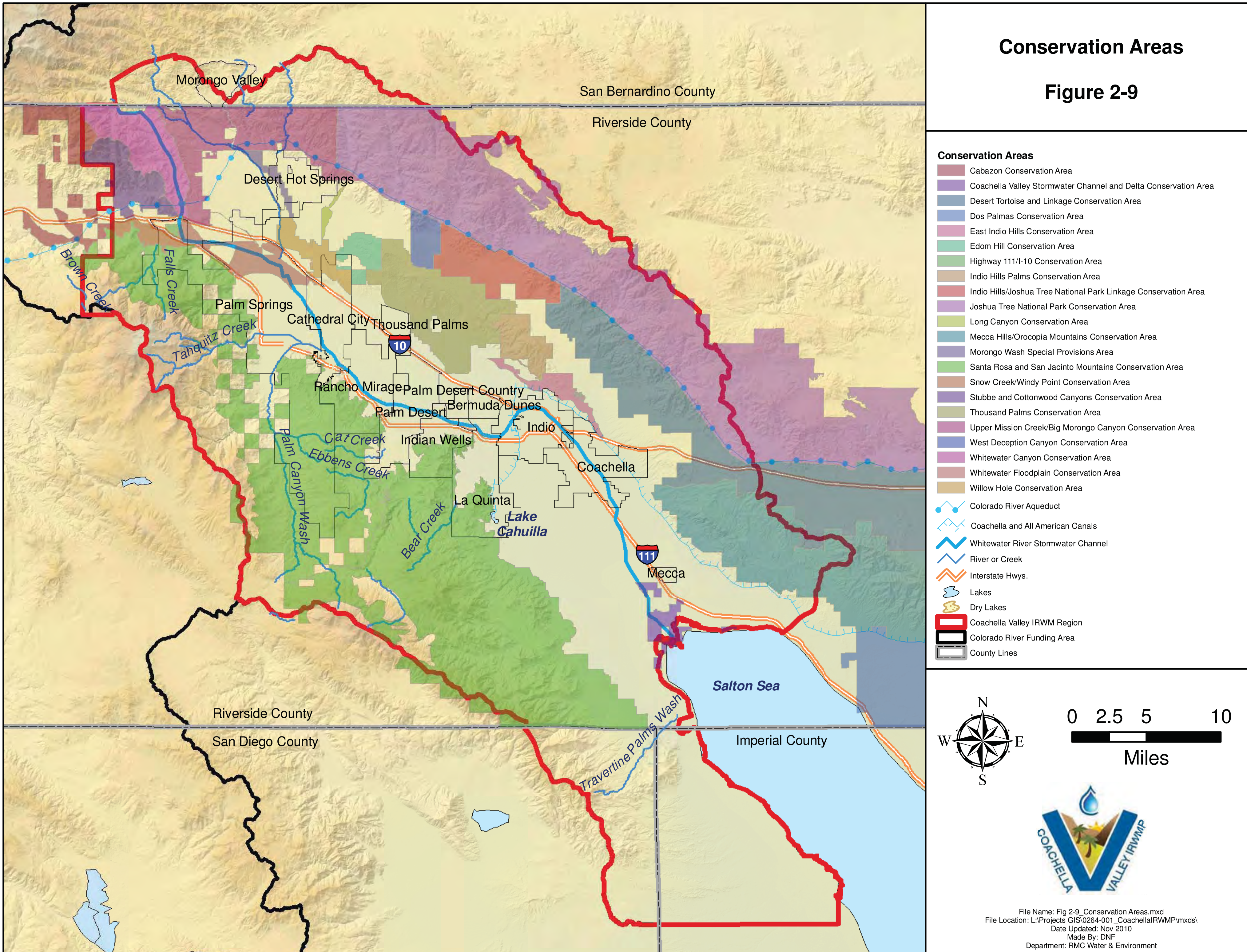
Date Updated: Nov 2010
Made By: AMH
Department: RMC Water & Environment

Conservation Areas

Figure 2-9



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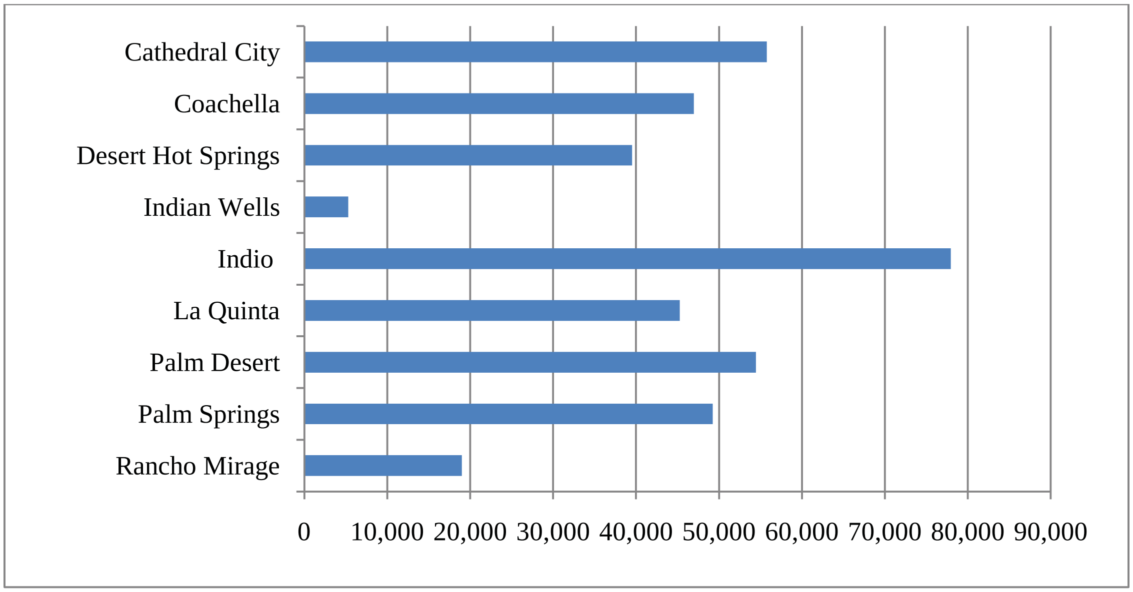
Date Updated: Nov 2010
Made By: DNF
Department: RMC Water & Environment

Table 2-6: Coachella Valley Cities

City	Population	Land Area (miles^2)
Cathedral City	55,745	21.8
Coachella	46,981	28.6
Desert Hot Springs	39,539	23.4
Indian Wells	5,309	14.6
Indio	77,967	29.1
La Quinta	45,272	35.7
Palm Desert	54,435	27.0
Palm Springs	49,239	94.4
Rancho Mirage	18,983	24.7

Sources: Coachella Valley Association of Governments 2008
http://www.cvag.org/CVAG%20Demographics/CVAGProfile.pdf
http://www.cvag.org/CVAG_Demographics.htm

Figure 2-10: Population of Coachella Valley Cities



Eleven community councils are represented within the Coachella Valley. Community councils represent smaller groups of individuals that share a common geographic location (smaller than city councils). Community councils typically agree upon common values and create a tighter social cohesion through collective issues and concerns. Community councils are located within unincorporated Riverside County land, and are therefore advisory to the County Board of Supervisors for the district within which they are located. Below is a list of the Coachella Valley Community Councils:

- Bermuda Dunes Community Council
- Desert Edge Community Council

- Desert Palms Community Council
- Indio Hills Community Council
- Mecca Community Council
- North Shore Community Council
- Oasis Community Council
- Sky Valley Community Council
- Thermal Community Council
- Thousand Palms Community Council
- Vista Santa Rosa Community Council

The central Coachella Valley has experienced major changes in land use, predominantly the conversion from prime farmland to urban or other land forms. Farmland has vastly been transformed since the 1980s to developed, metropolitan areas. The region has been among the top urbanizing counties in California since 1984 when mapping of the region started (California Department of Conservation, 2010). Over 13,500 acres were removed from prime farmlands and urban land has increased by just less than 16,000 acres during this timeframe.

2.4 Water Supplies and Demand

This section describes the water supply and demand projections for at least a 20-year planning horizon.

2.4.1 Water Supply

Each water agency in the region has different supply availability depending on various factors such as water source type or distribution systems. The following table shows the projected supply condition of each service agency under normal water year conditions from 2010-2030.

Table 2-7: Total Projected Water Supply

	Water Supply (AFY)				
Agency	**2010**	**2015**	**2020**	**2025**	**2030**
CVWD[1]	513,800	568,800	607,300	634,900	658,000
DWA[2]	56,500	57,530	58,950	60,280	61,600
MSWD[3]	40,000	42,000	45,350	46,070	46,720
CWA[4]	34,800	54,200	59,200	62,000	65,800
IWA[5]	24,900	41,700	45,800	46,500	46,500
Total	670,000	764,230	816,600	849,750	878,620

[1] CVWD 2005 Urban Water Management Plan, p.3-40.
[2] DWA College Park Specific Plan/Water Supply Assessment
[3] MSWD 2005 Urban Water Management Plan, p. 4-10.
[4] CWA 2005 Urban Water Management Plan, p. 3-5.
[5] IWA 2010 Urban Water Management Plan

2.4.2 Water Demand

The Coachella Valley is expected to continue to experience substantial population growth. Projections produced by the Coachella Valley Association of Governments (CVAG) and the Southern California Association of Governments (SCAG) indicate that by year 2020, the Valley's population, including outlying unincorporated areas is expected to grow to approximately 676,700 permanent residents (CVAG 2008). The projected average annual growth rate between 2000 and 2020 is nearly 2.0 percent, with the most rapid growth expected to take place in the East Valley (CVAG 2009). Continued growth in seasonal residences is also likely. Coachella Valley's population is projected to increase from 285,000 in 2000 to 414,000 in 2020, and to 529,000 in 2035, a growth of 31 percent and 46 percent, respectively. Growth will be more rapid in the East Valley, where population is projected to nearly double by 2035. Population growth in the West Valley is expected to be 76 percent.

Total water demand for the Region is projected to increase by 44% from 533,250 AFY in 2005 to 817,938 AFY in 2030 (see **Table 2-8** and **Figure 2-11**). Over half of the demand in the Region is attributed to non-potable uses – including agricultural and landscape irrigation – in the East Valley (see **Table 2-9** and **Figure 2-12**). Increases in potable water demand are mainly attributed to residential growth. A breakdown of water demand by agency is shown in **Figure 2-11**.

Demands for water in the Coachella Valley are divided between urban uses and agricultural uses. Urban demands are expected to increase at a faster rate than agricultural demands primarily due to population growth. Urban uses include domestic, industrial and golf course use whereas agricultural use includes crop irrigation, fish farming, greenhouses, and farming processes that require water. Urban uses represent about 476,764 AFY (58 %) of the future demand while agricultural uses represent the remaining 345,243 AFY (42 %) (CVWD 2005).

Table 2-8: Total Projected Water Demand with Conservation[1]

	Water Usage (AFY)					
Agency	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**
CVWD[2]	452,366	518,381	570,504	588,728	625,567	644,288
DWA[3]	45,400	50,550	55,350	59,482	65,782	69,782
MSWD[4]	9,194	14,400	19,800	22,500	25,200	27,900
CWA[5]	5,698	10,921	16,145	21,368	26,591	31,814
IWA[6]	20,592	23,432	27,954	34,141	39,394	44,154
Total	**533,250**	**617,684**	**689,753**	**726,219**	**782,534**	**817,938**

[1] Projections are for a normal water year and include water losses and recycled water use.
[2] CVWD 2005 UWMP
[3] DWA 2005 UWMP and DWA College Park Specific Plan/Water Supply Assessment
[4] MSWD 2005 UWMP
[5] CWA 2005 UWMP
[6] IWA 2010 UWMP

Figure 2-11: Total Projected Water Demand with Conservation

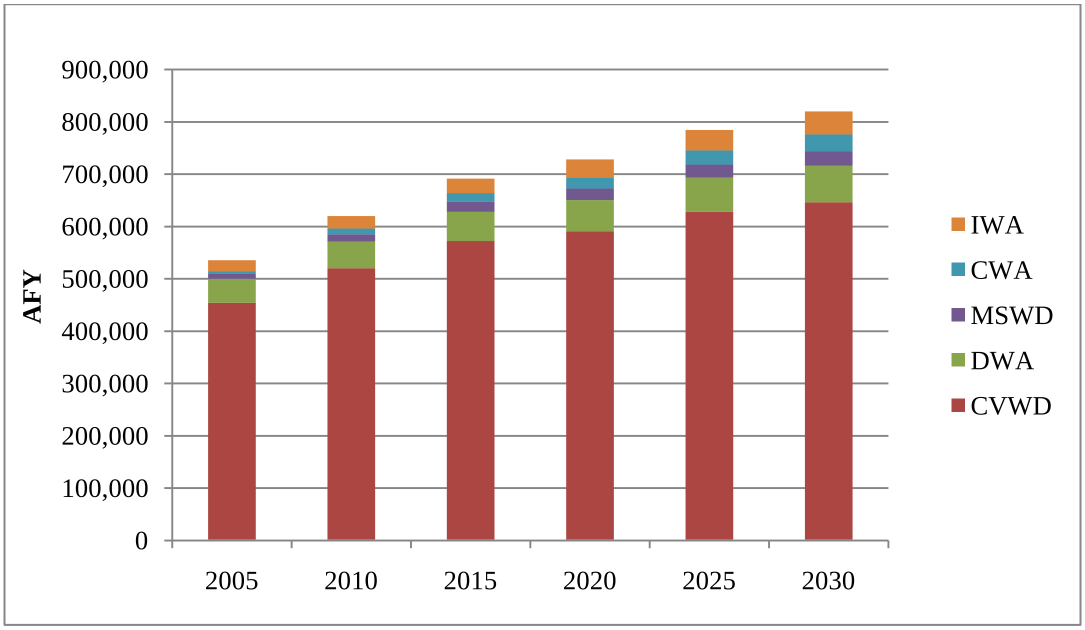
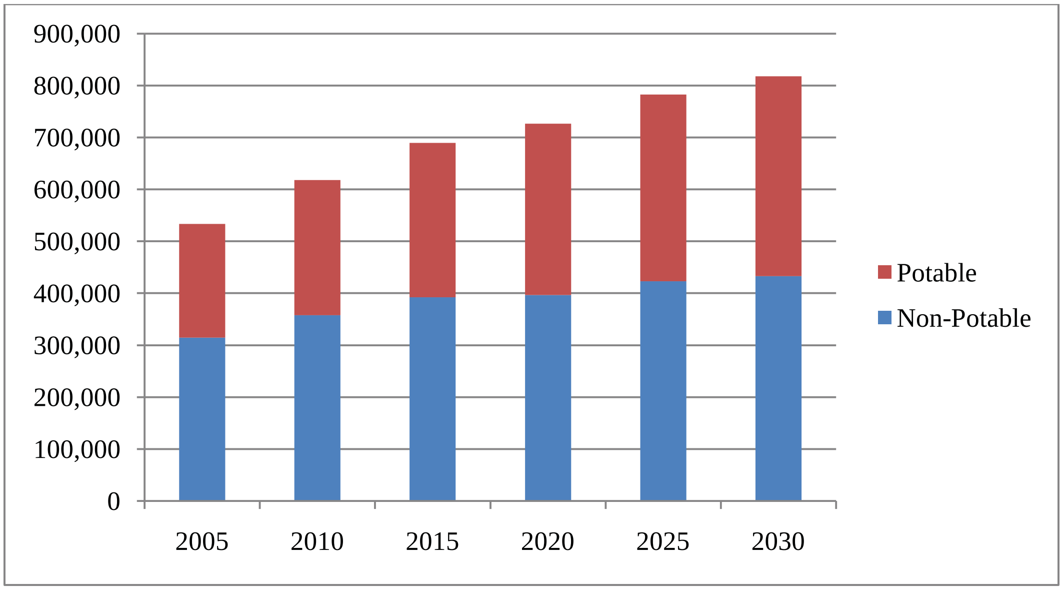


Table 2-9: Total Projected Non-Potable Water Demand with Conservation[1]

	Water Usage (AFY)					
Agency	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**
CVWD[2]	310,000	350,700	381,100	381,700	404,700	413,200
DWA[3]	2,850	4,500	6,100	6,100	8,400	8,400
MSWD[4]	0	0	2,000	5,350	6,070	6,720
CWA[5]	283	543	802	1,062	1,321	1,581
IWA[6]	1,221	2,045	2,332	2,680	2,921	3,116
Total	**314,354**	**357,788**	**392,334**	**396,892**	**423,412**	**433,017**

[1] Projections are for a normal water year and include water losses and recycled water use.
[2] CVWD 2005 UWMP
[3] DWA 2005 UWMP and DWA College Park Specific Plan/Water Supply Assessment. Assumes total projected non-potable water demand to be the same as recycled water demand.
[4] MSWD 2005 UWMP. Assumes total projected non-potable water demand to be the same as recycled water demand.
[5] CWA 2005 UWMP. Assumes total projected non-potable water demand to be the same as recycled water demand.
[6] IWA 2010 UWMP. Assumes total projected non-potable water demand to be the same as recycled water demand.

Figure 2-12: Projected Potable vs. Non-Potable Water Demand



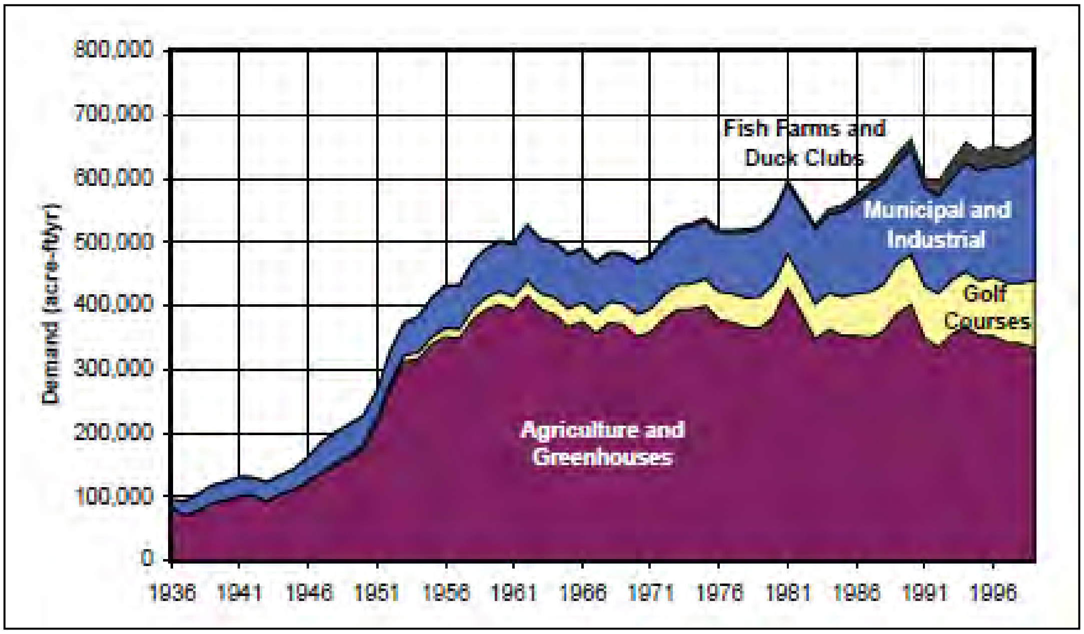
Note that this analysis was prepared during the height of an economic boom and does not reflect the recent downturn in housing and other development trends. In order to get a more realistic projection of future demands, it will be necessary to reassess current growth trends in the Region. Regardless of the current trends, it is essential for agencies to proactively update their water management plans and ensure supply for future development.IWA has completed and adopted its 2010 Urban Water Management Plan (UWMP), and the other four water agencies will be preparing 2010 updates to their UWMPs to take their local development plans into account.

Trends

In 1936, water demand for the Valley was approximately 96,300 AFY. Between 1936 to the early 1960s, agricultural demand rose significantly due to the water availability provided by the establishment of the All-American Canal. Since then, water demand has been reduced through the implementation of better irrigation management and efficiency. In 1936, agricultural water demand accounted for 87% of total demand; currently, that demand has decreased to 54% (CVWD 2005). By 1999, Coachella Valley demands were approximately 668,900 AFY. Total agricultural water demand in 1999 was 358,700 AFY (54%) and 310,200 AFY for urban demand (46%). This represents a nearly seven-fold increase in demand during this 64-year period (see **Figure 2-13**). **Figure 2-13** shows that agricultural water demand varies considerably on an annual basis. Agricultural water demand is dependent on many factors, including the number of acres farmed, the type of crops planted, local climatic conditions, and agricultural water use efficiency measures used. Most of Coachella Valley's agricultural activities occur in the East Valley.

Urban water demand historically serviced domestic and industrial building, services, and needs. In 1936, the total Coachella Valley urban demand was 12,200 AFY; in 1999 this value rose to 310,200 AFY (CVWD UWMP 2005). Urban demand has jumped from 13% in 1936 to 46% in 1999. The higher demands can be attributed to the amplified development of residential neighborhoods, hotels, golf course, resorts and country clubs.

Figure 2-13: Total Historical Water Demands by Type of Use in CVWD



Source: CVWMP 2002

2.5 Water Quality

This section describes the current and future (or proposed) water quality conditions in the Region.

This section discusses current water quality conditions within the Region. For information regarding future or proposed water quality conditions, as well as water quality protection and improvement needs, refer to *Chapter 3*, *Issues and Needs*, *Section 3.1.5 Water Quality*. Note that the quality of local water supplies will vary depending on the water source.

Water quality objectives for the Coachella Valley are established within the Water Quality Control Plan for the Colorado River Basin Region 7 (Basin Plan) (Colorado River RWQCB 2006). The Basin Plan is intended to protect surface and groundwater quality throughout the Colorado River Basin, which includes the Whitewater River watershed. Maximum containment levels (MCLs), established by the U.S. Environmental Protection Agency (USEPA) under the Safe Drinking Water Act, are the standard by which water quality is described throughout this section. MCLs are the maximum allowable concentration of contaminants in surface or groundwater to be used for drinking water supply.

2.5.1 Groundwater Quality

Groundwater supply from the CVGB is generally of high quality. In addition, disinfection is regularly provided as a precautionary measure before distribution for potable uses. However, groundwater quality issues have arisen in isolated areas throughout the Valley. Naturally occurring substances such as uranium, arsenic, and fluoride have been detected, and are likely due to natural geologic conditions. Further, some localized areas have also seen elevated nitrate levels. Representatives of DAC and tribal organizations report that groundwater supplies for some mobile home park communities within the East Valley have arsenic concentrations that exceed the MCL of 10 ppm.

Basin-wide groundwater quality is difficult to characterize as groundwater quality varies throughout the Valley. The water quality in a given well depends upon well depth (or the screened interval of the water supply well), proximity to faults, presence of surface contaminants, proximity to recharge basins, and other hydrogeologic features. **Table 2-10** provides a summary of recent groundwater quality concentrations. Water quality monitoring from CVRWMG wells shows that groundwater concentrations, most recently, from the Colorado River Aqueduct and East/West Valley groundwater do not exceed any MCL drinking water standards (see **Table 2-10**). However, as discussed above, DAC and Tribe reports suggest that arsenic levels exceed MCL drinking water standards in localized areas. As part of the *Coachella Valley IRWM Planning Grant Proposal*, CVRWMG agencies intend to complete water quality evaluations within DAC and tribal communities in order to address this issue. Perched ground water on the other hand has exceeded allowable TDS levels. However, six parameters assessed by CVWD between 1996 and 2004 had concentrations that exceeded either a primary or secondary drinking water standard at various locations. These included TDS, nitrate, sulfate, chloride, fluoride and arsenic. Most water pumping for domestic purposes has TDS concentrations of less than 300mg/L. Groundwater pumped for agricultural and domestic purposes typically contain small concentrations of silts, clays, and fine sands.

Riverside County Department of Environmental Health (DEH), State of California, and U.S. Environmental Protection Agency (USEPA) all have groundwater monitoring programs in the Region. Government and non-profit organizations that are concerned about groundwater quality include the CVRWMG, Desert Alliance for Community Empowerment (DACE), U.S. Department of Agriculture (USDA) Rural Development Office, California Department of Public Health (CDPH), Torres-Martinez Desert Cahuilla Indians, Agua Caliente Band of Cahuilla Indians, Rural Community Assistance Corporation (RCAC), Environmental Justice Coalition for Water (EJCW), Poder Popular of the Coachella Valley, California Rural Legal Assistance Inc. / Foundation (CRLA), and Pueblo Unido CDC.

Salinity

Overdraft of natural groundwater supplies has increased with increasing demand, because the extraction rates exceed recharge rates. The CVGB has been in overdraft for a significant portion of the last century (City of Palm Desert Comprehensive Plan 2004). The continued decline of groundwater levels could result in substantial degradation of water quality in the groundwater basins. The possible negative impacts of groundwater overdraft include 1) the downward flow from the degraded upper aquifers in the East Valley and, 2) the intrusion of highly saline Salton Sea water into the East Valley aquifer. In the past, the East Valley has prevented leakage of poor-quality water from the upper aquifers by maintaining an upward pressure gradient. Rather than leak into the lower aquifers, the degraded water flows into manmade drains to the Salton Sea. However, reduction of water levels in the lower aquifers could also lead to downward leakage of the low-quality, upper aquifer water and subsequent degradation of water quality.

Located south of Coachella Valley, the Salton Sea has salinity levels 25 percent higher than that of ocean water. This water is too salty to grow crops, to irrigate golf courses or lawns, or to drink. Having no outlet, Salton Sea water evaporates, leaving behind extremely concentrated salt water. Historically, groundwater pressure levels in the lower aquifers have been high enough to keep denser Salton Sea water from displacing the high-quality waters in adjacent freshwater aquifers. Continued decline of groundwater levels may cause high-quality water to be displaced by salt water. As displacement occurs, wells near the Salton Sea, and eventually large areas in the Lower Valley, may become unusable, as they pump saline water. Once saltwater intrusion occurs, it is extremely expensive, if not impossible, to remove salts from the groundwater basins. Groundwater currently accounts for about 63 percent of the Coachella Valley's total water supply. Saltwater intrusion would result in the loss of the groundwater resource which could seriously affect the Coachella Valley economy.

Table 2-10: Quality of Water Sources

Water Source	TDS (ppm)	Nitrate (ppm)	Perchlorate (ppb)	Uranium (pCi/L)	Selenium (ppb)
MCL (Drinking Water)	1,000, 1,500[1]	45	6	20	50
Coachella Canal (Colorado River)	710 – 914 (avg 761)[2]	<2[2]	<4[3]	3.5[3]	<5[3]
SWP Exchange Water (Colorado River Aqueduct)	660	NA	2	NA	NA
Groundwater Recharge (Colorado River Aqueduct Turnout – From San Jacinto Tunnel West Portal)	614 – 655 (avg 635)[5]	<2 – 2.1 (avg <2)[5]	<4[5]	3.2 – 3.5 (avg 3.3)[6]	<5[7]
Groundwater (East, West Valleys)	130 - 1200 (avg 242)[8]	<2 – 39 (avg 6.6)[8]	<4[8]	<1 – 12 (avg 3.8)[8]	<5[8]
Surface Water (Chino Canyon Creek)	148[4]	<2[4]	ND	ND	ND
Surface Water (Snow Creek)	77[4]	<2[4] (estimated)	NA	NA	NA
Surface Water (Falls Creek)	NA	NA	NA	NA	NA
Surface Water (Whitewater River – North of Colorado River Aqueduct Turnout)	231[4]	<2[4]	NA	NA	NA
Recycled Water	343 – 443 (avg 405)[2]	25.5 – 53.6 (avg 39.9)[2]	NA	NA	NA
Perched Groundwater	2,500	NA	NA	NA	NA

[1] Secondary MCL, upper and short term consumer acceptance contaminant levels
[2] CVWD data, range and average results for 2009
[3] CVWD data, May 12, 2010 result
[4] USGS data, 2009 Water Year Report, April 13, 2010 result
[5] MWD data, range and average results for 2009
[6] MWD data, range and average results for 2008
[7] MWD data, range and average results for April and October 2009
[8] CVWD data, most recent range and average results for active CVWD wells in Whitewater River Subbasin
NA: Not analyzed

Continued overdraft also increases the possibility of land subsidence within the Lower Valley. As groundwater is removed from the lower Coachella Valley groundwater aquifers, the soil begins to compress from the weight of the ground above, causing subsidence. Subsidence may cause damage to streets and highways and could result in the rupture of water mains, sewer lines and gas pipes. Building foundations might crack leading to required and costly maintenance. Structures that cover large areas or have height are especially vulnerable. Railroads, earthen dams, wastewater-treatment facilities and canals are also vulnerable to damage from subsidence. Groundwater pollution becomes a concern because surface flow and its possible contaminants – chemicals, animal waste, sediments, particulates, etc. – may have a more direct route to the aquifer without much filtration and percolation due to losses from subsidence.

2.5.2 Imported Water Quality

Although both imported water supplies (described above) come from the Colorado River, their water qualities are different. The Coachella Canal diversion is further downstream than the Colorado River Aqueduct diversion; this results in higher concentrations of TDS and other contaminants of concern. The Colorado River Aqueduct intake location at Parker Dam is upriver of the All-American Canal diversion point at Imperial Dam.

The quality of water from the SWP is generally good. Historically, TDS concentrations in MWD's Colorado River Aqueduct water have averaged approximately 660 ppm since 1973. Total hardness varies from 54 to 131 milligrams per liter (mg/L) as CaCO3. TDS and hardness are typically lower in wet years and higher in dry years. In spite of its lower mineral content, SWP water contains more total organic carbon as well as bromide, both of which are precursors for creating disinfection byproducts. Since CVWD does not take direct delivery of SWP water – rather, they receive SWP exchange water – its quality is not of current concern.

TDS concentrations of Coachella Canal water (at Avenue 52) have averaged nearly 800 ppm since 1949 (CVWD 2002 WMP). Historical water quality testing has shown low levels of perchlorate, selenium, and uranium in Colorado River supplies; however, testing results indicate that the contaminants are no longer a concern.

Concentrations of TDS and other constituents for other water sources are listed in **Table 2-10** (above). The table shows that imported water has yet to be reported above maximum containment level (MCL) objectives.

2.5.3 Surface Water Quality

Quality of the surface water supplies currently utilized by DWA is good, with only disinfection needed before distribution for potable uses. **Table 2-9** (above) provides a summary of recent surface water quality concentrations. As shown surface water concentrations have not exceeded any MCL levels. The concentrations shown for TDS and nitrates are both well within the MCLs.

The RWQCB's Surface Water Monitoring Program was developed in 1980 as an outgrowth of the State's Primary Monitoring Network. Its goal has been to characterize the water quality of the Region's surface water bodies. Quarterly sampling was conducted on major water bodies and annual sampling was conducted on other surface waters. Analyses were conducted for pH, turbidity, total dissolved solids, suspended solids, volatile suspended solids, settleable solids, phosphate, nitrate, ammonia, MBAS, BOD, COD, and fecal coliform. Field measurements were made for dissolved oxygen, temperature, pH, flow rate, and conductivity. Data from this program has been entered into the statewide database system (SWQIS) from which it is periodically entered into the federal water quality data system (STORET).

2.5.4 Recycled Water Quality

As shown in **Table 2-9** (above), the recycled water results have concluded that in some scenarios nitrate has been detected at higher concentrations than MCL standards. However studies have indicated that little nitrate moves past the root zone in well managed golf courses, which could potentially reduce recycled water users' application of nitrate-rich fertilizers.. For recycled water users, it is important to identify water quality concentrations such as boron, phosphorus, nitrogen and/or pH in order to adjust fertilization and irrigation practice accordingly (California Agricultural Water Stewardship Initiative 2010).

2.5.5 Stormwater Quality

CVSC, which drains to the Salton Sea, is listed on the RWQCB's 2006 Clean Water Act Section 303(d) List of Water Quality Limited Segments (USEPA Approval: June 28, 2007) for pathogens and toxaphene from illegal discharges and animals. The listing for pathogens only applies to a 17 mile area of the CVSC from Dillion Road to the Salton Sea. Although public access to the CVSC is prohibited, this violation of water quality standards impairs the following CVSC beneficial uses: Water Contact Recreation (REC I) and Water Non-Contact Recreation (REC II). The listing for toxaphene only applies to a 2 mile area of the CVSC from Lincoln Street to the Salton Sea.

A Total Maximum Daily Load (TMDL) was adopted by the RWQCB on May 16, 2007 for bacterial indicators in the CVSC. On June 17, 2010, the RWQCB adopted revision to the Basin Plan amendment language (Resolution No. R7-2010-0028). Specifically, the TMDL regulates discharges from the County and City of Coachella (the only MS4 permittee discharging into the impaired section of the CVSC). Agricultural discharges and CVWD participated in early implementation actions and are exempted from completing near-term actions.

Regional Stormwater Permit

The RCFCWCD and the County of Riverside (County) are considered Principal Permittees for the 2008 Whitewater River MS4 Permit. Other Permittees are considered co-permittees and they include CVWD and the cities of Banning, Cathedral City, Coachella, Desert Hot Springs, Indian Wells, Indio, La Quinta, Palm Desert, Palm Springs, and Rancho Mirage. The Whitewater Region Stormwater Management Plan (SWMP) describes activities and programs implemented by all Permittees to manage urban runoff to comply with the requirements of the MS4 permit for the Whitewater River watershed.

All Permittees must also, in conjunction with the MS4 Permittees of the other major watersheds within Riverside County (Santa Ana River Region and Santa Margarita River Region), create a Consolidated Monitoring Program (CMP) to coordinate monitoring programs across the regions. The Permittees will evaluate the effectiveness of their program elements to identify revisions to the program that will subsequently be reflected in an updated SWMP. RCFCWCD has developed and implemented a monitoring program for the Whitewater River region. To accomplish the monitoring program objectives specific to the Whitewater River watershed, the program has incorporated: data management, source identification, storm drain characterization, and water quality monitoring.

The CMP is reviewed and updated annually based on program findings and changes in program needs, including TMDL development and implementation. A significant revision was initiated in 2008-2009 to include the provisions from the 2008 Whitewater Region MS4 Permit, adopted on May 21, 2008. Updated provisions for the Whitewater River Region will be reflected in the Whitewater SWMP which was due to the Regional Board in June 2009. The CMP outlines four objectives:

- Develop and support and effective MS4 management program.
- Identify those receiving waters, which, without additional action to control pollution from urban runoff, cannot reasonably be expected to achieve or maintain applicable water quality standards.
- Characterize pollutants associated with urban runoff and assess the influence of urban land uses on receiving water quality.
- Analyze and interpret the collected data to identify trends, if any, both to prevent impairments through the implementation of preventative BMPs and to track improvements based on the MS4 management program.

Water Quality Concerns

Many of the analytes of concern have not been detected in the water quality samples collected for the CMP. Of the analytes detected in the water quality samples, there have not been persistent exceedances of Basin Plan Objectives (BPOs). The following analytes have exceeded the BPOs: lead, selenium, fecal coliform, and enterococcus. Selenium and lead are naturally present in the ground water within the Whitewater River region. Indicator bacteria (fecal coliforms, total coliforms, fecal treptococci, and enterococcus) have been detected in water quality samples, some of which are detected above the BPO, more often than other analytes of concern. Sources of indicator bacteria include excretion from humans, mammals, amphibians, or birds. Indicator bacteria can be detected with higher probability in areas where pet droppings and bird droppings are more frequent. Bacterial indicators may be considered a priority water quality problem for the Whitewater River region depending on their concentrations, their frequent and dispersed detections, and their potential to adversely affect beneficial uses.

Following is a brief summary of parameters for each sampling site that exceeded Basin Plan Objectives (BPOs) during the 2007-2008 Annual Progress Report (RCFCWCD 2009).

- Avenue 52 Storm Drain experienced a higher BPO level for enterococcus than anticipated for their dry weather samples
- Date Palm Drive Storm Drain constituent results indicated that enterococcus and fecal coliform were detected at levels higher than BPO standards. Selenium levels were also higher than BPO levels.
- Ramey Street Storm Drain water quality results that no constituents exceed BPO levels except for fecal coliform.
- Sunrise Storm Drain Outlet was similar to the Ramsey Street Storm Drain site in that only fecal coliform was observed to be higher than BPO levels.
- Whitewater River Canyon Road station satisfied all BPO standards.
- Whitewater River Station at Avenue 72 results satisfied all BPO standards.

2.5.6 Drinking Water Quality

All five water purveyors that make up the CVRWMG annually report the quality of water that they serve. The majority of domestic water served by the CVWRMG partners is obtained locally from wells drilled into the Coachella Valley's vast groundwater basin; although DWA also obtains some supply from surface water sources. Most water quality testing is performed in State-certified laboratories. A few highly specialized tests are performed by other laboratories. Water quality staff monitor for over 100 regulated and unregulated chemicals (both covered and not covered in the Clean Water Act).

While all of CVRWMG partners' domestic water supplies meet current drinking water requirements, some private wells contain low levels of arsenic. Research has shown the health effects of low levels of arsenic as being linked to cancer, skin damage and circulatory ailments. The CVRWMG agencies also monitor nitrate levels in groundwater closely because they can have health effects and preventive measures are taken seriously. Nitrate in drinking water that exceeds 45 mg/L poses major health risks to infants younger than three months. Methemoglobinemia, also known as blue baby syndrome, is caused by consumption of water that is highly contaminated with nitrate. Other contaminants that are monitored include:

- Inorganic contaminants- salts or metals from urban stormwater runoff industrial or domestic wastewater discharges, oil and gas production, mining or farming.

- Pesticide and herbicides- primarily from agriculture but also for residential landscaping, transported by urban stormwater runoff.
- Organic chemical contaminants-synthetic and volatile organic chemicals, by-products of industrial processes and petroleum production, can come from gas stations, urban stormwater runoff and septic systems.
- Radioactive contaminants-naturally occurring and can be detected near mining activities and petroleum production.

The CVRWMG members have conducted source water assessments that provide information about the vulnerability of district drinking water wells to contamination. In 2002, CVWD completed a comprehensive source water assessment that evaluated all groundwater wells supplying the district's six public water systems. An assessment is performed on each new well added to CVWD's system and on existing wells approximately every five years. Other agencies in the CVRWMG follow similar reporting protocols. Groundwater from these district wells are considered vulnerable to urban and agricultural activities, because of the Region's permeable aquifer, and because the Region's water purveyors cannot control land use decisions. Drinking water supplied by the CVRWMG purveyors to Coachella Valley communities, to date, have complied with state and federal drinking water quality standards.

2.6 Social and Cultural Make-up

This section describes the social and cultural makeup of the regional community.

The Coachella Valley population includes a wide-ranging, diverse group of citizens. In 2008, the 2010 Coachella Valley population was projected to be 477,900, including unincorporated areas that lie outside the IRWM region boundary (CVAG 2008). Of that, 75% of the population resides within incorporated cities and 25% of the population inhabits unincorporated areas of the County, including Indian lands and mobile park homes that are largely located outside of city jurisdictions (City of Coachella 2009). The Coachella Valley's proximity to Los Angeles, San Diego and Riverside counties in conjunction with its supply of affordable homes have attracted more permanent residents to the Region.

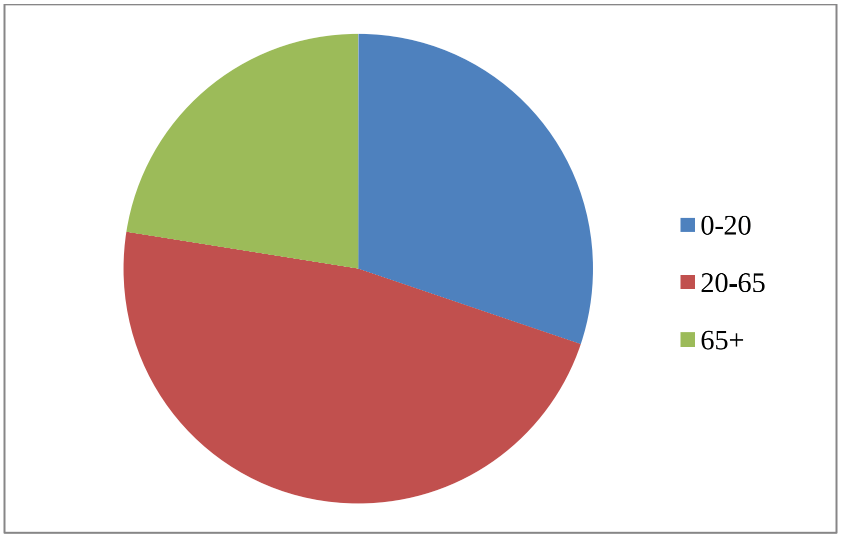
Compared with the state as a whole, the Coachella Valley economy has a larger proportion of jobs in agriculture, construction, retail trade, and services and a comparatively small proportion of jobs in manufacturing, wholesale trade, and government. The Coachella Valley is one of the fastest growing regions in California because of its vibrant, entrepreneurial business climate and its international acclaim as a tourism destination. The tourism sector in the region provides an exciting, resort-style lifestyle; from 121 golf courses to art and children's museums to Indian gaming casinos to concerts and theater to nationally acclaimed attractions like the Palm Springs Aerial Tramway, the PNP Paribas Open Tennis Masters Tournament, the Bob Hope Classic PGA golf tournament, the Kraft Nabisco LPGA golf tournament, the Living Desert Zoo and Botanical Gardens, the Palm Springs Air Museum, Coachella Music and Arts Festival and the Stagecoach Festival. Due to all the local attractions for tourism, the region allows for hundreds of retail trade and service jobs (Alliance 2010).

Higher education institutions have been moving to the region, and providing an opportunity for local high school students to further their education. The new California State University, San Bernardino-Palm Desert campus and the University of California, Riverside's Palm Desert Graduate Center campus have become magnets attracting businesses to the Coachella Valley bringing in educators and administrators. College of the Desert's $350 million expansion has provided lower division college courses as well as career, vocational education and technical training. Other institutions of higher education are Chapman University, Phoenix University, and Kaplan College.

Social Make-up

The population in the Coachella Valley is older than in Riverside County and California. In 2004, the median age in the Coachella Valley is 36.1 years compared to 32.64 in Riverside County, and 33.64 in California. In 2004, thirty percent (30.2%) of the residents are aged 20 or younger and twenty-two (22.5%) are seniors and this ratio is projected to remain almost the same in 2009 (30.0% and 23.3% respectively) (Coachella Valley Health Assessment 2006). **Figure 2-14** graphs the Valley's age distribution.

Figure 2-14: Coachella Valley Age Distribution

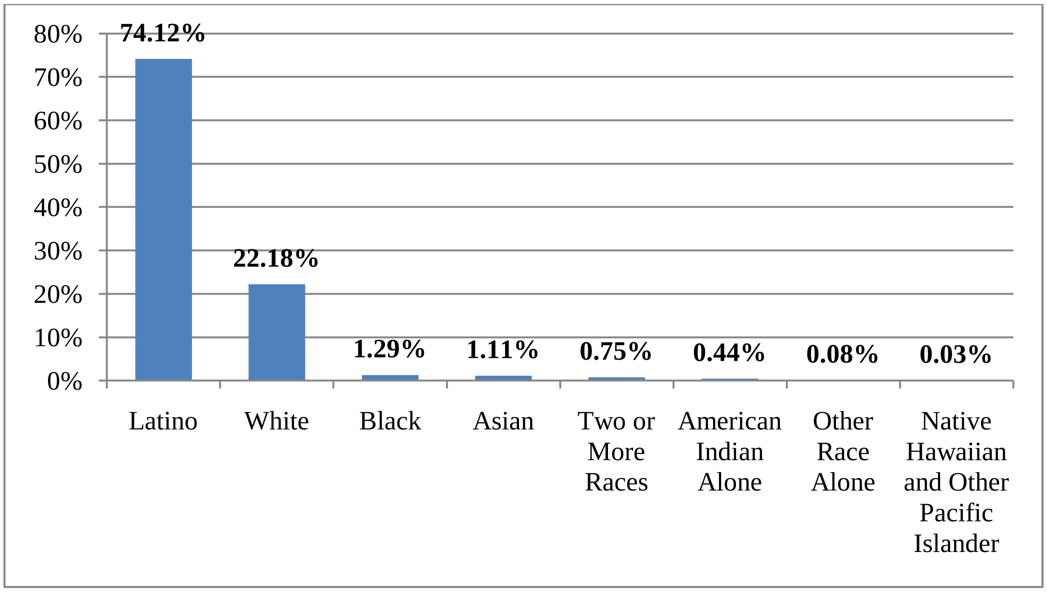


CVAG has provided a summary of the age data of the region by city. Generally speaking, the highest median age groups (61.3 years old and 63.4 years old) are living in Rancho Mirage and Indian Wells respectively. The youngest age-group reside in Coachella, their median average age was 22.8; followed by Indio at 27.3. There is a strong correlation between the age group and median home prices. The older the median age group, the higher the median home price (CVAG 2007).

Cultural Make-up and Diversity

The Coachella Valley has a well-established, yet growing, Latino population (Coachella Valley Health Assessment 2006). Latinos have always had a strong presence in the Palm Springs central and eastern sections; the cities of Indio and Coachella have also contained a high Latino population for decades. Most of the Valley's Latinos are Mexican from a multi-generational community. Central American immigrants can be mostly found in Indio and Cathedral City, while Cuban Americans, Puerto Ricans, and South Americans are prevalent in Palm Springs and Rancho Mirage areas. Compared with the state as a whole, the Coachella Valley economy has a substantially larger proportion of jobs in agriculture, construction, retail trade, and services and a comparatively small proportion of jobs in manufacturing, wholesale trade, and government. In the past, most Latinos found steady work through Coachella Valley's large agricultural trade, but at the present time, other employment opportunities have arisen with the expansion of home and business development within the region. **Figure 2-15** graphs racial composition of the Coachella Valley.

Figure 2-15: Coachella Valley Racial Composition



Economic Profile

From 2000 until 2007, the Coachella Valley grew at a much faster pace than California and the nation; employment has grown by 32.6 percent (4.1 percent annually), as compared to 4.4 percent (0.6 percent annually) nationwide. In recent quarters, however, the Valley's employment growth has stalled and fallen behind State and national levels (CVEP 2009). The Coachella Valley's most concentrated employment sectors are agriculture, and hospitality and tourism. The region has a relatively small share of its employment in manufacturing, finance, and professional services as compared to the national share.

The Coachella Valley's largest industry – hospitality and tourism – has long contributed to local job growth and the attraction of billions of dollars in tourism-serving investment, including hotels, golf courses, shopping, dining and nightlife establishments, casinos, and second-home developments. The agriculture sector is one of the other traditional lynchpins of the Coachella Valley economy. According to CVWD, the average gross value per acre of cropland was $7,986 for a total value of over $491 million in 2007 (CVWD 2009). The top producing crops for that same year were grapes, dates, lemons and limes, oranges and tangerines, peppers, lettuce, and greens.

The economic profile of Coachella Valley varies throughout the Region. While some communities within the Region have annual median household income (MHI) similar to Statewide values, the Coachella Valley has several disadvantaged communities (DACs). Please refer to *Chapter 5, Stakeholder Involvement*, *Section 5.6 Disadvantaged Communities Outreach* for detailed information regarding the economic composition and geographic location of DACs within the Coachella Valley.

Tribes

Most lands within the Coachella Valley are either private lands, public lands administered by the U.S. Bureau of Land Management, or Native American tribal lands. Major Native American reservation lands include (see **Figure 2-16**):

- Torres-Martinez Desert Cahuilla Indian Reservation, Cahuilla
- Cabazon Band of Mission Indian Reservation, Indio
- Augustine Band of Cahuilla Indian Reservation, Coachella
- Agua Caliente Band of Cahuilla Indian Reservation, Palm Springs
- Twenty-Nine Palms Band of Mission Indian Reservation, near Palm Springs
- Santa Rosa Tribal Lands, in southern Coachella Valley
- Morongo Tribal Lands, which are located just west of the IRWM Region

The Torres-Martinez and Agua Caliente Reservations are the largest by acre; the Agua Caliente Indian Reservation is approximately 31,500 acres, while the Torres-Martinez Indian Reservation is roughly 24,000 acres in size.

Due to their historical presence in the Valley, tribes face specific issues and considerations with relation to this IRWM Plan. Native Americans are the original inhabitants of the Coachella Valley, having resided in the Valley for centuries. The water in the Valley has sustained these Native American people agriculturally, economically, culturally, and spiritually for a long period of time, as it still does today. The CVRWMG intends to collaborate with the local tribes on long-term water management planning to ensure that the water supply within the Valley is adequate for all users. *Chapter 8, Agency Coordination, Section 8.2.1 Water Supply Planning and Groundwater Management,* describes how planned buildout on the tribal reservations were considered in the CVWMP (CVWD 2002) in order to have a complete understanding of current and future impacts on the groundwater basin.

Current and future planning for the management and administration of water in the Valley takes into account identified tribal issues and needs. These points were taken into consideration by the CVRWMG as part of this IRWM Plan. Detailed information regarding tribal issues can be found within *Chapter 3, Issues and Needs, Section 3.1.8 Issues Groups.*

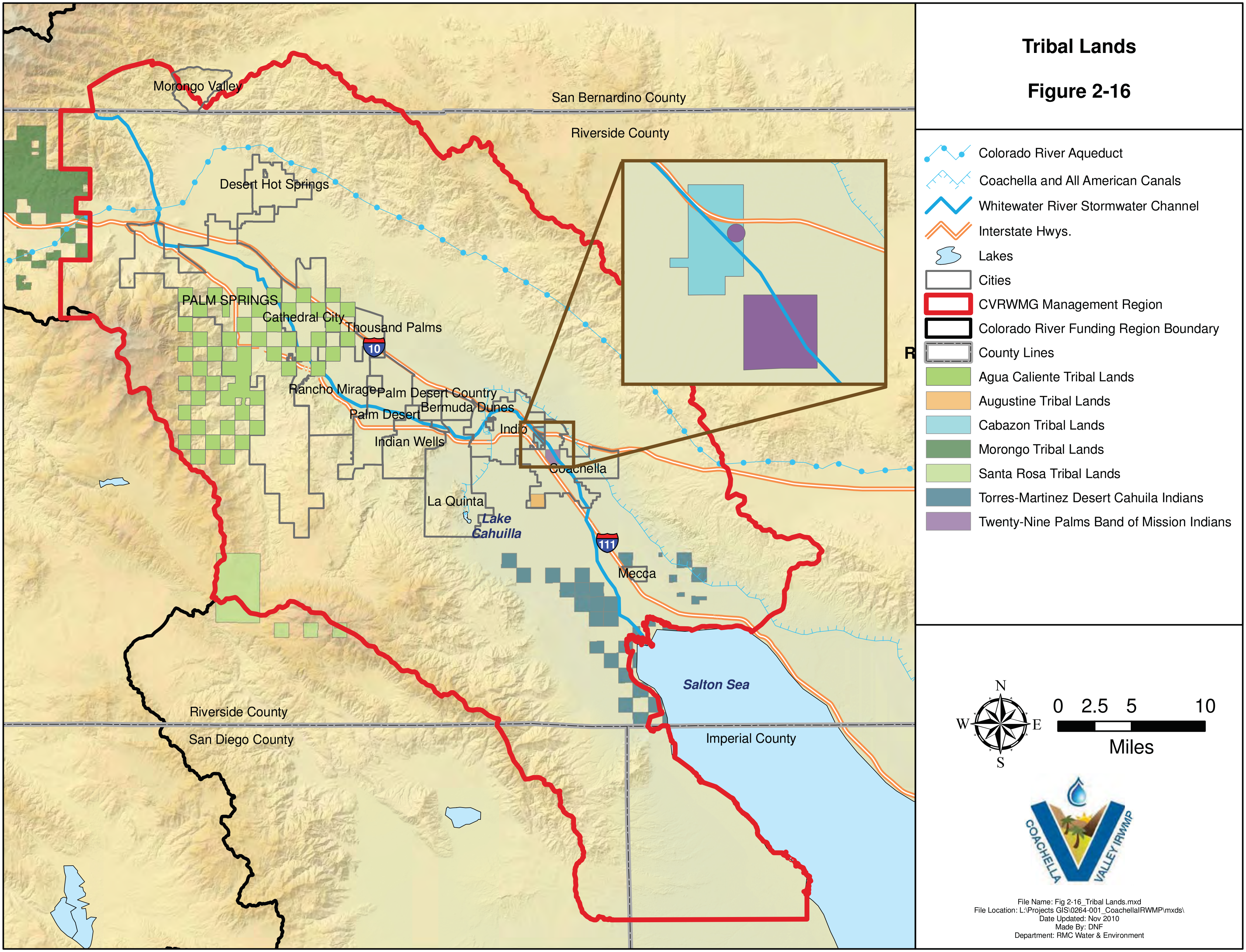
2.7 Major Water-Related Objectives and Conflicts

This section contains a description of major water-related objectives and conflicts.

Both conflicts and agreements have occurred between the agencies prior to the establishment of the CVRWMG. Major water-related conflicts have generally revolved around groundwater recharge and pumping activities and associated assessments. MSWD was annexed as a sub agency to DWA in 1963 and since that time, land owners within MSWD's boundaries have paid a SWP assessment for the capital costs of the SWP. All land owners within DWA's boundaries pay the assessment as well. As early as 1984, MSWD, CVWD, and DWA held discussions about recharging the Mission Creek Subbasin and the facilities that would be required. In 2001, construction of a turnout from the Colorado River Aqueduct began and by 2002, construction of the spreading basins was completed. In 2001, MSWD adopted a resolution declaring its support for DWA's program to replenish the subbasin. Construction of the recharge basins was completed the following year.

Tribal Lands

Figure 2-16



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Department: RMC Water & Environment

CVWD and DWA executed the Mission Creek Groundwater Replenishment Agreement in April 2003, which allowed for storage of advanced deliveries from MWD. In a May 2003 White Paper, MSWD outlined its concerns with the Agreement, underscoring its dependence and interest in the subbasin. In October 2003, MSWD filed action in the Superior Court of the State of California against DWA and CVWD seeking a writ of mandate, declaratory relief for prescriptive and appropriative water rights and declaratory and injunctive relief for a physical solution of a groundwater basin. MSWD sought adjudication of the subbasin and questioned the quality of the imported water. Both CVWD and DWA filed answers challenging the complaint. In December 2004, MSWD, DWA, and CVWD reached a settlement agreement. The agreement stated the agencies would work jointly to manage the subbasin. The agreement included provisions regarding payment of Replenishment Assessment Charges, shared costs for basin studies and development of a Basin Management Plan for the Mission Creek and Garnet Hill Subbasins. In October 2008, final contracts needed for development of the Basin Management Plan were approved by CVWD and MSWD. DWA agreed with development of modeling studies but questioned whether the Basin Management Plan would duplicate efforts expected for the IRWM Plan. In April 2009, DWA approved a modified proposal to facilitate management plan preparation; In November 2010, DWA approved the additional efforts.

In January 2005, CVWD established a replenishment assessment charge that covered East Valley groundwater pumpers, including the cities of Coachella and Indio. The City of Indio ceased paying the charge in July 2007, challenging the benefits of the Dike 4 replenishment project to the City. One year later, after negotiations with the City failed to resolve the issues, CVWD filed suit against the City of Indio for nonpayment. In April of 2008, IWA filed a cross complaint seeking CVWD to show proof that IWA received any special benefit from the replenishment assessment charge. In December 2008, CVWD and the City of Indio announced they had approved terms of an agreement to settle the nonpayment lawsuit. The terms include the following:

- CVWD and IWA will participate in an IRWM Plan,
- Future groundwater basin recharge projects financed through the Replenishment Assessment Charge will continue to benefit the lower basin,
- A recharge facility will be built within the City of Indio if feasible, and
- IWA will pay CVWD all outstanding Replenishment Assessment Charges.

In early 2007, CVWD filed a California Environmental Quality Act (CEQA) lawsuit against IWA regarding a development within IWA's sphere of influence. The Citrus Ranch development is located outside of the Whitewater River basin and in order to move forward with the development, IWA had planned to export water from the basin to Citrus Ranch. CVWD did not believe IWA had researched alternative sources and addressed the overdraft impact. The lawsuit was settled in October 2008 stating among other things, that the developer of Citrus Ranch, SunCal, will pay the city approximately $5.6 million to offset the project's impact on the local groundwater supplies.

DWA and CVWD assess a replenishment assessment based on the amount of water pumped. Therefore, revenues are generated from the extraction of groundwater and not the delivery of imported water. This is a key component in understanding water management issues within the Coachella Valley IRWM region.

The Coachella Valley IRWM program is a collaborative effort resulting from the aforementioned lawsuits, and contains regionally-defined issues, objectives, resource management strategies, and implementation projects that ultimately provide resolution. For further information regarding major water-related conflicts defined in the Coachella Valley, refer to *Chapter 3, Issues and Needs*. *Chapter 4 Objectives, Section 4.1.1 Determining Objectives* provides an understanding of how the CVRWMG seeks to resolve those conflicts.

2.8 Climate Change

*This section implements the **Climate Change Standard** by describing and considering the effects of climate change on the Region.*

According to the U.S. Environmental Protection Agency, greenhouse gases (GHGs) are a group of gases in the atmosphere that have the ability to absorb and emit solar radiation. The presence of GHGs contributes to the greenhouse effect, a process that warms the planet by not allowing heat to leave Earth's surface. GHGs absorb the planet's heat and re-radiate that energy in all directions within the Earth's atmosphere, creating warm enough conditions for human habitation. Without the greenhouse effect, scientists estimate that the average temperature on Earth would be colder by approximately 30 degrees Celsius (54 degrees Fahrenheit), far too cold to sustain our current ecosystem. GHGs, therefore, play a vital role in regulating our global climate.

Increased GHG emissions have been linked to stronger greenhouse effects, global temperature increases, and sea level rise (United States Global Change Research Program 2010). These climatic changes could potentially continue depending on a number of factors, including the amount and type of heat-trapping GHG emissions and the sensitivity of climates to those emissions. The affects have the potential of being felt much sooner and the sources may be more apparent in relation to the Earth's water cycle.

As described in the United States Global Change Research Program literature global consequences of climate change are very broad, but on a smaller, regional scale the impacts of warming trends become much more diverse and distinctive. Climate responds to local, regional, and global factors (United States Global Change Research Program 2010). For instance, precipitation is not distributed evenly over the globe. Its average distribution is governed primarily by atmospheric circulation patterns, the availability of moisture, and surface terrain effects.

The inconsistencies of land surfaces, wind patterns, and moisture levels across regions have produced very distinct climatic trends that ultimately alter the quantity and quality of natural resources. According to the California Water Plan 2009 Update (DWR 2009), California could be facing a significant water crisis exacerbated by climate change. The following list describes possible anticipated changes in the regional water cycle (DWR 2009):

- Decreases in snowfall could result from climate change increasing air temperatures, which would inhibit snow fall conditions to form;
- Decreased snowfall could lead to a reduction in snowpack size. Water supply availability would potentially change, because a less substantial snowpack would result in less snow melt, thereby reducing water sources;
- Water supply availability could also change if atmospheric temperatures reduce glaciers sooner than expected;
- Earlier peak stream flow due to climatic shifts (earlier melting periods) has the potential of impacting water supply, fisheries, and recreation activities. In the U.S. warming has occurred earlier in the winter season and into the spring, causing natural water flows to occur at higher intensities, which leaves the late spring and early summer with reduced water availability;
- Runoff/recharge volumes could be significantly reduced in the late spring and summer months because of the onset of warmer atmospheric pressures from climate change earlier in the winter season;

- Increased water usage could occur in summer months when warmer temperatures arrive and water availability has been reduced significantly due to earlier melting;
- Regions could be more susceptible to severe droughts as water supplies are over-utilized, and climate change worsens drought conditions;
- Water losses could be felt region-wide if higher air temperatures lead to increased evaporation rates in water bodies. This could also exacerbate drought conditions; and
- The frequency and intensity of floods can potentially increase in late winter and early spring as a consequence of early melting and inundation of early water supplies to the region.

These predicted water cycle changes, coupled with urbanization, create an awareness of potentially serious water supply challenges in the following years and decades ahead. Changes in climate may have adverse effects related to the release and availability of water sources critical for California's regional needs. Every region in California faces potential flood risks; housing and urban development in California continues to occupy floodplains and flood-prone areas every day (U.S. Global Change Research Program 2010). The threat of flooding therefore becomes much greater in densely populated regions. The State's water and flood systems could face both the threat of too little water to meet water demand during droughts and too much water to protect life and property during floods.

As described in *Section 2.3 Water Supply and Demand*, it is anticipated that the Coachella Valley IRWM region will experience increasing population growth, thereby possibly driving up water demands. Current water extractions and projected water demands are not sustainable in the Coachella Valley; if current water practices persist, climate change might reduce availability of water supplies, which has the potential to inhibit crop growth and fishery production, damage recreational areas, and degrade water quality (U.S. Global Change Research Program 2010).

2.8.1 Legislative and Policy Context

Given the currently predicted effects of climate change on California's water resources, DWR's IRWM Grant Program Guidelines seek to ensure the Coachella Valley IRWM Plan describes and considers the effects of climate change. Below is a summary of State legislation and policy that were considered as part of this IRWM Plan.

Executive Order (EO) S-3-05

EO S-3-05, signed on June 1, 2005 by Governor Arnold Schwarzenegger, is one of the key pieces of legislation that has laid the foundation for California's climate change policy. This piece of legislation recognizes California's vulnerability to the impacts of climate change, which includes its water-related natural resources. EO S-3-05 established three GHG reduction targets for California:

- By 2010, reduce GHG emissions to 2000 California levels
- By 2020, reduce GHG emissions to 1990 California levels
- By 2050, reduce GHG emissions to 80 percent below 1990 California levels

In addition to establishing GHG reduction targets for California, EO S-3-05 dictates the head Secretary of the California Environmental Protection Agency (CalEPA) to establish the Climate Action Team (CAT) for State agencies to coordinate oversight of efforts to meet these targets. As laid out in the EO, the CAT has submitted biannual reports to the governor and State legislature describing progress made toward reaching the targets.

There are currently 12 sub-groups within CAT, one of which is the Water-Energy group (also known as WET-CAT). WET-CAT was tasked with coordinating the study of GHG effects on California's water supply system, including the development of GHG mitigation strategies for energy consumption related to water use. Since the adoption of the AB 32 Scoping Plan (see discussion below), WET-CAT has been working on the implementation and analyses of six water-related measures identified in the Scoping Plan: Water Use Efficiency, Water Recycling, Water System Energy Efficiency, Re-use Urban Runoff, Increase Renewable Energy Production, and Public Goods Charge for Water.

Assembly Bill 32: The California Global Warming Solutions Act of 2006

Assembly Bill 32 (AB 32), the California Global Warming Solutions Act of 2006, is a piece of legislation that has laid the foundation for the State's response to climate change. In 2006, AB 32 was signed by Governor Schwarzenegger to codify the mid-term GHG reduction target established in EO S-3-05 (reduce GHG emissions to 1990 levels by 2020). AB 32 directed the California Air Resources Board (CARB) to develop discrete early actions to reduce GHGs by 2007, and to adopt regulations to implement those early action measures by January 1, 2010.

Climate Change Scoping Plan

AB 32 required CARB to prepare a Scoping Plan to identify and achieve reductions in GHG emissions in California. The approved Climate Change Scoping Plan, which was adopted by CARB in December 2008, recommends specific strategies for different business sectors, including water management, to achieve the 2020 GHG emissions limit.

Senate Bill 97

Senate Bill 97 (SB 97) directed the Governor's Office of Planning and Research (OPR) to develop amendments to the CEQA Guidelines to determine how climate change is analyzed in documents required under the California Environmental Quality Act (CEQA). On December 31, 2009, the Natural Resources Agency adopted amendments to the CEQA Guidelines and sent them to the California Office of Administrative Law for approval and filing with the Secretary of State (http://www.ceres.ca.gov/ceqa/guidelines/). The CEQA Guidelines are not prescriptive; rather they encourage lead agencies to consider many factors in performing a CEQA analysis, and maintain discretion with lead agencies to make their own determinations based on substantial evidence.

Managing an Uncertain Future: Climate Change Adaptation Strategies for California's Water

DWR, in collaboration with the State Water Resources Control Board (SWRCB), other state agencies, and numerous stakeholders, has initiated a number of projects to begin climate change adaptation planning for the water sector. In October 2009, DWR released the first state-level climate change adaptation strategy for water resources in the U.S., and the first adaptation strategy for any sector in California. Entitled *Managing an Uncertain Future: Climate Change Adaptation Strategies for California's Water*, the report details how climate change is currently affecting the state's water supplies, and sets forth ten adaptation strategies to help avoid or reduce climate change impacts to water resources.

Central to these adaptation efforts will be the full implementation of IRWM plans, which address regionally-appropriate management practices that incorporate climate change adaptation. These plans will evaluate and provide a comprehensive, economical, and sustainable water use strategy at the watershed level for California.

Executive Order S-13-08

Given the potentially serious threat of sea level rise to California's water supply and coastal resources, and the subsequent impact it would have on our state's economy, population, and natural resources, Governor Schwarzenegger issued EO S-13-08 to enhance the state's management of climate impacts from sea level rise, increased temperatures, shifting precipitation, and extreme weather events.

California Climate Adaptation Strategy

In response to the passage of EO S-13-08, the Natural Resource Agency wrote the report entitled *2009 California Climate Adaptation Strategy* (CAS), to summarize the best known science on climate change impacts in the state, to assess vulnerability, and to outline possible solutions that can be implemented within and across the state agencies to promote resilience to climate change.

GHG Reporting Rule

While California has taken the lead in climate change policy and legislation, there have been several recent important developments at the federal level. On September 22, 2009, USEPA released its final GHG Reporting Rule (Reporting Rule). Starting in 2010, facility owners that emit 25,000 metric tons of CO_2e or more per year are required to submit an annual GHG emissions report with detailed calculations of facility GHG emissions. These activities will dovetail with the AB 32 reporting requirements in California.

2.8.2 Implications of Effects of Climate Change

Coachella Valley imports a majority of its water supply in order to satisfy regional demands. Of the five water purveyors, CVWD and DWA are both SWP contractors and retailers. Annual SWP water supplies delivered to state water contractors will depend on the amount of rainfall, snowpack, runoff, water storage, pumping capacity from the Delta, and water demand. Water delivery reliability will thus depend on three major factors: the availability of water at the source; the ability to convey water from the source to delivery points; and the magnitude of demand for water. The availability of the water source will be dependent on the amount of snowpack and water use in the source area. The reliability of the water source may also be contingent on the additional stressors that result from possible temperature increases.

Research on recent California climate variability indicates that the state has been warming at a rate of 0.13°C per decade (U.S. Global Change Research Program 2010). Temperature increases are expected to modify rainfall and runoff, which may in turn affect SWP operations. Precipitation patterns are unpredictable and thus warmer climate can produce wetter *and* drier conditions. Changes in the regional and seasonal distribution of precipitation could cause the most damage. For the SWP, the size of the April 1 snowpack in the Feather River watershed and the storage in Lake Oroville are key components of the annual estimation of the SWP's delivery capabilities from April through September. By and large, increased temperatures due to climate change may reduce the snowpack at a faster rate, thereby releasing snowmelt water earlier than anticipated. This could potentially make water resource areas more susceptible to flooding in the late winter and early spring, quickly depleting water sources for the later seasons when water is crucial (summer and fall). The reliability of water from the source is therefore hindered by any drastic modification of rainfall patterns. Water demand close to the water source could also be expected to increase, creating a domino effect of diminishing water availability and reliability to any SWP contractors downstream; thus possibly leading to water shortages for the Valley. The reliability of SWP water supply is expected to be reduced for the range of future climate projections studied.

Outside of the SWP, the Coachella Canal allows CVWD to provide approximately 300,000 acre-feet per year of Colorado River water to over 1,100 non-potable customers, which mostly consist of agricultural and golf course uses. Past climate records based on changes in spring snowpacks and Colorado River flows indicate that drought is a frequent feature of the Southwest, which includes Coachella Valley, with some of the longest documented “megadroughts” on Earth (U.S. Global Change Research Program 2010). Coachella Valley’s arid climate is likely to experience a higher number of dry days between precipitation events, thereby leading to longer and longer drought periods. To further complicate the situation, Coachella Valley’s population and urban areas are continuing to grow (refer to *Section 2.1.*5 *Water Supplies and Demand* for future population projections). The number of customers is estimated to increase and associated water use will grow, leading to greater water supply challenges.

Groundwater will be less directly and more slowly impacted by climate change, as compared to surface water sources. This is because rivers get replenished on a shorter time scale, and drought and floods are quickly reflected in surface water levels. Groundwater, on the other hand, will be affected much slower. Only after prolonged droughts or overdraft conditions will groundwater levels show declining trends. Groundwater pumping in Coachella Valley is already exceeding recharge rates and experiencing overdraft. Continued groundwater pumping at current rates could further decrease water tables and concurrently, reduced recharge associated with climate change could add to the growing problem with groundwater sustainability.

As vulnerability analysis tools become available, this description of potential climate change effects will be updated. Refer to *Chapter 6 Resource Management Strategies*, *Section 6.5 Adapting Resource Management Strategies to Climate Change* for information regarding climate change adaptation and mitigation.

3 Issues and Needs

*This chapter outlines the major water-related issues and need of the Region, and demonstrates that it based on sound technical information, analyses, and methods as directed in the **Technical Analysis Standard**.*

3.1 Coachella Valley Issues and Needs

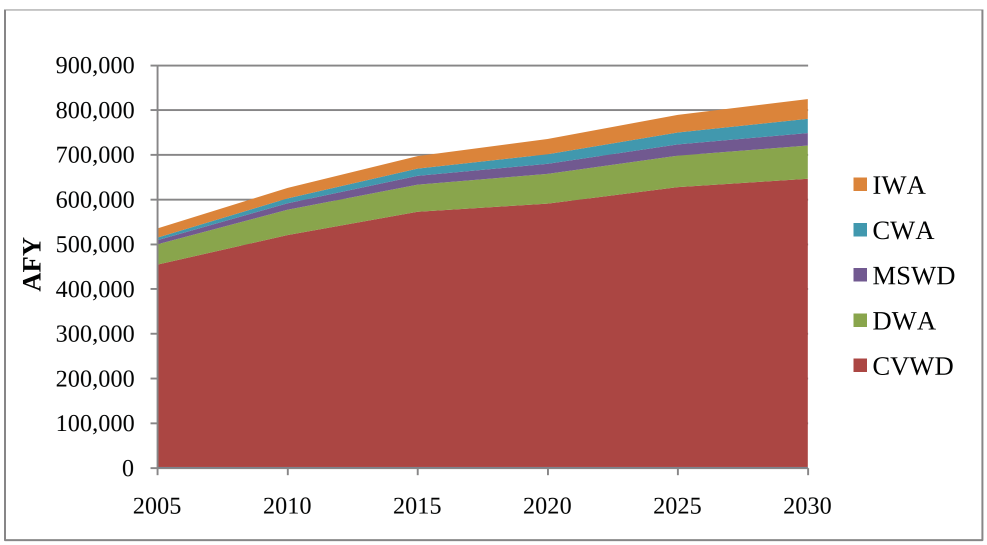
In order to clearly establish the IRWM Plan Objectives (see *Chapter 4, Objectives*), the following section outlines the issues, needs, and conflicts related to water management in the Valley.

3.1.1 Demand

The total water demand for the Region is projected to increase by 68% from 534,680 AFY in 2005 to 898,108 AFY in 2030. Almost half of the demand in the Region is attributed to non-potable uses in the East Valley. A breakdown of water demand by agency is shown in **Figure 3-1** (see *Chapter 2, Region Description*, Table 2-7: Total Projected Water Demand with Conservation).

In order to determine realistic projections of future demands, it is essential for agencies to proactively update their Urban Water Management Plans (UWMPs) and ensure supply for future development. Water agencies will soon be preparing 2010 updates to their Urban Water Management Plans to take their local development plans into account.

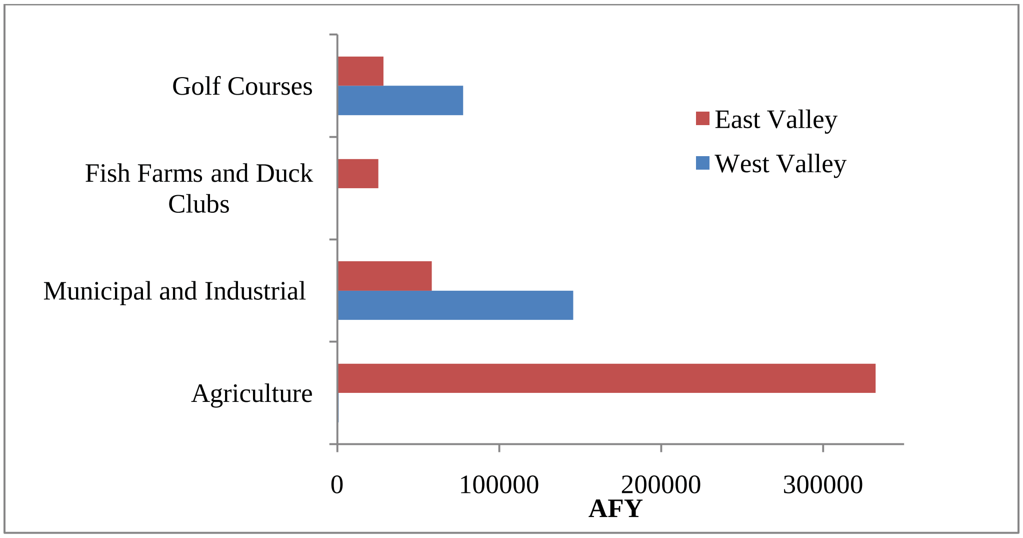
Figure 3-1: Total Projected Water Demand with Conservation[1]



[1] Projections are for a normal water year and include water losses and recycled water use.
[2] CVWD 2005 Urban Water Management Plan
[3] DWA College Park Specific Plan/Water Supply Assessment
[4] MSWD 2005 Urban Water Management Plan
[5] CWA 2005 Urban Water Management Plan
[6] IWA 2010 Urban Water Management Plan

Water demand in the Coachella Valley is divided between urban and agricultural uses. In 1999, water demand in Coachella Valley was a total of 333,300 AFY for agricultural uses and 204,000 AFY for urban uses. **Figure 3-2** provides a breakdown of water demand for the East and West Coachella Valley in 1999. However, due to projected residential growth in the Coachella Valley (discussed in *Chapter 2, Region Description*), urban demands are expected to increase at a faster rate than agricultural demands.

Figure 3-2: Total Water Demand in 1999 for East and West Valley



Source: CVWD 2002 Coachella Valley Water Management Plan

Regional water demand issues are listed below.

Regional Water Demand Issues	
Topic	**Issue Statement**
Increasing Water Demands	Regional population projections include continued growth, equating to water demand increases. Municipal demands are expected to increase at a faster rate than agricultural demands primarily due to population growth. Because the region is currently in overdraft conditions, there is increasing concern about the availability of high quality groundwater supply.[1]

1. CVWD 2005 UWMP; CVWD 2002 WMP; CWA 2006 WMP Update; MSWD WMP

3.1.2 Water Supply

Coachella Valley water supplies are primarily obtained from: imported water supplied through the Coachella Canal and the Colorado River Aqueduct, as well as groundwater pumped from the Coachella Valley Groundwater Basin. However, concerns over Coachella Valley's future water supplies has increased due to a combination of drought, reductions in imported water deliveries, over pumping of groundwater, and seasonal variation in surface water. These concerns are discussed further below.

Groundwater

Despite the large amount of artificial groundwater recharge, the local groundwater basin has not been in balance since the 1930's. The freshwater overdraft was estimated to be about 137,000 AFY in 1999, with a cumulative overdraft of nearly 4.8 million acre-ft between 1936 and 1999 (CVWD 2002 WMP). This means that 4.8 million more acre-ft of freshwater was withdrawn from the basin than was recharged.

Groundwater overdraft has caused groundwater levels to decrease more than 60 feet in portions of the East Valley and raised significant concern about water quality degradation and land subsidence in this area. Recently, however, reduced pumping in the East Valley along with recharge at the Thomas E. Levy Facility has resulted in a return to artesian flow in the vicinity of Mecca. It is thought that a pumping hole created by Kent Sea Farms has recovered since they reduced their pumping from about 8,000 AFY to 2,000 AFY. Groundwater levels in the West Valley have also decreased substantially, except in the areas near the Whitewater Spreading Facility where artificial recharge has successfully raised water levels. **Figure 3-3** shows areas within the Region where land subsidence studies have been conducted.

Continued overdraft would have significant consequences for the Coachella Valley, including:

- Land subsidence and associated permanent loss of groundwater storage capacity in some areas, along with resultant potential for ground fissures and damage to buildings, sidewalks, streets, wells, and buried pipelines;
- Increased costs to pump water and deepen wells; and
- Water quality degradation, which includes increased salinity from Salton Sea intrusion and perched water intrusion.

Issues related to groundwater supplies are listed below.

Groundwater Supply Issues	
Topic	**Issue Statement**
Groundwater Overdraft	Basin pumping exceeds total recharge by more than 100,000 AFY on average. Pumping needs to be brought into balance through increased recharge, source substitution, and conservation. Failure to achieve this balance will lead to continued water level declines, water quality degradation, and land subsidence, which can result in loss of groundwater storage and impacts on infrastructure.[1]
Land Subsidence	Continued water level declines may result in significant land subsidence, which leads to permanent loss of groundwater storage as well as cracking, warping, and failure of buildings and subsurface infrastructure. In the vicinities of Palm Desert, Indian Wells, and La Quinta, subsidence rates have increased 2-4 times since 2000.[2]
Land Fissuring	Surficial land fissuring may occur due to land subsidence, particularly along basin margins. Fissures are hazardous and could damage buildings in some of the valleys most heavily developed and populated areas.[3]
Liquefaction	As overdraft conditions improve in the East Valley and groundwater levels rise, the potential for liquefaction increases, as well as the need for adequate drainage.[4]
Groundwater Recharge	A 100-200 foot-thick aquitard in the East Valley retards deep percolation, thus making recharge of the Lower Aquifer difficult.[5]
Increased Conjunctive Use	Potential increases in conjunctive use, to the degree that recharge and source substitution are increased more than net outflow, could lead to a solution to overdraft-related problems facing the basin. Key issues that must be addressed include completion of the SWP aqueduct extension and amount of this additional recharge water, its cost, its reliability, and its quality.[6]
Costs	Cost related to continued overdraft could include: reduced groundwater storage capacity; increased power consumption due to increased pumping lifts; repair and replacement of damaged infrastructure; and additional water treatment requirements due to decreases in water quality.[7]

Groundwater Supply Issues	
Topic	**Issue Statement**

1. CVWD 2005 UWMP; CVWD 2002 WMP; IWA IWRDP - Phase 1 White Paper; IWA 2007 WMP; MSWD WMP; MSWD 2007 RWFS; DWA 2005 UWMP
2. CVWD 2005 UWMP; CVWD WMP 2002; USGS 2007; IWA IWRDP - Phase 1 White Paper
3. CVWD WMP 2002
4. CVRWMG Planning Group meeting - May 19, 2010
5. IWA IWRDP - Phase 1 White Paper
6. CVWD 2005 UWMP; CVWD WMP 2002
7. CVWD WMP 2002

Imported Water

The Coachella Valley Region relies on SWP supply via the Colorado River Aqueduct and Colorado River supply via the Coachella Canal (refer to Figure 2-3 in *Chapter 2, Region Description*). However, concern regarding the reliability of imported water supplies has increased due to: reductions in SWP deliveries; drought in the Colorado River Basin and recent litigation that could potentially affect the 2003 Quantification Settlement Agreement; and increased costs for importing water.

Further details on imported water supply are listed below.

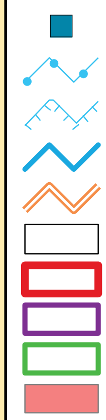
Imported Water Supply Issues

Topic	Issue Statement
SWP Delivery	Reductions in SWP delivery would directly impact groundwater replenishment in the Valley.[1] Delta conveyance solutions may only increase reliability without increasing overall yield.[2]
SWP Reliability	SWP supplies are less reliable due to Statewide drought conditions and environmental constraints (which have led to reduced pumping) in the Delta.[3]
SWP Cost	Concern about the cost of Delta conveyance projects increasing SWP costs and local groundwater replenishment assessments.[4]
Colorado River Delivery	Colorado River supplies are vulnerable due to the prolonged Colorado River Basin drought and recent litigation which could impact the stability of the 2003 QSA. However, the 2003 QSA and 1968 Colorado River Basin Project Act currently ensure full delivery to the Coachella Valley except in the case of a prolonged period of extreme drought.[5]
Climate Change	Implications of climate change may impact SWP allotments and/or deliveries and Colorado River water deliveries and/or allocations.[6]

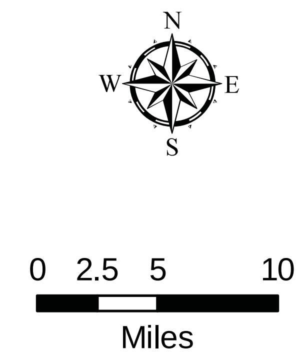
1. DWA Board Minutes - August 4, 2009; IWA IWRDP - Phase 1 White Paper
2. DWA Board Minutes - December 1, 2009, May 19, 2009
3. DWR 2009 Colorado River Regional Report Draft
4. DWA Board Minutes - December 1, 2009, May 19, 2009
5. DWR 2009 Colorado River Regional Report Draft; CVWD 2005 UWMP
6. IWA IWRDP - Phase 1 White Paper

Land Subsidence Study Areas

Figure 3-3



Source: USGS Detection and Measurement of Land Subsidence in Coachella Valley, 1996-2005; Desert Water Agency GPS Control Survey April 2008 and Facilities Benchmarks 1962-1994



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Date Updated: Wednesday, July 21, 2009
Made By: DNF
Department: RMC Water & Environment

Surface Water

Surface water is obtained from several local streams including the Whitewater River, Snow Creek, Falls Creek, and Chino Creek. In 1999, surface water supplied approximately 6,900 acre-ft of water to the Upper Valley (approximately 3 percent of its water supply) to meet municipal demand. Because the surface water supply is directly affected by variations in annual precipitation, the annual supply is highly variable. Since 1936, the estimated historical surface water supply has ranged from approximately 4,000 to 9,000 acre-ft/yr (CVWMP 2002). All surface water that is not used for domestic water supply is accounted for and put to beneficial use of recharging the groundwater aquifer.

Surface water supply issues are listed below.

Surface Water Supply Issues	
Topic	**Issue Statement**
Surface Water Supply	Surface water supplies are inherently more susceptible to seasonal variation and drought because they are fed by runoff originating in the local mountains.[1]
1. CVWD 2005 UWMP; DWA 2005 UWMP; DWA 2008 General Plan	

Water Conservation

All five water purveyors within the Coachella Valley recognize that water is a limited resource and that water conservation and use efficiency should be actively pursued. Each agency implements a variety of irrigation and/or domestic water conservation measures, including model landscape ordinances, water-efficient irrigation controls, water efficient plumbing, water-wise landscaping programs, conservation outreach and education, conservation pricing of water rates, and water audits (CVWD 2005 UWMP; DWA 2005 UWMP; MSWD 2005 UWMP). **Figure 3-4** provides screenshots of two local water conservation efforts.

Figure 3-4: IWA and CVWD Water Conservation Programs

Issues related to water conservation are listed below.

Water Supply Conservation Issues	
Topic	**Issue Statement**
Conservation	Conservation efforts (municipal, agricultural, and golf courses) are critical to reduce pressure on the groundwater supply. [1]
Local Economy	Water conservation measures must consider the effect on industries that rely on water for irrigation (tourism, golf, agriculture). [2]
1. CVWD 2005 UWMP; CVWD 2002 WMP; IWA 2007 WMP; MSWD 2005 UWMP 2. Planning Group – May 19, 2010	

3.1.3 Recycled Water

Recycled water is needed to meet anticipated future demands and offset existing use of groundwater for non-potable uses, as well as provide for supply redundancy. However, during the summer months, recycled water supplies are not sufficient to meet all current demands; users are required to use their private wells or other water sources to supplement the recycled water supply. A map of existing recycled water systems is provided in Figure 2-4 (see *Chapter 2 Region Description*).

Issues related to recycled water are listed below.

Recycled Water Supply Issues	
Topic	**Issue Statement**
Recycled Water	Recycled water is needed to meet anticipated future demands and offset existing use of groundwater for non-potable uses, as well as provide for supply redundancy.[1]
Recycled Water	During summer months, recycled water supplies are not sufficient to meet all current demands; users are required to use their private wells or other water sources to supplement the recycled water supply. Need to consider augmenting recycled water with another non-potable source, like Colorado River water, to make the supply more reliable. [2]
Recycled Water	Challenges associated with cost-effectively linking recycled water supply to customers (i.e., strategic location of treatment facilities), possibly through inter-agency partnerships.[3]
1. IWA 2007 WMP; MSWD WMP; MSWD 2007 RWFS; DWA 2005 UWMP 2. CVWD 2005 UWMP 3. CVRWMG Planning Group meeting - May 19, 2010	

3.1.4 Stormwater

Riverside County Flood Control and Water Conservation District (RCFCWCD) and CVWD are the Region's flood control districts. They operate and maintain a series of regional flood control facilities throughout the Valley that ultimately drain to the Salton Sea (refer to Figure 2-7 in *Chapter 2, Region Description*). Local cities and the County of Riverside manage localized urban drainage systems that drain to these facilities. The backbone of this system is the Region's 49-mile Whitewater River/Coachella Valley Stormwater Channel. West of Washington Street, it's called the Whitewater River Stormwater Channel (WRSC); east of Washington Street, it's called the Coachella Valley Stormwater Channel (CVSC).

Local cities and the County divert runoff from storm events to the WRSC. The WRSC is designed for the Standard Project Flood of 85,000 cubic feet per second. Three wastewater treatment plants (VSD, Coachella, and WRP-4) also discharge effluent to the WRSC.

Issues related to stormwater are listed below.

Stormwater Issues	
Topic	**Issue Statement**
Stormwater Management	Opportunities for source substitution include stormwater harvesting to retain and reuse all stormwater on site. Low impact development should be encouraged to reduce precipitation losses via runoff. [1]
1. IWA IWRDA - Phase I White Paper	

3.1.5 Water Quality

This section addresses key issues concerning Coachella Valley's water quality.

Water Supply

Groundwater

Groundwater supply from the Coachella Valley Groundwater Basin is generally of high quality. Disinfection is not required but is generally provided as a precautionary measure before distribution for potable uses. For a summary of recent groundwater quality concentrations, see Table 2-10 in *Chapter 2, Region Description*. The possible negative impacts of groundwater overdraft include a downward flow of degraded upper aquifer water, and intrusion of saline Salton Sea water into the East Valley aquifer thus degrading groundwater quality.

Still, groundwater quality is a concern in isolated areas of the Region. In the East Valley, a combination of reduced Coachella Canal deliveries and increased groundwater pumpage has reduced groundwater flow into the agricultural drains. This allows high-TDS water to migrate from the semi-perched zone downward to the Upper aquifer. **Figure 3-5** illustrates the structure of the local groundwater aquifer, including the semi-perched zone. Additionally, decreasing water levels in the Lower aquifer allows poorer quality Upper aquifer water to migrate downward into the Lower aquifer, particularly along the margins of the basin, where the aquitard separating the two zones is thin or absent. The net result is a decline in the water quality of the Lower aquifer in the East Valley (CVWMP 2002).

In the East Valley, there is concern about elevated levels of arsenic in the groundwater. Naturally occurring substances such as uranium, arsenic, and fluoride have been detected, and are likely due to natural geologic conditions. As described in *Chapter 2, Region Description, Section 2.5.1 Groundwater Quality*, representatives of DAC and tribal organizations report that groundwater supplies for some mobile home park communities within the East Valley have arsenic concentrations that exceed the MCL of 10 ppm. Groundwater overdraft also causes agricultural drainage to percolate past the drains and thereby increasing TDS levels in groundwater (CVWD WMP 2002). Overall, the major groundwater quality concerns for the Coachella Valley include degradation of water quality from: saline intrusion due to declining groundwater levels; presence of Arsenic in the East Valley; high concentration of TDS from agriculture drainage and fluoride; and septic tank leakage (see Wastewater discussion below).

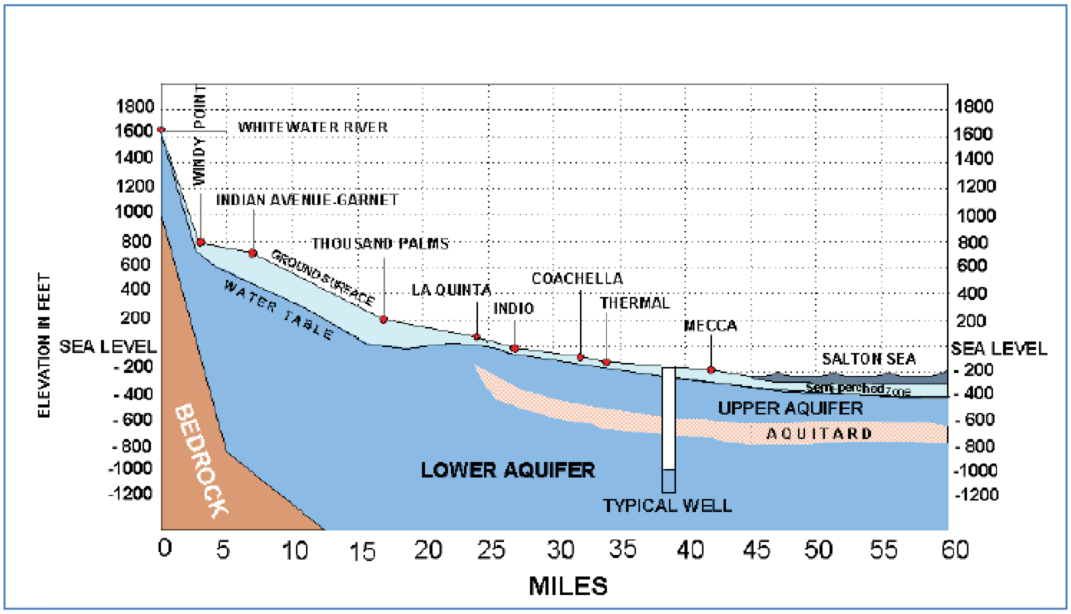
Additionally, a naturally-occurring high groundwater table within the semi-perched zone has the potential to saturate the root zone of crops and stifle growth or eliminate crop production. Therefore, a drainage system was developed for much of the East Valley to reclaim the area for farming. CVWD operates and maintains a collector system of 166 miles of pipe, along with 21 miles of open ditches, to serve as a drainage network for nearly 38,000 acres of irrigated lands. All agricultural drains empty into the CVSC, except those at the southern end of the Coachella Valley which flow directly to the Salton Sea. CVWD plans to begin desalting agriculture drainage to a quality equivalent to Canal water and delivering it for irrigation use by 2023 (CVWD 20005 UWMP).

The CVRWMG has also addressed potential concerns regarding the organic compounds ethylene dibromide (EDB), trichloroethylene (TCE), dibromochloropropane (DBCP), and perchloroethylene (perc or PCE) in Coachella Valley groundwater. Current information demonstrates that EDB and TCE have not been detected in Coachella Valley groundwater, as both have been either banned or replaced. However, groundwater testing demonstrates that DBCP and PCE have been detected in isolated areas.

DBCP has been detected in some groundwater wells located within the Whitewater River Subbasin, and specifically in wells located in the communities of Palm Desert, Indian Wells, Bermuda Dunes, and La Quinta. DBCP was banned in California in the 1980's, but was previously used as a soil fumigant that was primarily applied on grapes in the Coachella Valley to control nematodes. Despite its presence, evidence demonstrates that detected levels of DBCP range from 0.01 to 0.02 ug/L, which is below the drinking water MCL of 0.2 ug/L. CVWD monitors DBCP occurrences in the Coachella Valley and installs wells outside areas of concern or at greater depths to avoid this constituent.

Although PCE is a solvent widely used for dry cleaning and metal degreasing, detection of this substance in the Valley has been limited to isolated incidents. For example, a former dry cleaning business has been identified as the source of a PCE plume in south Palm Springs and is currently subject to a cleanup order. PCE has also been detected in some wells in an area adjacent to the border of Rancho Mirage and Palm Desert within the Whitewater River Subbasin, although the source of PCE in this area has not been identified. When detected, PCE levels in these wells range from 0.5 ug/L to 1.5 ug/L, which is well below the drinking water MCL for PCE of 5.0 ug/L. CVWD monitors PCE occurrence in domestic wells and installs new wells outside areas of concern or at greater depths to avoid this constituent.

Figure 3-5: Coachella Valley Groundwater Basin Perched Zone



Source: CVWD 2002

Issues related to groundwater quality are detailed below.

Groundwater Quality Issues	
Topic	**Issue Statement**
Groundwater Recharge	Urban runoff percolation/retention basins could cause nitrates and other contaminants in the soil to be transported/leached into the deep aquifer. [1]
Groundwater Quality	Although the Coachella Valley Groundwater Basin has had historically high water quality, regional groundwater quality is potentially at risk for increased salinity and nitrates. Individual domestic septic tanks and leach fields, fertilizer application, and wastewater percolation ponds are likely sources of natural organic contaminants.[2]
Groundwater Recharge	The salinity of Colorado River water is higher than the salinity of SWP water, recycled water, and some groundwater. Use of Colorado River water for recharge and irrigation may result in the addition of salt to the basin. [3]
Groundwater Recharge	SWP water contains more total organic carbon and bromide than Colorado River water (both of which are precursors for creating disinfection byproducts). Long term recharge with SWP supplies could contaminate groundwater quality. [4]
Groundwater Quality	Several small private water systems in mobile home parks in East Valley exceed the MCLs for arsenic. Dependable arsenic removal systems are needed. [5]
Groundwater Quality	Groundwater quality may be degraded as a result of increased Salton Sea water and perched water intrusion. [6]

Groundwater Quality Issues	
Topic	**Issue Statement**
Groundwater Quality	Elevated fluoride, arsenic, chromium, and uranium concentrations have been found in groundwater. Several tribal and DAC populations are without a safe and reliable drinking water source. Further research is needed to understand the extent of potential contamination. [6]

1. CVRWMG Tribe meeting - May 20, 2010
2. DWR 2009 Colorado River Regional Report Draft; MSWD 2005 UWMP; RWQCB WMI; CVRWMG Tribe meeting - May 20, 2010
3. DWR 2009 Colorado River Regional Report Draft; MSWD 2005 UWMP; RWQCB WMI
4. DWR 2009 Colorado River Regional Report Draft; MSWD 2005 UWMP; RWQCB WMI RCAC 2010 Coachella Valley Water System Assessments
5. CVRWMG Planning Group meeting - May 19, 2010
6. CWA 2006 WMP Update; IWA IWRDP - Phase 1 White Paper, CVRWMG Tribe meeting - May 20, 2010, CVRWMG DAC meeting - May 20, 2010

Imported Water

Although water supplies (described in *Chapter 2, Region Description*) come from the Colorado River, their water qualities vary slightly. The Coachella Canal diversion is further downstream than the Colorado River Aqueduct diversion (see Figure 2-3: Statewide Imported Water Systems); this results in higher concentrations of TDS and other constituents of concern, including the potential for invasive species such as Quagga mussels. TDS concentrations have averaged in MWD's Colorado River Aqueduct water approximately 635 ppm since 1973 and in the Coachella Canal water (Avenue 52) nearly 800 ppm since 1949 (CVWD 2002 WMP). TDS concentrations and other constituents are listed in Table 2-10 in *Chapter 2 Region Description*.

Therefore, issues regarding imported water supply in Coachella Valley are: presence of TDS, hardness, and minerals; potential presence of Quagga mussels; and salinity of Colorado River water.

Issues related to imported water quality can be found listed below.

Imported Water Quality Issues	
Topic	**Issue Statement**
Colorado River Water Quality	In the past, low levels of perchlorate, selenium, and uranium were detected in Colorado River supplies. Testing results indicate that the contaminants are no longer a concern.[1]
Coachella Canal Water Quality	Coachella Canal water turbidity and temperature can vary greatly. Canal water is not suitable for domestic use without treatment.[2]
Colorado River Water Quality	Quagga mussels pose a potential threat to the imported water supply. These species have not been detected in the Coachella Canal to date, but future use of Colorado River water containing the mussels could cause multiple economic and environmental impacts. [3]
Colorado River Water Quality	The salinity of Colorado River water is higher than the salinity of SWP water, recycled water, and some groundwater. Use of Colorado River water for recharge and irrigation may result in the addition of salt to the basin; this is being studied.[4]

Imported Water Quality Issues	
Topic	**Issue Statement**

1. MSWD 2005 UWMP; DWA 2005 UWMP; CVWD 2005 UWMP
2. CVWD 2005 UWMP
3. CVWD Invasive Species – Quagga Mussels Issues Paper (Draft)
4. CVWD 2005 UWMP; CVWD 2002 WMP; IWA IWRDP - Phase 1 White Paper; MSWD 2005 UWMP; DWA 2005 UWMP

Local Surface Water

The surface water supplies currently used by DWA and those that may be diverted by the Agua Caliente Band of Cahuilla Indians are of high quality, with the concentration of TDS and nitrates both well within the MCLs.

Issues related to surface water can be found below.

Local Surface Water Quality Issues	
Topic	**Issue Statement**
Surface Water Supply	Surface water supplies are inherently more susceptible to seasonal variation and drought because they are fed by runoff originating in the local mountains.[1]
Surface Water Quality	Surface water supplies used for municipal supply are currently only disinfected, but may need filtration in the future.[2]

1. CVWD 2005 UWMP; DWA 2005 UWMP; DWA 2008 General Plan
2. DWA 2008 General Plan

Wastewater/Recycled Water

Wastewater may also impact local water quality through the leeching of septic effluent into the groundwater basin, as well as the addition of salts to the basin through irrigation with recycled water.

Wastewater

Some Valley residents utilize septic systems for wastewater treatment. Failing septic systems or a high density of septic systems have the potential to contaminate the local groundwater basin, a source of drinking water for the area.

Effluents from failing septic tanks have a high risk of polluting ground and surface water with nutrients, and human-borne pathogens. Nitrate, a water-soluble nutrient and major constituent of septic tank effluent, is a widespread ground water contaminant due largely to releases from septic tanks. Heavy pumping of water supply wells may draw down nitrate-polluted water in the unsaturated zone from septic tank discharges, and contaminate ground water.

Issues with wastewater quality are listed below.

Wastewater Quality Issues	
Topic	**Issue Statement**
Septic Systems	Failing septic systems have the potential to contaminate the local groundwater basin.[1]
Groundwater Quality	Widespread use and density of septic tanks in some areas raises possible concerns about using artificial recharge to address overdraft. Changes in groundwater levels could result in septic effluent percolating from underground tanks. However, recharge in the area may reduce the nitrate levels. This issue is being studied.[2]
1. MSWD website, CVRWMG DAC meeting - May 20, 2010, CVRWMG Tribe meeting - May 20, 2010 2. CVRWMG Planning Group meeting - May 19, 2010	

Recycled Water

The two potential sources of recycled water in the Coachella Valley are desalinated agricultural drainage water and treated municipal wastewater effluent. At present, golf courses and parks utilize treated municipal effluent for irrigation. Although recycled water tends to contain elevated nitrogen concentrations, studies at the University of California at Riverside have indicated that little nitrate moves past the root zone in well managed golf courses (Colorado River RWQCB 2006).

The key concerns regarding the quality of recycled water for the IRWM Region are: potential percolation of recycled water with elevated nitrogen concentrations; timing of peak flows; regulatory conflicts associated with recycled water use; and high costs and large energy requirements.

Issues regarding quality of recycled water can be found below.

Recycled Water Quality Issues	
Topic	**Issue Statement**
Matching Quality to Use	Local sources need to be considered, including recycling and stormwater harvesting. Large irrigators (agriculture and golf courses) may be supplied recycled water from municipal effluent, desalinated agricultural drainage water, or untreated Canal water.[1]
Timing of Peak Flows	Wastewater flows in the region peak during winter during high-tourism months. Recycled water demands, however, peak during summer, when the precipitation is low and heat is high. Agencies are using percolation ponds for seasonal groundwater storage; percolation will be reduced as recycled water customer bases develop in the future.[2]
Regulatory Conflicts	Regulatory conflicts regarding recycled water use have arisen between DWR and CDPH. While DWR promotes and encourages the use of recycled water, the CDPH restricts the use of recycled water due to perceived health concerns.[3]
Costs	Planning and implementing a recycled water system, including treatment plant upgrades to tertiary and distribution system expansions, involves high costs and large energy requirements.[4]
1. IWA IWRDP - Phase 1 White Paper; CVWD 2002 WMP; CWA 2006 WMP Update; IWA 2007 WMP 2. CVWD 2005 UWMP; MSWD 2007 WRFS 3. Communication with CVRWMG 2010. 4. MSWD 2005 UWMP; MSWD 2007 WRFS	

Stormwater

Contamination of drinking water wells from agricultural and urban stormwater runoff is a concern for the Coachella Valley IRWM region (CVWD 2002). Stormwater pollution can pose a serious health risk to people due to pesticides, bacteria, and chemicals being picked up as water drains from streets, parking lots, and lawns and enters the WRSC untreated.

Issues related to stormwater quality are detailed below.

Stormwater Quality Issues	
Topic	**Issue Statement**
CVSC Water Quality	CVSC, which drains to the Salton Sea, is listed on the 303(d) List of Water Quality Impaired Segments for pathogens and toxaphene from illegal discharges and animals. A Total Maximum Daily Load (TMDL) is being developed for bacterial indicators in the CVSC. Specifically, the TMDL regulates discharges from the County and City of Coachella. [1]
Stormwater Quality	Salton Sea is listed on the 303(d) List of Water Quality Impaired Segments for nutrients, salinity, and selenium, due primarily to agricultural drainage. Changes in stormwater flows to the Salton Sea may have both positive and negative impacts in regards to this list. [2]

1. DWR 2009 Colorado River Regional Report; RWQCB WMI; RWQCB 303(d) List; RCFCWCD 2008 Whitewater Watershed Benefit Assessment
2. RWQCB 303(d) List

3.1.6 Flood Management

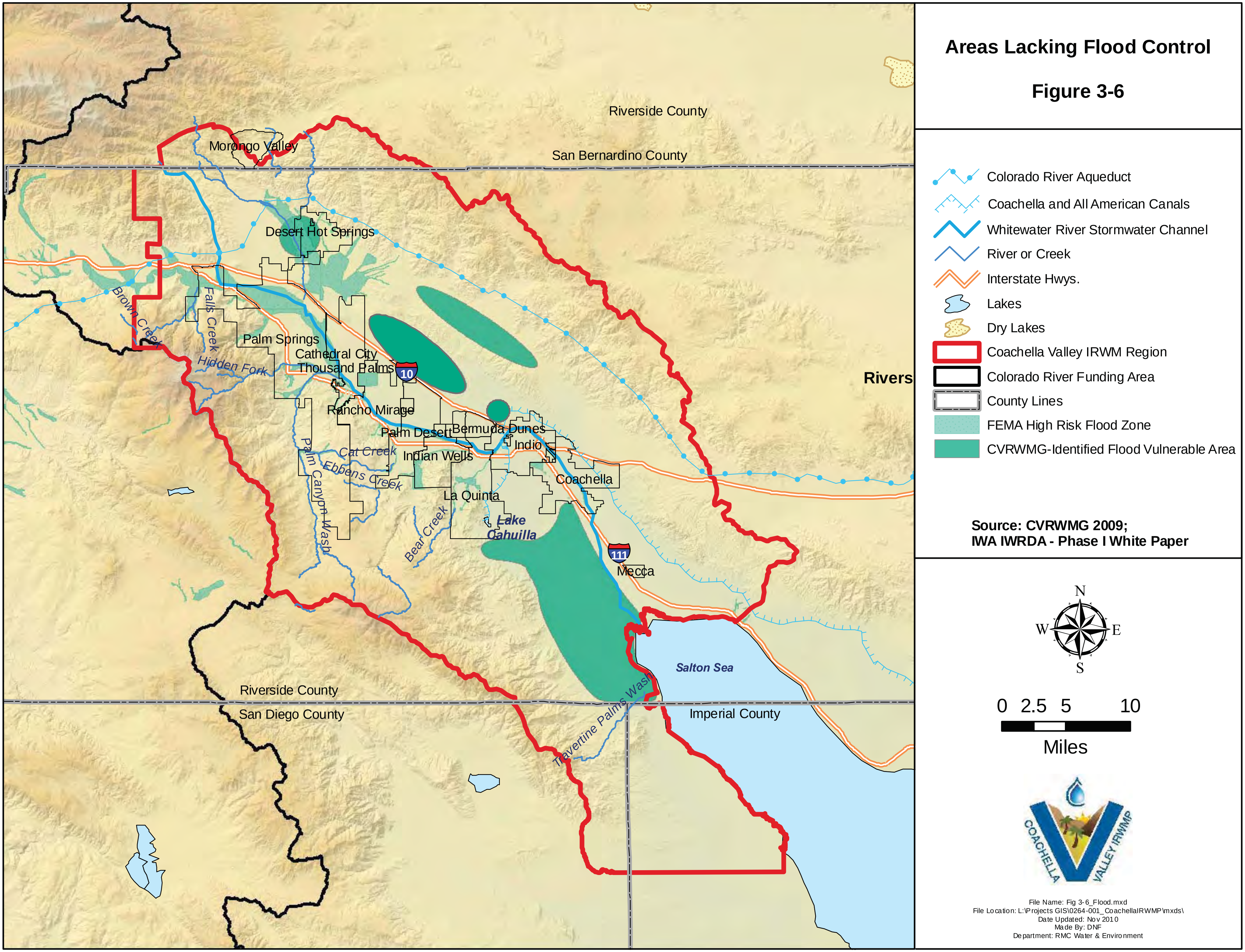
CVWD's regional flood control systems consist of a series of debris basins, levees, and stormwater channels that divert floodwaters from the canyons and alluvial fans surrounding the Coachella Valley to the WRSC. Coachella provides local drainage control via a system of storm drains, retention basins and dry wells, some of which discharge to CVWD's regional flood control system. City of Indio/IWA local drainage control is via a system of storm drains, retention basins, and dry wells.

Some areas are subject to alluvial-fan flash flooding from the surrounding mountain ranges and severe flooding has been frequently recorded beginning as early as 1825 (County of Riverside 2000). The WRSC and its tributary channels protect the Valley cities from Palm Springs to Coachella from flooding. However, there are still several areas of the Coachella Valley IRWM Region that lack flood control facilities and are vulnerable to devastating alluvial and riverine flooding (see **Figure 3-6**).

The current lack of flood control in the East Valley makes development cost-prohibitive. In the City of Desert Hot Springs, alluvial flooding issues coupled with MSHCP requirements make development very difficult. As there appears to be a relationship between flood control and the ability to accommodate housing growth, the need for affordable housing may drive allowances for affordable housing to be built in regions lacking proper flood control.

Areas Lacking Flood Control

Figure 3-6



Source: CVRWMG 2009; IWA IWRDA - Phase I White Paper

File Name: Fig 3-6_Flood.mxd
File Location: L:\Projects GIS\0264-001_CoachellaIRWMP\mxds\
Date Updated: Nov 2010
Made By: DNF
Department: RMC Water & Environment

Issues concerning flood management are detailed below.

Flood Management Issues	
Topic	**Issue Statement**
Alluvial and Riverine Flooding	Much of the Coachella Valley has not been mapped by FEMA, yet is subject to alluvial and riverine flooding. [1]
Alluvial and Riverine Flooding	Several areas lack flood control facilities and are vulnerable to devastating alluvial and riverine flooding. From Avenue 52 to Salton Sea, the WRSC lacks bank stabilization and is in a levee condition meaning that the estimated surface elevation of Standard Project Flood is higher than the elevation of adjacent properties. [2]
1. CVRWMG 2009; IWA IWRDA - Phase I White Paper 2. CVRWMG 2009; IWA IWRDA - Phase I White Paper	

3.1.7 Natural Resources

Key issues concerning the Coachella Valley IRWM Region's water-related natural resources are addressed in this section.

Habitat Conservation

The Coachella Valley IRWM Region may support populations of sensitive species such as migratory birds and endangered desert pupfish listed by California and the federal government. At the north end of the Salton Sea, the CVSWC provides important sheltering, nesting, and feeding resources for migratory and resident waterfowl.

Key water-related natural resource issues for the Coachella Valley include the need for permanent water availability for native flora and fauna; and preserving, restoring, and managing its water-related natural resources. Issues related to Coachella Valley's water-related natural resources are detailed below.

Coachella Valley Natural Resource Issues	
Topic	**Issue Statement**
Water Availability	Lowering the water table (increasing the depth to groundwater) can significantly affect water availability to mesquite plants.[1]
Water Availability	A permanent water source for permanent riparian habitat is needed for the California black rail, Yuma clapper rail, and riparian bird species in the Coachella Valley Stormwater Channel and Delta Conservation Area. Changes in flow to the Sea may impact this habitat.[1]
Water Availability	A permanent water source for desert pupfish habitat is needed in the agricultural drains and flood control channels.[1]
Habitat Restoration	Mesquite and Coachella Valley round-tailed ground squirrel habitat restoration may be needed on CVWD land in the East Indio Hills Conservation Area.[1]
1. CVAG 2007 MSHCP Executive Summary	

Salton Sea

Although the Salton Sea is not within the Coachella Valley IRWM region, local stakeholders acknowledge that runoff from the Valley's storm drains ultimately discharge to the Salton Sea and can impact its wetlands resources.

The Salton Sea is the largest lake in California and has served as a recreational attraction, avian refuge and is a great source of biodiversity. The northern end of the Salton Sea has been described as a freshwater marsh that provides nesting areas, shelters, and feeding resources for migratory waterfowl, including federally listed endangered species. However, the Salton Sea has no natural outlet other than evaporation. Salinity has been steadily increasing due to the lack of discharge; water evaporation thus leaves behind high concentrations of salt.

To ensure continued restoration and protection of wildlife dependent on the Salton Sea ecosystem, three pieces of legislation (Senate Bill 277, Senate Bill 317, and Senate Bill 654) were signed by Governor Schwarzenegger in September 2003, committing the state to a restoration path for the Salton Sea, establishing a Restoration Advisory Committee, and providing limited relief from California's Fully Protected Species Act. By October 2003, the Quantification Settlement Agreement (QSA) had been signed by local, state and federal agencies.

Water-related natural resource issues are listed below.

Salton Sea Issues	
Topic	**Issue Statement**
Salton Sea	Freshwater marshes and wetlands of Salton Sea face rising salinity due to evaporation. Preservation of these water sources and the quality of their water is critical to the survival and propagation of numerous wildlife species. [1]
1. DWR 2009 Colorado River Regional Report Draft; RWQCB WMI	

3.1.8 Issues Groups

Basic provisions of quality groundwater supply and wastewater services are needed to support basic quality of life, health, and safety needs for the two currently defined Issues Groups: DACs and Native American tribes.

Disadvantaged Communities

As described in *Chapter 2, Region Description*, the basis of the disadvantaged communities' characterization in most IRWM plans is U.S. Census maps on income level. The State of California defines a DAC as a community with an annual median household income (MHI) that is less than 80% of the Statewide MHI. Mapping at the Census tract scale was done using 2000 Census data. Data from the 2006-2008 American Community Survey demonstrates that the Statewide MHI was $61,654, and DACs are considered those who earned less than $48,923. Using these standards, portions of six of the nine cities in the Coachella Valley IRWM Region would qualify as DACs: Cathedral City, Coachella, Desert Hot Springs, Indio, Palm Desert, and Palm Springs. Figure 5-2 (in *Chapter 5, Stakeholder Involvement*) provides a map of DACs in the Coachella Valley using 2000 Census data.

Updated data from the 2010 Nielsen Update Demographics model for 2010 demonstrates that that the Statewide MHI was $62,401, and DACs are considered those who earned less than $49,921. Using these standards, all nine cities in the Coachella Valley IRWM Region contain neighborhoods that would qualify as DACs. Use of this Nielsen Update Demographics data shows that eight unincorporated communities also qualify as DACs: Desert Edge, North Shore, Mecca, Oasis, Sky Valley, Thermal, Thousand Palms, and Vista Santa Rosa. Figure 5-3 (in *Chapter 5, Stakeholder Involvement*) provides a map of DACs using 2010 Nielsen Claritas data).

Affordability of water and wastewater is a key issue for DACs. As described in *Chapter 2 Region Description, Section 2.5.2 Groundwater Quality*, DAC and Tribe reports suggest that arsenic levels exceed MCL drinking water standards in localized areas. This issue is complicated by other issues such as affordable housing; for instance, there are many unpermitted mobile home parks in the East Valley that do not receive the required water system monitoring, and provide housing to residents that cannot afford necessary treatment and testing procedures on their own. The Riverside County DEH, Economic Development Agency (EDA), and CVRWMG partners need to be involved in these issues. Additionally, DAC communities within the East Valley report a lack of adequate wastewater infrastructure. The East Valley communities are located within the service area of CVWD; that agency's long-term water supply planning will address the desire for these communities to potentially connect to CVWD's drinking water and wastewater systems.

Furthermore, poor groundwater quality in the hot water aquifer has the potential to have adverse economic impacts on the hot water resources in the West Valley's Desert Edge community. Comprised of senior residents on fixed incomes, many of these small DACs desire to convert local septic systems to municipal sewer in order to ensure that water quality of the hot water resources is maintained. The County of Riverside and CVRWMG partners also need to be involved in these issues.

DAC water supplies must be affordable, accessible, and in compliance with state and federal requirements in order to meet the needs of both East and West Valley residents.

Water-related issues concerning DACs in the Coachella Valley are detailed below.

DAC Water-Related Issues

Topic	Issue Statement
Affordability	Addressing DAC water-related issues without increasing rates.[1]
Connection to the Sewer System	The need for septic to sewer conversion is great, but jurisdictional issues or high costs may delay or prohibit project construction.[1]
Water Supply	Other groundwater sources, such as wells above the perched aquifer, hot water basin wells, and agricultural wells, are not suitable for drinking. In places where wells are contaminated, other water sources such as hauled water can be scarce or entirely inaccessible.[1]
Water Supply	Many DACs are not within urban areas, making water supply even more difficult. One example is concentrated communities of farm workers in rural areas. Rural water treatment systems (point of source or other new technologies) and training are needed in these rural/remote areas.[1]
Flooding and Stormwater	Flooding and storm water management improvements are needed to address flooding hazards in DAC areas, particularly in unincorporated communities. [2]

1. CVRWMG DAC meeting - May 20, 2010
2. 2007 DAC Community Planning Group Notes; CVRWMG DAC meeting - May 20, 2010

Tribal Lands

Many of the issues faced by DACs are also faced by tribes, namely the lack of adequate water and wastewater infrastructure and the high costs associated with improving it. There is a lack of basic water and wastewater infrastructure on some tribal lands in the East Valley. For instance, private sewer facilities are undersized or inadequate in low percolation areas.

The tribes share the CVGB, using groundwater wells where municipal water is not available. Like other Valley users, the tribes are also concerned about regional water issues such as groundwater supply and quality. Groundwater quality in some areas is unsuitable for certain uses. Testing at mobile home parks on tribal lands has found arsenic concentrations of 60-70 ppm compared to the 10 ppm MCL. Due to water quality issues, some tribes rely on bottled water for drinking water supply. There is also concern about increasing TDS concentrations due to recharge activities.

Resource management for sustainability is important to tribes. For example, in the Whitewater River channel on the Twenty-Nine Palms Reservation, flood control channel operations and maintenance activities could potentially impact native plant species or habitats that are culturally important to the tribes. There are also culturally-significant water resources on tribal lands. Tribes wish for these resources to be recognized in the IRWM Plan.

Detailed descriptions of issues concerning tribal reservations in the Coachella Valley are detailed below.

Tribal Water-Related Issues	
Topic	**Issue Statement**
Water and Wastewater Infrastructure	There is a lack of basic water and wastewater infrastructure on some tribal lands in the East Valley. For instance, private sewer facilities are undersized or inadequate in low percolation areas.[1]
Recycled Water	Further expansion of recycled water systems has provided water supplies to tribal development authorities for use on golf courses and other non-potable uses.[2]
Water Quality	Testing at mobile home parks showed arsenic concentrations of 60-70 ppm compared to the 10 ppm MCL. Some tribes are using bottled water for basin water supply.[1]

1. CVRWMG Tribe meeting - May 20, 2010
2. DWA Board Minutes - December 25, 2009

3.1.9 Summary of Water Management Issues

As with other regions throughout the State, the Coachella Valley IRWM Region is facing a variety of water-related issues that can be addressed through the IRWM planning process. Issues identified in this chapter range from the need to secure additional imported water supplies to the quantity and quality of local groundwater to lack of regional flood control.

Table 3-1 below provides a preliminary evaluation and summary of the top 12 categories of key water management issues in the Coachella Valley.

Table 3-1: Summary of Significant Water Management Issues in Coachella Valley

#	Category	Key Issues
1	Reliability of Water Supply	Regional population projections include continued growth, equating to water demand increases. Municipal demands are expected to increase at a faster rate than agricultural demands primarily due to population growth.
2	Groundwater Levels	Basin pumping exceeds total recharge by more than 100,000 AFY on average. Pumping needs to be brought into balance through increased recharge, source substitution, and conservation. Failure to achieve this balance could lead to continued water level declines, water quality degradation, and land subsidence, which can result in loss of groundwater storage and impacts on infrastructure.
3	Imported Water Supply	SWP supplies are less reliable due to Statewide drought conditions and environmental constraints (which have led to reduced pumping) in the Delta. Colorado River supplies are vulnerable due to the prolonged Colorado River Basin drought and recent litigation which could impact the stability of the 2003 QSA.
4	Local Supply Opportunities	Local sources need to be considered, including recycling and stormwater harvesting. Large irrigators (agriculture and golf courses) may be supplied recycled water from municipal effluent, desalinated agricultural drainage water, or untreated Canal water. Challenges associated with cost-effectively linking recycled water supply to customers (i.e., strategic location of treatment facilities), possibly through inter-agency partnerships.
5	Groundwater Quality	The salinity of Colorado River water is higher than the salinity of SWP water, recycled water, and some groundwater. Therefore, use of Colorado River water for recharge and irrigation may result in the addition of salt to the basin. SWP water contains more total organic carbon and bromide than Colorado River water (both of which are precursors for creating disinfection byproducts). Long term recharge with SWP supplies could contaminate groundwater quality. Although the Coachella Valley Groundwater Basin has had historically high water quality, regional groundwater quality is potentially at risk for increased salinity and nitrates. Individual domestic septic tanks and leach fields, fertilizer application, and wastewater percolation ponds are likely sources of natural organic contaminants. Several small private water systems in mobile home parks in East Valley exceed the MCLs for arsenic. Dependable arsenic removal systems are needed.
6	Surface Water Quality	CVSC, which drains to the Salton Sea, is listed on the 303(d) List of Water Quality Impaired Segments for pathogens and toxaphene from illegal discharges and animals.
7	Local Environment	A permanent water source for permanent riparian habitat is needed for the California black rail, Yuma clapper rail, and riparian bird species in the Coachella Valley Stormwater Channel and Delta Conservation Area. Changes in flow to the Sea may impact this habitat.
8	Flood Risks	Several areas lack flood control facilities and are vulnerable to devastating alluvial and riverine flooding. From Avenue 52 to Salton Sea, the WRSC lacks bank stabilization and is in a levee condition meaning that the estimated surface elevation of Standard Project Flood is higher than the elevation of adjacent properties.

Table 3-1: Summary of Significant Water Management Issues in Coachella Valley

#	Category	Key Issues
9	Conjunctive Use	Potential increases in conjunctive use, to the degree that recharge and source substitution are increased more than net outflow, could lead to a solution to overdraft-related problems facing the basin. Key issues that must be addressed include completion of the SWP aqueduct extension and amount of this additional recharge water, its cost, its reliability, and its quality.
10	Water-Related Needs Of Native Americans	There is a lack of basic water and wastewater infrastructure on some tribal lands in the East Valley. For instance, private sewer facilities are undersized or inadequate in low percolation areas.
11	Water-Related Needs Of Disadvantaged Communities	Many DACs are not within urban areas, making water supply even more difficult. One example is farm workers in rural areas. Rural water treatment systems (point of source or other new technologies) and training are needed in these rural/remote areas. The need for septic to sewer conversion is great, but DACs worry that jurisdictional issues or high costs may delay or prohibit project construction.
12	Affordability Of Water	Cost related to continued overdraft could include: reduced groundwater storage capacity; increased power consumption due to increased pumping lifts; repair and replacement of damaged infrastructure; and additional water treatment requirements due to decreases in water quality. Planning and implementing a recycled water system, including treatment plant upgrades to tertiary and distribution system expansions, involves high costs and large energy requirements.

3.2 Technical Analysis

*This section addresses with **Technical Analysis Standard** by documenting that the IRWM Plan is based on sound technical information, analyses, and methods.*

This section identifies the scientific and technical analysis used in development of the Coachella Valley IRWM Plan. Published documents such as regional plans, studies, and technical reports were reviewed, experts were consulted, and meetings with various interest groups were held to understand the short term and long-range needs of the Coachella Valley.

The documents referenced in *Chapter 2, Region Description, Chapter 3, Issues and Needs*, and *Chapter 10, References* of the Coachella Valley IRWM Plan were reviewed by the CVRWMG and the consulting team (RMC and IPM, Inc). As a partnership of the five Coachella Valley water purveyors, the CVRWMG includes a wide variety of water professionals with different water-related backgrounds. The variety of backgrounds of the CVRWMG members and the consulting team allowed the information to be evaluated, analyzed, and interpreted from many different perspectives.

To better understand the water management needs of the Coachella Valley, the CVRWMG also held meetings with various interest groups, which are described in further detail in *Chapter 5, Stakeholder Involvement*:

- Coachella Valley Planning Partners are a group formed at the request of the CVRWMG consisting of representatives from public and non-profit entities that have an interest in water resources of the Region. The Planning Partners support the CVRWMG by reviewing and contributing to draft issues identification, goals and objectives, project prioritization criteria, long-term governance, implementation framework, and other Plan deliverables.
- Disadvantaged Community representatives within the Coachella Valley; DAC representatives were also invited to become Planning Partners. These meetings allowed the CVRWMG to understand the critical water supply/water quality issues and needs of the DACs; and to identify potential solutions.
- The Valley's tribal governments, Bureau of Indian Affairs, and other tribal coordinating agencies were contacted to better understand their critical water resources issues and needs. The CVRWMG learned more about the major water-related concerns facing the tribes such that the long-term implementation of the IRWM Plan was responsive to those needs.
- Other Coachella Valley stakeholders were also identified. These meetings consisted of individual community members concerned with water resources, and representatives from various community groups that are concerned about water resources. The CVRWMG gathered input from the stakeholders about the community priorities and water related concerns.

The information gathered from the pertinent literature, water resource experts, and various interest groups was compiled and analyzed by the CVRWMG and the consulting team to determine the water management needs of the Coachella Valley. This work focused on identifying the key water resource goals and objectives of the Plan area (see *Chapter 4, Objectives*). The CVRWMG and its consulting team then used the information to prepare the Coachella Valley IRWM Plan.

3.2.1 Technical Information

The IRWM Plan goals were determined through review of pertinent literature, and consultation of various experts and interest groups. The CVRWMG undertook an extensive review of regional plans, studies, and technical reports to identify water management issues facing the Coachella Valley. Each section of the above *Section 3.1, Coachella Valley Issues and Needs* contains a summary of issues statement and pertinent literature used to derive the issues statement. This summary provides a snapshot of the studies, models, and other technical methodologies used to analyze the technical information and data sets.

Information was obtained from a broad range of sources, including: CVWD, CWA, DWA, MSWD, IWA, CVAG, DWR, RCAC, Poder Popular, RCFCWCD, County of Riverside, Colorado River RWQCB, and the Desert Recreation District. Plans and reports included: water management plans, water quality reports, engineer's reports, habitat conservation plans, general plans, groundwater replenishment reports, master plans, feasibility studies, system assessments, storm water management plans, and trails studies. *Chapter 10, References* provides a comprehensive list of the resources used to develop this IRWM Plan. Use of these technical resources is appropriate for development of the IRWM Plan, because it represents historic, current, and projected conditions for all service providers within the Valley.

4 Objectives

*This chapter addresses the **Objectives Standard** and establishes which regional conflicts and water management issues the IRWM Plan is designed to address.*

This section identifies the goals and objectives of the IRWM Plan and establishes planning targets that can be used to gauge our success in meeting the objectives for the Coachella Valley IRWM region.

4.1 Goals and Objectives

This section presents the IRWM Plan intent, goals, and objectives, and then explains the collaborative process and tools used to establish objectives.

When the CVRWMG established the Coachella Valley IRWM program in September 2008, CVRWMG members articulated the following overall intent:

"3.1.1 This MOU is to memorialize the intent of the Partners to coordinate and share information concerning water supply planning programs and projects and other information, and to improve and maintain overall communication among the Partners involved. It is anticipated that coordination and information sharing among the Partners will assist the agencies in achieving their respective missions to the overall well-being of the region." (see **Appendix E**).

Through input and discussion by the CVRWMG, Planning Partners, and other stakeholders, five regional goals were established for this IRWM Plan.

IRWM Plan Goals

1. Optimize water supply reliability,
2. Protect or improve water quality,
3. Provide stewardship of water-related natural resources,
4. Coordinate and integrate water resource management, and
5. Ensure cultural, social, and economic sustainability of water in the Coachella Valley.

Through a series of facilitated public workshops and meetings, the CVRWMG, Planning Partners, and stakeholders developed thirteen specific IRWM Plan objectives to accomplish the five broad IRWM Plan goals. Detailed descriptions of each of the objectives are presented in the following sections along with the rationale for development and inclusion of each objective.

IRWM Plan Objectives

A. Provide reliable water supply for residential and commercial, agricultural community, and tourism needs.
B. Manage groundwater levels to reduce overdraft, manage perched water, and minimize subsidence.
C. Secure reliable imported water supply, including restoring/improving reliability of State Water Project supply and securing other imported water supplies.
D. Maximize local supply opportunities, including water conservation, water recycling and source substitution, and capture and infiltration of runoff.
E. Protect groundwater quality and improve, where feasible.
F. Preserve and improve surface water quality by maintaining integrity of agricultural drainage systems, protecting the quality of natural runoff used for potable supply, and reducing pollution in stormwater runoff.
G. Preserve the water-related local environment and restore, where feasible.
H. Manage flood risks, including current acute needs and needs for future development.
I. Optimize conjunctive use of available water resources.
J. Maximize stakeholder involvement and stewardship in water resource management.
K. Address water-related needs of local Native American culture.
L. Address water and sanitation needs of disadvantaged communities, including those in remote areas.
M. Maintain affordability of water.

4.1.1 Determining Objectives

The process for developing objectives for the Coachella Valley IRWM Plan was based on a succession of public workshops and meetings. The CVRWMG, Planning Partners, and stakeholders all participated in a series of facilitated brainstorming sessions on the water management issues facing the region. All of this information is synthesized in *Chapter 3, Issues and Need.* Specifically, a summary of significant water management issues facing the Coachella Valley IRWM Region can be found in Table 3-1.

The IRWM plan goals and objectives are developed based on the major issues identified during the CVRWMG, Planning Partners, and stakeholder meetings. Five issue groups were created to identify, discuss, and prioritize the various water resource issues in the Coachella Valley (see notes from June 2010 public workshop in **Appendix A**). These groups consisted of:

- Water Supply/Conservation Issue Group
- Groundwater Issue Group
- Wastewater/Recycled Water Issue Group
- Stormwater/Flood Management Issue Group
- Natural Resources Issue Group

Based on identified water resource issues, the goals and objectives were established for the IRWM program. Each of the objectives addresses multiple issues raised by the region's stakeholders and is consistent with CWC §1054(c).

Objective 1 Provide reliable water supply for residential and commercial, agricultural community, and tourism needs.

The focus of this objective is to meet the requirements of Goal 1 (optimize local water supply reliability). The Valley's 448,000 residents and $576M agricultural economy are both dependant on a reliable water supply. Additionally, regional growth forecasts project that water demands within the region are expected to increase despite conservation efforts (see Figure 3-1 in *Chapter 3 Issues and Needs, Section 3.1 Demand*). Adequate water supplies must be identified for all sectors of the Valley economy, including residential and commercial, agricultural, and tourism needs. Emphasizing local solutions that increase reliability would potentially reduce future additional demand for imported water supply from the Sacramento-San Joaquin Delta by encouraging development of other, more reliable sources of water.

Objective 2 Manage groundwater levels to reduce overdraft, manage perched water, and minimize subsidence.

The focus of this objective is to meet the requirements of Goal 1 (optimize local water supply reliability). Pumping of the Coachella Valley Groundwater Basin currently exceeds total recharge by more than 100,000 AFY on average. Groundwater levels must be managed in order to curb land subsidence and associated permanent loss of groundwater storage capacity. Further, groundwater overdraft exacerbates salinity issues associated with Salton Sea and perched water intrusion. As groundwater is the Valley's primary water supply source, it is essential that the Valley's water managers work together to manage regional groundwater conditions.

Objective 3 Secure reliable imported water supply, including restoring/improving reliability of State Water Project supply and securing other imported water supplies.

The focus of this objective is to meet the requirements of Goal 1 (optimize local water supply reliability). As documented in the *California Water Plan 2009 Update* (DWR 2009), water allocation, environmental, and hydrologic constraints present significant challenges to the sustainability of historic State Water Project and Colorado River supplies, particularly during long-term droughts. In order to serve projected growth while limiting groundwater overdraft, new or expanded imported water supplies must be secured for the Coachella Valley. This objective aims at securing reliable (non-SWP) imported water supplies and/or encouraging the Region to engage in water transfers that would potentially reduce Sacramento-San Joaquin Delta dependence. For example, collaboration with coastal water purveyors could potentially provide a new source of ocean desalinated water and reduce the region's future dependence on SWP supplies.

Objective 4 Maximize local supply opportunities, including water conservation, water recycling and source substitution, and capture and infiltration of runoff.

The focus of this objective is to meet the requirements of Goal 1 (optimize local water supply reliability). Diversification of regional water portfolios is a key element of this IRWM Plan. Water conservation (reducing water demand and use) is the Valley's most cost effective option and is therefore a central component of the region's diversification program. In order to meet the State's 20x2020 Water Conservation Plan (February 2010) goals for the Colorado River Funding Area – which include 285 gpcd baseline (1995-2005), 237 gpcd interim target (2015), and 188 gpcd target (2020) – all five local water purveyors are implementing water conservation measures. The CVRWMG agencies are also focusing on expansion of recycled water systems, source substitution, desalination of agricultural drain water, and stormwater capture and reuse. Maximizing local supply opportunities is the primary climate change adaptation strategy being employed by the CVRWMG. Source substitution will also help the CVRWMG mitigate potential climate change by reducing energy consumption, especially the energy embedded in water use, and ultimately reduce GHG emissions. Increasing local supply opportunities would also potentially reduce the need for future additional imported water supply from the Sacramento-San Joaquin Delta.

Objective 5 Protect groundwater quality and improve, where feasible.

The focus of this objective is to meet the requirements of Goal 2 (protect water quality). Groundwater quality has historically been of high enough quality to meet all federal drinking water standards without treatment. However, emerging issues include nitrates leaching from septic systems that are failing or above recommended densities, high arsenic levels in the East Valley, and possible salt loading from various agricultural and recharge applications. The salinity of Colorado River water is higher than the salinity of SWP water, recycled water, and some groundwater. Compliance with Basin Plan groundwater quality objectives (taste and odors, bacterial indicators, chemical and physical quality, brines, and radioactivity) is vital for maintaining existing beneficial uses. As the Valley's primary water supply source, it is essential that the Valley's water managers work together to manage regional groundwater quality.

Objective 6 Preserve and improve surface water quality by maintaining integrity of agricultural drainage systems, protecting the quality of natural runoff used for potable supply, and reducing pollution in stormwater runoff.

The focus of this objective is to meet the requirements of Goal 2 (protect water quality). Multiple surface water quality issues challenge the Valley's water managers, including the salinity of agricultural drainage, sedimentation and erosion of natural waterways, and non-point source pollution in stormwater runoff. Although existing regulatory programs control pollutants through a broad range of point and non-point source programs, poor water quality conditions in some areas still challenge the region's water managers. Compliance with Basin Plan surface water quality objectives (aesthetics, tainting substances, toxicity, temperature, pH, dissolved oxygen, suspended solids, TDS, bacteria, biostimulatory substances, sediment, turbidity, radioactivity, chemical constituents, and pesticide wastes) is vital for maintaining existing beneficial uses. As documented in *Section 2, Region Description*, the CVSC does not currently attain water quality standards related to pathogens and toxaphene. Protection of the region's surface water bodies is critical to both meeting future water demands and maintaining functioning ecosystems.

Objective 7 Preserve the water-related local environment and restore, where feasible.

The focus of this objective is to meet the requirements of Goal 3 (provide stewardship of our water-related natural resources). The Coachella Valley features important desert and riparian habitats, and discharges all stormwater runoff into the biologically-rich Salton Sea. Native habitats may be subject to impacts or stress from invasive species, water quality degradation, or groundwater overdraft. Ecosystem protection and restoration activities should focus on the riparian habitats along the Coachella Valley Stormwater Channel.

Objective 8 Manage flood risks, including current acute needs and needs for future development.

The focus of this objective is to meet the requirements of Goal 3 (provide stewardship of our water-related natural resources). Several areas in the Valley currently lack flood control facilities and are vulnerable to devastating alluvial and riverine flooding. Current regulations demand that new developments mitigate their incremental increase in surface runoff and provide retention basins where necessary. Despite these regulations, future growth and development throughout the Valley may increase the volume and duration of stormwater runoff due to the increased amount of impermeable surfaces, which may exacerbate flood risks in undeveloped areas. Floodplain management is particularly critical as it relates to the ability of the Region to adapt to possible climate change impacts associated with storm frequency and intensity.

Objective 9 Optimize conjunctive use of available water resources.

The focus of this objective is to meet the requirements of Goal 4 (coordinate and integrate water resource management). Conjunctive use involves closer coordination between imported surface water supply and other supply sources, including groundwater, recycled water, stormwater, and flood flows. Optimizing conjunctive use will contribute to meeting future water demands, while combating challenges associated with supply unreliability and/or climate change. Optimizing conjunctive use will also contribute to possible climate change adaptation by more efficiently managing water supply and, therefore, reducing associated energy use and GHG emissions. In addition, by improving efficiency through conjunctive use, the Region could potentially reduce future additional demand for imported water from the Sacramento-San Joaquin Delta.

Objective 10 Maximize stakeholder involvement and stewardship in water resource management.

The focus of this objective is to meet the requirements of Goal 4 (coordinate and integrate water resource management). The CVRWMG seeks to establish a stakeholder-driven process for water resources management and this objective encourages that paradigm throughout individual IRWM projects. Maximizing stakeholder involvement and stewardship is essential to Plan implementation because it provides a forum for addressing stakeholder concerns and ensuring regional support for proposed solutions. Public education and outreach at community events, public workshops, and school-based educational programs are necessary in order to promote awareness and support for management of the Valley's water resources.

Objective 11 Address water-related needs of local Native American culture.

The focus of this objective is to meet the requirements of Goal 5 (ensure cultural, social, and economic sustainability of water in Coachella Valley). As described in *Chapter 3 Issues and Needs, Section 3.1.8 Issues Groups*, key issues on tribal lands include lack of adequate water and wastewater infrastructure, particularly in East Valley areas. The Valley's tribes are also concerned with protection of culturally-significant native plant species and habitats, as well as culturally-significant water resources on tribal lands.

Objective 12 Address water and sanitation needs of disadvantaged communities, including those in remote areas.

The focus of this objective is to meet the requirements of Goal 5 (ensure cultural, social, and economic sustainability of water in Coachella Valley). As described in *Chapter 3 Issues and Needs, Section 3.1.8 Issues Groups*, affordability of water supply and wastewater treatment are key issues for DACs. Further, groundwater quality in some areas, such as wells in the perched aquifer, hot water basin wells, and agricultural wells, are not suitable for drinking.

Objective 13 Maintain affordability of water.

The focus of this objective is to meet the requirements of Goal 5 (ensure cultural, social, and economic sustainability of water in Coachella Valley). Water affordability is a concern for all Valley residents, and has been noted as a key concern of DACs and tribes, namely in terms of the capital costs associated with extension of municipal services to remote areas. Further, the Valley's water purveyors struggle with the costs associated with implementing recycled water systems and infrastructure repair and replacement. Although provision of high quality water supply is expensive, the CVRWMG seeks to maintain affordability of water for Valley residents.

4.1.2 Describing the Process

A collaborative process was used to determine the Coachella Valley IRWM Plan goals and objectives. The process of identifying and developing regional goals and objectives involved the following steps:

- Compiling a preliminary set of water resource issues based on regional plans, studies, and technical reports;
- Refining and clarifying the region's water resource issues through a series of facilitated public workshops and meetings;
- Translating the various water resource issues identified by stakeholders into a set of goals and objectives that achieve consensus; and
- Revising the regional goals and objectives based on stakeholder input and feedback.

The CVRWMG undertook an extensive review of regional plans, studies, and technical reports to identify the preliminary set of water resource issues. Information was obtained from a broad range of sources, including CVWD, CWA, DWA, MSWD, IWA, CVAG, DWR, RCAC, Poder Popular, RCFCWCD, County of Riverside, Colorado River RWQCB, and Desert Recreation District. Plans and reports included water management plans, water quality reports, engineer's reports, habitat conservation plans, general plans, groundwater replenishment reports, master plans, feasibility studies, systems assessments, stormwater management plans, and trails studies. *Chapter 10, References* provides a comprehensive list of the resources used to develop this IRWM Plan.

Following completion of the preliminary issues identification, a series of facilitates public workshops and meetings were held to gather further information on key water resource issues from stakeholders. A wide range of stakeholders were gathered in several different meetings to discuss and clarify the issues important to them:

- Planning Partners, including city, county, and regulatory representatives
- Targeted outreach to disadvantaged community representatives
- Targeted outreach to tribal representatives
- Public workshop attended by broad range of stakeholders

Following a thorough vetting of the region's water resource issues, the CVRWMG developed a draft list of goals and objectives for stakeholder consideration. These draft goals and objectives were intended to capture and address all of the many issues raised by stakeholder throughout the issue identification phase. The draft goals objectives were discussed and revised in multiple forums:

- Planning Partners, including city, county, and regulatory representatives
- Targeted outreach to disadvantaged community representatives

- Targeted outreach to tribal representatives
- Public workshop attended by broad range of stakeholders

Following revisions based on all comments received, a final list of goals and objectives were included in the project database, on the www.cvrwmg.org website, and in this IRWM Plan.

4.1.3 Goals, Objectives, and the Planning Hierarchy

This IRWM Plan is intended to optimize water supply reliability, protect water quality, provide stewardship of water-related natural resources, coordinate water resource management, and ensure the cultural and social sustainability of water in the Coachella Valley. To meet these broad goals, thirteen objectives were developed through a collaborative stakeholder process. With input from the Planning Partners, the CVRWMG has also identified measurable targets for each objective in **Table 4-1**. The targets and measurements listed in this table will be revisited through IRWM planning updates and revisions. At that time, the CVRWMG will establish a uniform set of metrics for measuring IRWM Plan effectiveness.

The measurable targets for each IRWM Plan objective provide a way to assess each proposed project's contribution to the regional goals and objectives established by the Valley's stakeholders. The targets are presented for purposes of measuring the region's collective attainment of the IRWM Plan objectives.

Through a public stakeholder process, the CVRWMG and Planning Partners developed these targets to measure the region's progress during Plan implementation (see *Chapter 9, Framework for Implementation*). On an annual basis, the CVRWMG will evaluate the status of each IRWM project and develop a summary of implementation progress for stakeholder review. By reporting each project's contribution to the measurable targets, the Annual Reports will provide the region with an understanding of how the Valley's water management issues and needs are being addressed each year. Projects which are undergoing planning, engineering, and construction will be updated to provide a comprehensive picture of their progress. For more information on monitoring efforts, see *Chapter 9, Framework for Implementation Section 9.4 Plan Performance and Monitoring.*

Table 4-1: Coachella Valley IRWM Plan Goals, Objectives, and Targets

Goals	Objectives	Qualitative and Quantitative Targets/Measurements
1. Optimize water supply reliability.	A. Provide reliable water supply for residential and commercial, agricultural community, and tourism needs.	• Provide average year, single-year dry, and multi-year dry supplies to meet projected demand
	B. Manage groundwater levels to reduce overdraft, manage perched water, and minimize subsidence.	• Stabilize groundwater levels at or near current groundwater levels • Limit further subsidence due to groundwater overdraft to an acceptable level in Palm Desert, Indian Wells, and La Quinta
	C. Secure reliable imported water supply, including restoring/improving reliability of State Water Project supply and securing other imported water supplies.	• Secure 40,000 AFY new imported water supply • Contribute to restoring/improving reliability of State Water Project supply
	D. Maximize local supply opportunities, including water conservation, water recycling and source substitution, and capture and infiltration of runoff.	• Achieve compliance with SB7x7 for conservation savings • Maximize recycled water use to 90% of available supplies AFY Expand stormwater capture and infiltration over current levels • Establish Canal water desalination capacity of 11,000 AFY
2. Protect or improve water quality.	E. Protect groundwater quality and improve, where feasible.	• Maintain West Valley groundwater quality at or above current conditions when economically feasible • Reduce the arsenic concentration in East Valley drinking water • Convert 2 percent per year of existing septic systems that are failing or identified as degrading water quality to municipal sewer • Reduce the frequency and volume of sanitary sewer overflows • Develop and implement a regional Salt and Nutrient Management Plan Strategy in accordance with the State's Recycled Water Policy
	F. Preserve and improve surface water quality by maintaining integrity of agricultural drainage systems, protecting the quality of natural runoff used for potable supply, and reducing pollution in stormwater runoff.	• Implement TMDL requirements according to adopted schedules • Preserve natural runoff in Chino Creek, Snow Creek, and Falls Creek for drinking water needs

Goals	Objectives	Qualitative and Quantitative Targets/Measurements
3. Provide stewardship of our water-related natural resources.	G. Preserve local environment and restore, where feasible.	• Conserve or protect native water-related habitats • Provide restoration consistent with the CVMSHCP
	H. Manage flood risks, including current acute needs and needs for future development.	• Provide flood protection to existing properties where benefits exceed costs • Develop new flood control facilities in conjunction with new development
4. Coordinate and integrate water resource management.	I. Optimize conjunctive use of available water resources.	• Implement projects coordinating management of surface and groundwater resources consistent with the CVWMP
	J. Maximize stakeholder involvement and stewardship in water resource management.	• Develop CVRWMG website to provide centralized access to water resources data • Conduct outreach and education on water resources topics/projects to the Valley population through conservation programs • Provide “hands-on” water resources stewardship opportunities to the Valley population through conservation programs
5. Ensure cultural, social, and economic sustainability of water in the Valley.	K. Address water-related needs of local Native American culture.	• Address Native American needs through ongoing communication with local tribes • Support protection of culturally-significant resources on tribal lands
	L. Address water and sanitation needs of disadvantaged communities, including those in remote areas.	• Address DAC needs through ongoing communication with an increasing number of organizations and participants. • Improve well conditions in DACs to meet drinking water standards, where feasible • Convert 50% or more septic systems that are failing or degrading water quality in DACs to municipal sewer
	M. Maintain affordability of water.	• Manage rate increases to $/AF • Maintain average cost to income ratio at current levels

4.2 Prioritizing Objectives

This section contains an explanation of how IRWM Plan objectives are grouped together as a priority for implementation.

Through facilitated meetings to discuss project prioritization, the CVRWMG, Planning Partners, and stakeholders have determined that the following regional goals and objectives are priorities for implementation in the Coachella Valley:

- Optimizes Water Supply Reliability (Goal 1, including Objectives A-D)
- Protects or Improves Water Quality (Goal 2, including Objective E-F)
- Manages Flood Risks (Objective H)
- Optimizes Conjunctive Use of Surface and Groundwater Supplies (Objective I)
- Directly Benefits Disadvantaged Communities (Objective L)

Because of the broad range of stakeholders involved in the planning process – from water suppliers and wastewater agencies, to land use planners and regional flood managers, to conservation organizations and DACs representatives – no specific numerical priority could be placed on the priorities. Different stakeholders in the IRWM planning process place priority on different issues and needs. However, through a consensus-based stakeholder process, the region's participants have determined that the nine identified objectives are key priorities for near-term Plan implementation. As such, those objectives are granted more weight in the project prioritization process discussed in *Chapter 7, Project Evaluation and Prioritization.*

Of primary importance to the Coachella Valley IRWM Plan is the concept of integration, which involves addressing water supply, water quality, flood control, and ecosystem challenges through multi-benefit project solutions. Projects and programs which are able to address multiple Valley issues through the combination of resource management strategies and/or partnerships are given priority weighting (see detailed discussion in *Chapter 7, Project Evaluation and Prioritization*). Single-objective projects, in contrast, that may address a critical water management needs are re-designed to seek greater integration with other regional efforts.

5 Stakeholder Involvement

This chapter addresses the ***Stakeholder Involvement Standard****, which ensures that the CVRWMG gives the opportunity to all stakeholders to actively participate in the IRWM decision making process on an on-going basis. This chapter also addresses the* ***Governance Standard****, which describes the structures and procedures that govern Plan decision making and result in Plan longevity.*

As discussed within *Chapter 1*, *Introduction*, the IRWM program is led by the CVRWMG with primary support from an advisory board known as the Planning Partners. Because the Coachella Valley is an emerging IRWM region, the CVRWMG has many options for ensuring that stakeholders are identified and provided the opportunity to participate. No structures are in place that would create a barrier to participation; therefore, nothing has to be deconstructed and each procedure, process, or structure that is put in place can be evaluated for its effectiveness at being inclusive and providing transparency. A review of the CVRWMG governance structure will show that the process for stakeholder participation is rooted in broad-based community input through key processes:

- Stakeholders focus on a variety of water resource issues are invited to participate, as evidenced by the broad reach of the stakeholder list (**Table 5-6** at end of chapter);
- Stakeholders are drawn from outside the water community, to include environmental, recreational, development, and land use representatives; and
- Stakeholders have wide regional distribution in their geographic reach.

The intent of the CVRWMG is to establish processes that will achieve a collaborative, multi-stakeholder result so that regional solutions address concerns of DACs, tribes, the environmental community, and other key stakeholders. Some of the processes that CVRWMG will employ to promote collaboration and access include:

- Stakeholders participate in identifying regional water issues and then are free to participate in more focused Issues Groups, according to their interests;
- Within each of the Issues Groups, diverse and divergent views are heard as the Groups frame and articulate issues; and
- A representative from each of the Issues Groups participated in the Planning Partners to consider and scope the final issues, goals, and objectives of this IRWM Plan.

5.1 Formation of Regional Water Management Group

This section describes how the CVRWMG was selected.

In the past, the regional water management of Coachella Valley was done by DWA and CVWD without much participation/input from other Coachella Valley water purveyors. The initial interest in producing an IRWM Plan for the Coachella Valley came from MSWD seeking to qualify for Proposition 50 grant money to fund its septic-to-sewer conversion project. In 2004 and 2005, MSWD, DWA, and CVWD began discussions on the need of an integrated approach to water resources planning and an IRWM Plan. However, litigation between the regional agencies, questions regarding the need for an IRWM Plan, and concerns of added government level involvement to the Region's water management efforts delayed the IRWM process.

By 2006, the general managers of CVWD, DWA, and MSWD, along with representatives of the City of Indio/IWA and the City of Coachella/CWA, began bi-monthly meetings in which regional water issues were discussed. This provided a forum for discussions on the Valley's interest and willingness to participate in an IRWM Plan. As a result, in early 2008, the group agreed to a study on IRWM governance, which was funded by CVWD. In February 2008, the five Coachella Valley water purveyors held their first IRWM meeting to develop an MOU (see **Appendix E** of this IRWM Plan).

On September 9, 2008 the five Coachella Valley water purveyors formed the CVRWMG through the adoption of a MOU that established procedures to collaborate and develop an IRWM Plan. Each of the five water purveyors indicated their individual intent to adopt the IRWMP by signing the MOU. The MOU outlines the purpose and goals for the development of the Coachella Valley IRWM Plan, identifies common issues and interests, establishes communication and coordination between the partners, and provides other general provisions. The MOU, as well as the formalization of the Coachella Valley as an approved region through the 2009 RAP, qualify the CVRWMG as a RWMG in accordance with CWC §10539.

5.2 Stakeholder Composition

This section contains a listing of the stakeholders participating in the planning effort as documentation that the CVRWMG is a collaborative effort with participation from varied stakeholders.

As a first step toward achieving inclusiveness in the IRWM program, the CVRWMG held an exploratory meeting with other water resource agencies on April 9, 2009. The four agencies invited to meet were the County of Riverside (CEO office), RCFCWCD, VSD, and the City of Palm Springs. As a result of the meeting, the CVRWMG identified areas of mutual interests and opportunities for collaboration. They include developing multipurpose projects in which RCFCWCD can play a role, as well as obtaining input from all agencies to create a more robust IRWM Plan. From this preliminary meeting, the CVRWMG established the Planning Partners to function as an advisory committee for the IRWM program.

The Coachella Valley IRWM region recognized the importance of including other entities in the IRWM planning process. As a result, they have reached out to engage the broad range of organizations or agencies described in the section above.

5.2.1 Stakeholder Coordination

The goal of the stakeholder coordination effort is to provide a means for the region's various entities with interests and/or authority over water management in the region to maintain an active level of involvement in the IRWM program and implementation of the IRWM Plan. These entities have a vested interest in local water resources and can assist in articulating the needs of the Region during the planning phase, as well as implementing projects during implementation phases. These are also the entities with the greatest potential to oppose the IRWM planning effort if not engaged. Opposition to the IRWM Plan by entities with water management authority could present a significant obstacle to IRWM Plan implementation if these groups are not given ample opportunity to participate and engage in the planning effort.

The goal of public involvement is to increase awareness, understanding, and support for the Coachella Valley IRWM planning effort among the general public. The benefits of keeping the general public informed of the IRWM program and subsequent IRWM Plan implementation include educating constituents and politicians about the importance and interrelation of water management strategies, increasing regional as well as local support for projects, and generating broad-based support for continued regional coordination.

5.2.2 Participants

All interested stakeholders and members of the general public are invited to maintain coordination with the CVRWMG and the subsequent long-term institutional structure. Individuals representing the following groups have been identified as potential stakeholders:

- State, county and municipal governments
- Community councils
- Environmental conservation and natural resources organizations
- Resource agencies and special interest groups
- Flood control districts
- Farm Bureau and agricultural interests
- Academic institutions
- Regional planning organization
- Stormwater management agencies
- Wastewater and water agencies
- School districts
- Private pumpers and large landscape irrigators
- Disadvantaged and environmental justice communities
- Elected officials
- Tribes
- Recreational interests
- Regulatory agencies
- Desert Valleys Builders Association

Interested members of the general public may include:

- Private homeowners
- Landscape architects and contractors
- Chambers of commerce
- Commercial, industrial, and residential developers
- Home owners associations
- Garden clubs and organizations
- Rotary clubs and other service clubs

Table 5-6 (at the end of this chapter) lists of all Coachella Valley IRWM region stakeholders. All stakeholders identified by the CVRWMG and Planning Partners have been contacted and invited to participate in the program. All other meeting attendees can be viewed in meeting minute notes located in **Appendix A**.

5.2.3 Involving Stakeholders in IRWM Planning

This section contains a discussion regarding how the stakeholders necessary to meet plan objectives are either involved in plan activities or are being invited to participate in plan activities.

CVRWMG believes that public access is critical to the success of the IRWM process and outlines below its approach to ensure an open and transparent process. The CVRWMG will take a strategic approach to public outreach using the following tactics:

- Develop an initial public outreach plan that can be executed by any combination of agency staff or consultants (see **Appendix C**).
- Determine best management practices for the dissemination of information for public review and for public input (e.g. print media, agency public information personnel, email and website).
- Make suggestions for establishing public meetings or reformatting of current meeting schedules to allow for public participation.
- Refine the timeline for the IRWM process in such a way that appropriate dates for notification of public meetings, workshops, sub-committee meeting, etc. can be documented and addressed in a logical and orderly manner.
- Apprise the members at each meeting, and sooner if necessary, as to the issues and needs for supporting public outreach.

The public is notified of meetings and given specific contact information, and participants are given sufficient time to prepare. The first opportunity for the public to attend IRWM program meetings was concurrent with the RAP application in October 2009; the second opportunity was during the IRWM Plan development process in June 2010; the third was for public comment on the Draft IRWM Plan in November 2010. The CVRWMG expects that as the process evolves, the process of soliciting the input, help and support of the public will also evolve.

Workshops are the core of stakeholder and public participation. Initial stakeholder workshops were aimed at formulation of interest groups for more specific development of concepts and funding proposals. The public workshops and Issues Groups are organized to help guide the actions and policies of the CVRWMG and support continuous development of the proposed IRWM Plan. The CVRWMG recognizes the need and importance of public participation and will work diligently to make sure that not only the public is listened to, but that it’s valuable advice helps create the best IRWM process possible for the region.

5.3 Structure and Organization

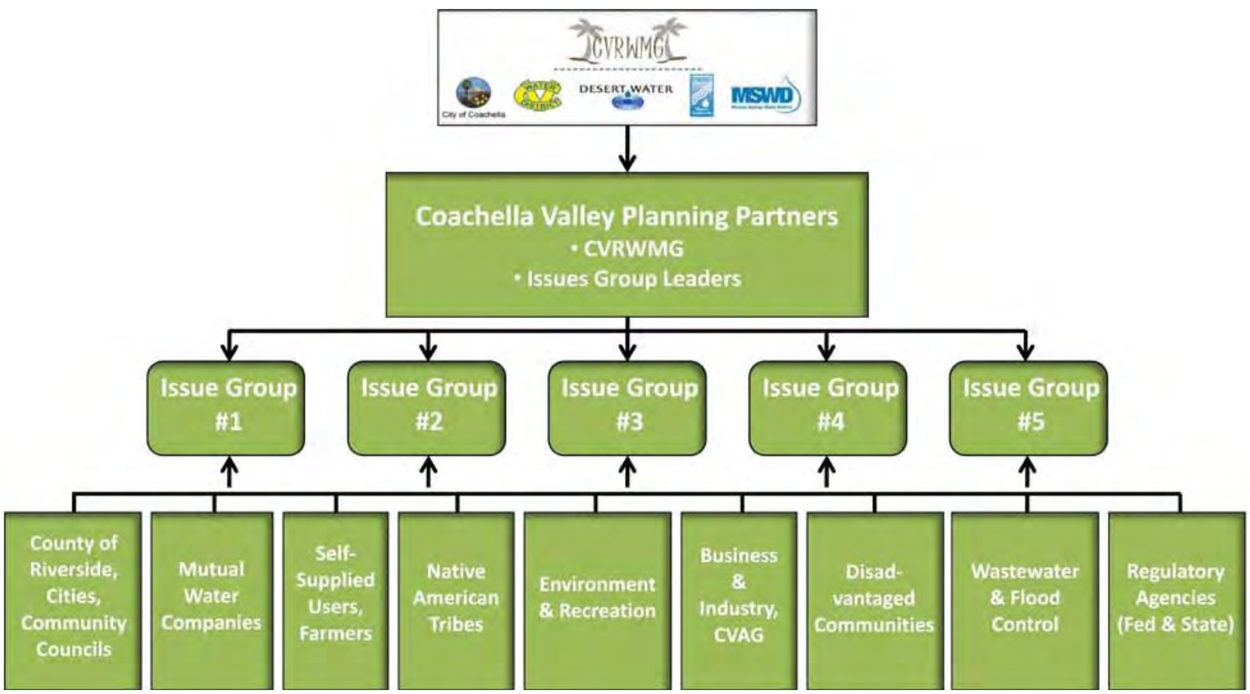
This section contains a description of the chosen governance structure, including committees or groups that support Plan development and implementation.

After the adoption of the CVRWMG MOU (see **Appendix E**), the Region Acceptance Process (RAP) document was submitted to DWR in April 2009. The structure and organization for the Coachella Valley IRWM program was first developed in the RAP. The RAP was accomplished through a collaborative, consensus-seeking process using facilitation services that formalized the CVRWMG’s fiduciary responsibility and authority for the IRWM planning process. It established the governance structure – a collaborative, consensus-seeking process made up of the CVRWMG, Planning Partners, Issues Groups, and stakeholders – under which the Coachella Valley IRWM program is now managed.

The current governance structure for the Coachella Valley IRWM program allows for effective collaboration for updating and implementing the IRWM Plan. It allows for the participation of all interested parties in IRWM planning activities; however, all final decisions are made by consensus of the CVRWMG partners. Since the approval of the RAP, the Planning Partners have evolved into a cohesive group of stakeholders representing agencies and groups throughout the Coachella Valley. Development meetings held in May 2010 identified the need to work directly and separately with two Issues Groups: Native American Tribes and DAC representatives. These two Issues Groups have been meeting since the initiation of the Plan. In the future, new issue groups will be developed both as requested by the stakeholders and in response to the needs of the IRWM Plan.

The regional decision-making process – undertaken by the CVRWMG, the Planning Partners, the Issues Groups, and other stakeholders – involves reaching consensus on fundamental IRWM program goals and activities. **Figure 5-1** illustrates the region's organizational structure.

Figure 5-1: Organization Chart



5.3.1 Group Membership and Participation

This section describes how the CVRWMG, Planning Partners, Issues Groups, and stakeholders have been involved in IRWM Plan development and implementation. **Table 5-1** outlines the roles and responsibilities of the various stakeholders involved in the IRWM program. All stakeholders can contribute to development and implementation of the IRWM Plan regardless of their ability to contribute financially.

Table 5-1: Summary of Roles and Responsibilities

Issue or Action	Roles for Each Group			
	CVRWMG Agency	Planning Partners	Issues Groups	Stakeholders*
Goals and Objectives	Primary	Recommend	Advisory	Participation
Issues and Needs	Participation	Participation	Participation	Participation
Plan Development	Primary	Primary	Advisory	Participation
Project Development	Participation	Participation	Participation	Participation
Project Selection	Primary Approval	Advisory/ Recommend	Inform and Review	Inform and Review
Plan Approval/Adoption**	Primary Approval	Advisory/ Recommend		
Business and Fiduciary Decisions	Primary Approval			

Notes:
Primary/Approval: Fiduciary responsibility and authority for approval
Advisory/Recommend: Review, participate, provide advice, and recommend
Participation: Participate and provide information
Informational: awareness, become informed and participate where needed
*The general public has informational roles wherever the stakeholders are involved.
** Adoption is required for CVRWMG agencies but optional for Planning Partners unless they have project selected for implementation grant applications.

Table 5-2 provides an overview of the meeting structure and frequency for each of the various stakeholders in the IRWM program. Frequency of meetings corresponds to the roles and responsibilities outlined above for each group.

Table 5-2: Meeting Structure Summary

Meetings	Frequency	Purpose
CVRWMG Business Meetings	Monthly	Provide direction, financial resources, and final approval over IRWM program activities.
Planning Partners	Quarterly	Provide guidance and recommendations for IRWM program activities.
Issues Groups	Quarterly	Provide information and recommendations for specific IRWM topics.
Public Workshops	IRWM milestones	Provide feedback and information at key IRWM milestones.

CVRWMG

The CVRWMG members consist of the five water purveyors of the region that are further described in the *Chapter 1, Introduction (Section 1.2, Regional Water Management Group)*: CWA, CVWD, DWA, IWA, and MSWD. The CVRWMG is responsible for providing direction, financial resources, and final approval over the Coachella Valley IRWM program.

Financial decision-making authority and fiduciary responsibility rest with the CVRWMG agencies' governing bodies. These governing bodies are publicly elected or appointed boards or councils, who are therefore held accountable to their electing constituents. IRWM program decisions result from a consensus of the five members of the CVRWMG through the advice and recommendations of the Planning Partners and a full stakeholder participation process.

Leadership and Term

The role of the CVRWMG is to provide direction, financial resources, and final approval of the IRWM Plan. The CVRWMG functions as a collaborative and all IRWM program decisions result from consensus of the five members, through a stakeholder participation process where all five members have equal power. As such, there is no chair of the CVRWMG or term of office.

The CVRWMG has generally asked their consulting team to facilitate and chair meetings. However, the location of the meetings rotates among the participating agencies and, when needed, the local host may function as chair. Each agency may send several representatives to participate in CVRWMG meetings; however, each agency will participate as a unit in consensus building. If a CVRWMG member is unable to attend a meeting, the member must designate an alternate in his/her place and participate in all discussions and report back to other agency representatives. The CVRWMG may establish subcommittees to address particular issues or tasks.

When approved in business meetings or by other means, official actions that do not require approval by the CVRWMG agency governing boards are transmitted under letter signed by all five partners.

Plan Development and Outreach

The role of the CVRWMG is primarily to develop the IRWM Plan. CVRWMG provides funding and support for the Plan, as well as providing information to the consultants assisting with development of the Plan. The CVRWMG's involvement in this IRWM planning process is critical, as the service areas of the CVRWMG agencies cover a vast majority of the IRWM planning area in the Coachella Valley. As such, several of the CVRWMG agencies are the primary authors of sections of the IRWM Plan.

CVRWMG members also have primary authority over implementation of the IRWM program. A CVRWMG member will submit IRWM Grant Program planning and implementation grant applications on behalf of the group, and will administer awarded grant funding to the selected projects. The CVRWMG and its governing boards have the ultimate responsibility for the overall program and for ensuring that all appropriate stakeholders and Issues Groups participate and contingent upon available funding.

CVRWMG Business Meetings

The CVRWMG will generally have monthly business meetings as necessary for the purpose of directing the consulting team and coordinating amongst each other.

Meeting Description and Content*:* The agenda for the meeting will set the business to be conducted, but will generally include the CVRWMG organization, management of the IRWM program and other purposes identified in Sections 3 and 4 of the CVRWMG MOU (see **Appendix E**). The meeting will be the opportunity for the CVRWMG to provide direction to the consulting team working on the IRWM Plan and related efforts.

Audience: Because the meeting content will be technical and detailed in nature, consistent participation is required in order to maintain momentum and effectively contribute to the discussions.

***Attendees**:* CVRWMG Partner agencies, as indicated in the MOU, shall have a representative at each meeting (see **Appendix E**). Other attendees may be recommended by one or more CVRWMG Partners but may only attend upon consensus of all CVRWMG Partners. Business meetings are not public meetings therefore attendees are CVRWMG Partners, consulting team members and/or approved invited guests.

***Documentation**:* Materials and approved notes of the CVRWMG business meetings may contain confidential information and are not public documents. Elements of the materials and summaries of actions may be prepared for public information, including publication to www.cvrwmg.org.

Planning Partners

One of the first steps in soliciting public involvement was to establish a list of key stakeholders that can serve in an advisory capacity. Planning Partners include the County of Riverside, Coachella Valley cities, special districts, public agencies, non-governmental organizations, and tribes. Planning Partners have participation from Issues Group Leaders and other representatives from stakeholder groups throughout the Valley with the approval of the CVRWMG. Representatives for the Planning Partners were self-selected by the Issues Groups to allow for interaction and feedback from the Issues Groups.

The Planning Partners played a valuable role in shaping key elements of the IRWM Plan, such as helping to establish goals and objectives, developing prioritization criteria for projects, reviewing and weighing in on draft IRWM Plan chapters, and implementing Plan activities. An advisory group's membership may be changed from time to time by the CVRWMG, as appropriate for ongoing management of the IRWM program. The goal of the Planning Partners is balanced membership and participation from representatives of all significant water resource issue areas in the Valley. **Table 5-3** provides a list of the Planning Partners.

The Planning Partners are expected to meet on a quarterly basis as necessary to provide recommendations on IRWM planning and funding application activities. At a minimum, meetings would be held during key program milestones, including project solicitation and prioritization and development of the IRWM Plan Update. Meetings may be held at variable times of day as needed and in different geographic locations within the Region. As appropriate, meetings would be located near disadvantaged areas to facilitate attendance by members of the local public.

Outreach would involve announcing and posting agendas, summaries, handouts and presentations of the advisory group meetings on the Coachella Valley IRWM website. Additionally, all meetings and materials would be announced to the Coachella Valley IRWM stakeholder email distribution list.

Letters indicating support of this IRWM Plan from the Planning Partners are available in **Appendix F**.

Leadership and Term

The Planning Partners currently do not have chairperson(s); rather the consulting team facilitates and chairs meetings. If the group determines that chairperson(s) are warranted, Planning Partners co-chairs will be appointed by CVRWMG, with the consensus of the Planning Partners. One co-chair shall be a member of the CVRWMG and the other shall be a representative of non-CVRWMG partners. The co-chairs may serve terms of one to two years, or the duration of the IRWM Update.

Table 5-3: Coachella Valley Planning Partners

No.	Agency / Organization
CVRWMG	
1	City of Coachella / Coachella Water Authority
2	City of Indio / Indio Water Authority
3	Coachella Valley Water District
4	Desert Water Agency
5	Mission Springs Water District
Planning Partners	
1	Agua Caliente Band of Cahuilla Indians
2	Augustine Band of Cahuilla Indians
3	Cabazon Band of Mission Indians
4	California Rural Legal Assistance Foundation
5	City of Cathedral City
6	City of Desert Hot Springs
7	City of Indian Wells
8	City of La Quinta
9	City of Palm Desert
10	City of Palm Springs
11	City of Rancho Mirage
12	Coachella Valley Association of Governments
13	Coachella Valley Economic Partnership
14	Colorado River Regional Water Quality Control Board
15	County of Riverside
16	Desert Alliance for Community Empowerment
17	Friends of the Desert Mountains
18	Morongo Band of Mission Indians
19	Myoma Dunes Mutual Water Company
20	Poder Popular
21	Representative from Assemblymember Perez
22	Representative from Supervisor Ashley
23	Representative from Supervisor Benoit
24	Riverside County Flood Control and Water Conservation District
25	Salton Community Services District
26	Torres-Martinez Desert Cahuilla Indians
27	Twenty-Nine Palms Band of Mission Indians
28	U.S. Bureau of Indian Affairs
29	Valley Sanitary District

Plan Development and Outreach

The Planning Partners are the primary advisory group for development of the IRWM Plan. They are involved with all facets of Plan development and implementation. They comprise many of the project submissions and are therefore essential to implementation of the Plan. Planning Partners also provide support for public outreach efforts. The public who may wish to participate in the IRWM planning process may contact their city and district representatives of the Planning Partners, and may interact with any member of the Planning Partners that they wish.

Planning Partners Coordination Meetings

The CVRWMG may also have frequent Planning Partners meetings which may or may not occur on the same day as business meetings or public workshops.

Meeting Description and Content: The agenda for the Planning Partners meeting will be set by the content for the development of the IRWM Plan and the needed materials, information, feedback and recommendations from the Planning Partners and Issues Groups Leaders. IRWM Plan content includes advice, issue identification and characterization, goal and objective development, project development and integration and plan documentation which will be the primary meeting content. These meetings will be the primary opportunity for the Planning Partners and CVRWMG to provide in-kind contributions and assistance to the development of the IRWM Plan and related efforts. Planning Partners would assist the development of draft materials and feedback prior to the broader stakeholder group and would require more significant time commitment than stakeholder participation.

Audience: Meeting content will be somewhat technical and detailed in nature and will benefit from consistent attendance for best results.

Attendees: Members of the CVRWMG agencies, consultant team, Planning Partner agencies and organizations, DAC Partners, Tribal Partner staff and Issues Groups Leaders will attend this meeting. Planning Partners include the County of Riverside, CVRWM Area Cities, DAC representatives, Tribal staff and other invited water-related organizations. Attendees may shift as the topics and content of the meeting changes but CVRWMG, Planning Partners and Issues Group Leaders shall have representatives at each meeting. Other attendees may be recommended by one or more Planning Partner or Issues Groups Leader but may only attend upon CVRWMG approval. This is not a public meeting.

Documentation: Materials and work products from the Planning Partners should not contain confidential information and will be made available to the public. Meeting preparation may include meeting notices and invitations, development and distribution of presentations, and meeting handouts and minutes. All materials, presentations, and notes of the Planning Partners will be made available on the website: www.cvrwmg.org.

Issues Groups

Participation in Issues Groups is open to any stakeholder who consistently participates. The Issues Groups may select their co-chairs or defer to the consulting team for leadership.

Native American Tribes Issues Group – The Native American Tribes Issues Group has been active and brings specific issues of cultural water use and special needs related to sovereign tribes in the region. Like other Valley users, the tribes are also concerned about regional water issues such as groundwater supply and quality. Tribal principals, as well as representatives the U.S. Bureau of Indian Affairs, were included. **Table 5-4** indicates the principal participants who are represented in meetings.

Table 5-4: Native American Tribes Issues Group Participants

Contact Person	Division/Title	Organization
Richard M. Milanovich	Chairman	Agua Caliente Band of Cahuilla Indians
Mary Ann Green	Chairwoman	Augustine Band of Mission Indians
John James	Chairman	Cabazon Band of Mission Indians
Robert Martin	Chairman	Morongo Band of Mission Indians
Mary L. Resvaloso	Chairperson	Torres-Martinez Desert Cahuilla Indians
Dean Mike	Chairman	Twenty-Nine Palms Band of Mission Indians
Kim Schneider	Palm Springs Agency	Bureau of Indian Affairs
Robert Eben	Superintendant Southern California Agency	Bureau of Indian Affairs
Dale Morris	Pacific Region, Regional Director	Bureau of Indian Affairs

Tribal representatives are also included as Planning Partners for the development of the Plan. Separate Tribal group meetings will be held as needed to facilitate their participation and ensure their issues are appropriately reflected during Plan implementation.

Disadvantaged Community Issues Group – DAC needs and issues were identified as special and different than other groups at the initiation of planning efforts. The DAC Issues Group and meetings began in May 2010. **Table 5-5** indicates the principal participants who are represented in meetings.

Table 5-5: DAC Issues Group Participants

Name	Organization
Anna Lisa Vargas	Poder Popular
Betty Leehan	Desert Edge Community Council
Cindy Nance	Desert Edge Community Council
Debbie Davis	Environmental Justice Coalition for Water
Ed Houser	Desert Edge Community Council
Elanor Dullen	Desert Edge Community Council
Jeff Hays	Desert Alliance for Community Empowerment
Jennifer Clary	Clean Water Action
Jennifer Hernandez	California Rural Legal Assistance Foundation
Jose Huerta	Poder Popular
Laurel Firestone	Community Water Center
Martha Guzman Aceves	California Rural Legal Assistance Foundation
Megan Beaman Carlson	California Rural Legal Assistance Foundation
Miriam Torres	Environmental Justice Coalition for Water
Rita Sonnenberg	Desert Edge Community Council
Sergio Carranza	Pueblo Unido CDC
Yvonna Cazares	Environmental Justice Coalition for Water

Several DAC representatives were also invited to the Planning Partners to support Plan development. DAC Issues Group meetings will continue to be held as needed to assist the DACs in project development and Plan implementation. The CVRWMG has been awarded a contract for services from DWR to explore and extend DAC outreach opportunities associated with the IRWM program.

Other Issues Groups – The RAP presented many other issue areas which may be important to the stakeholders shown in the organizational chart. Additional groups will be formed on an ad-hoc basis to address regional water management issues.

Leadership and Term

The Issues Groups currently do not have chairperson(s); rather the consulting team facilitates and chairs meetings. If the group determines that chairperson(s) are warranted, Issues Groups co-chairs will be appointed by CVRWMG, with the consensus of the Issues Groups. The Issues Groups co-chairs may be selected from any member who is capable of participating in the Planning Partners meetings. Issues Group co-chairs term of office may be one to two years, or the duration of the IRWM Update.

Plan Development and Outreach

Issues Group members and co-chairs are important to the development of issues and project solutions for the IRWM Plan. They are also valuable in establishing regional objectives and reviewing and providing comments on the IRWM Plan. Issues Group co-chairs may assist with outreach in their issue area to the public and other issue groups.

Issues Group Meetings

The Issues Group meetings may or may not occur on the same day as CVRWMG business meetings, Planning Parts meetings, or public workshops.

Meeting Description and Content: The agenda for the Issue Group meeting will be set by the content for the development of the IRWM Plan and the needed materials, information, feedback and recommendations from the Planning Partners and Issues Group Leaders. IRWM plan content includes advice, issue identification and characterization, goal and objective development, project development and integration and plan documentation which will be the primary meeting content. These meetings will be the primary opportunity for the Issues Group and CVRWMG to provide in-kind contributions and assistance to the development of the IRWM Plan and related efforts. Issues Group would assist the development of draft materials and feedback prior to the broader stakeholder group and would require more significant time commitment than stakeholder participation.

Audience: Meeting content will be somewhat technical and may be detailed in nature and will benefit from consistent attendance for best results. Meeting content will be modified for public or new members and may review some prior steps.

Attendees: Members of the CVRWMG agencies, consultant team, and Issue Group members will attend these meetings. Two Issues Groups currently meet, DAC and Tribal partners. Attendees may shift as the topics and content of the meeting changes but CVRWMG will have representatives at each meeting. Other attendees may be recommended by Planning Partners or Issues Groups Leader but may only attend upon CVRWMG approval. Issues Groups meeting agenda may vary depending on the issue and development of the group. Issues Groups meeting will generally be public meetings. Issues Groups members will have specialized knowledge about the subject matter of the group.

Documentation: Materials and work products from the Issues Groups should not contain confidential information and will be made available to the public. Meeting preparation may include meeting notices and invitations, development and distribution of presentations, and meeting handouts and minutes. All materials, presentations, and notes of the Issues Groups will be made available on the website: www.cvrwmg.org.

Stakeholders

Any member of the public who has an investment in or concern with integrated regional water management is a stakeholder. No leadership or term of office is specified for stakeholders.

The core of general public participation and communication will be through public workshops. Through these workshops, the CVRWMG and Planning Partners can solicit input and support from the public. The public is also welcome to attend public workshops that are aimed at formulating Issues Groups that develop concept and funding proposals. These workshops and subcommittees are structured to help guide the actions and policies of the CVRWMG and support development of the IRWM Plan.

Public Workshops

Public workshops may or may not occur on the same day as business meetings or Planning Partner meetings. Workshop topics could include water cost management, groundwater, water quality, water conservation, habitat conservation, and stormwater/flood management. Public workshops may be held at variable times of day as needed and in different geographic locations within the Region. As appropriate, meetings will be located near disadvantaged areas to facilitate attendance by members of the local public.

Two Public Workshops were conducted to enable stakeholders and the general public to help guide the actions and policies of the CVRWMG, as well as support the development of this IRWM Plan. An initial goal of the Public Workshops was to break out into Issues Groups for more specific identification and confirmation of the critical water resources issues in the Valley. The Issues Groups may be reconvened as needed to support development of project concepts and funding proposals.

Meeting Description and Content: The agenda for the Stakeholder Outreach Meetings will be the topical IRWM Plan content and information that is ready for public exposure, comment and feedback. IRWM Plan content issues and decisions will be presented and comments and feedback requested and a variety of formats may be used. This meeting will be the primary opportunity for the public and agencies or groups that do not participate in the Planning Partners to provide advice, comment and feedback on the IRWM Plan and related efforts.

Audience*:* Meeting content will be developed for public presentation and be presented in the most nontechnical manner possible. These meetings will review prior steps and will not rely on consistent participation.

Attendees*:* Members of the CVRWMG agencies, Planning Partners and Issues Groups Leaders will attend in addition to the general public and agencies or groups that do not participate in the other meetings but are interested in the IRWM process or issues to be included in the plan.

Documentation*:* Workshop preparation will include public meeting notices and invitations, development and distribution of public workshop presentations, meeting handouts and minutes, distribution of comment/feedback questionnaires, and compilation and summarization of public responses obtained during the workshops. All materials, presentations, and notes of the public workshops will be made available on the website: www.cvrwmg.org.

5.4 Effective Decision-Making

This section describes how decisions are made at the regional level and how decisions are made within the CVRWMG.

The regional decision-making process – undertaken by the CVRWMG, the Planning Partners, the Issues Groups, and other stakeholders – involves reaching consensus on fundamental IRWM program goals and activities. **Figure 5-1** (above) illustrates the region's organizational structure.

The CVRWMG's approach to decision-making with respect to the development and implementation of the IRWM Plan includes a high level of involvement by the Planning Partners, Issues Groups, and stakeholders. A range of issues is identified in a process that includes a broad variety of stakeholders. The stakeholders then participate in a smaller number of Issues Groups to clarify and formalize issues and opportunities. The chairperson of each Issues Group participates in the Planning Partners, which also includes the CVRWMG partners and any consultants that may be needed. The Planning Partners are tasked with development and implementation of the IRWM Plan, with the CVRWMG providing direction, financial resources, and final approval of the draft plan. The CVRWMG may convene additional subcommittees to address technical, legal, financial, or public outreach issues, as needed.

The CVRWMG, Planning partners, and Issues Groups used a consensus-seeking protocol for decision-making for Plan development and expect to continue with that approach to make key decisions, such as:

- Establishing IRWM Plan goals and objectives;
- Prioritizing projects for inclusion in the Plan and grant applications;
- Financing CVRWMG and IRWM program activities;
- Implementing Plan activities;
- Making future Plan revisions; and
- Hiring and managing consultants.

The CVRWMG expects the combination of a consensus-seeking decision style and broad-based stakeholder participation to be reflected in the regional goals and objectives as comprehensive regional collaboration.

5.4.1 CVRWMG Decision Making Process

The decision making process outlined in the CVRWMG Groundrules is based on the principles of consensus. The CVRWMG Groundrules are part of the RAP, and they help to define the governance structure, purpose, and decision making process for the Group. Decisions by the CVRWMG are made based on agreement among all the participants. To build consensus, an effort is made to meet the interests of all participating CVRWMG members. In addition, if members reach consensus on some but not all of the issues under discussion, they can only go forward with recommendations on the agreed-upon issues. For issues that still remain, members may agree upon a statement that delineates the areas of disagreement, and propose a process for the resolution of these differences in the future.

CVRWMG members are expected to characterize the concerns and positions of the agency/organization they represent and to support consensus-based recommendations to their respective Boards. The decisions, recommendations, and final work product must be acceptable to every CVRWMG member.

5.5 Balanced Access and Opportunity for Participation

This section describes the manner in which the governance structure ensures a balance of interested persons or entities representing different sectors and interests, and provides them the opportunity to participate, regardless of their ability to contribute financially to the IRWM Plan.

The current governance structure allows for the participation of all interested groups to take part in the development and implementation of the Coachella Valley IRWM Plan. No structures have been created that would bar the participation of those interested in being part of the IRWM process. The CVRWMG has invited participation from all stakeholders identified throughout the Valley. This open representation approach allows for the representation of stakeholders without regard to economic status or other constraints. The governance structure was created to achieve regional solutions that address the concerns of all stakeholders, DACs, tribes, and the environmental community through a collaborative and multi-stakeholder approach. See *Section 5.3.1, Group Membership and Participation* (above) for the specific procedures in place to ensure an equal playing field amongst all stakeholders involved in the Coachella Valley IRWM Plan. The roles, their responsibilities, and time commitment (if any) within the governance structure are also detailed in the above *Section 5.3.1*.

The CVRWMG holds an open invitation for participation to all groups within the region. One area where additional participation is expected is from a diverse group of DAC communities. The CVRWMG members and stakeholders look forward to the DAC Outreach Demonstration Program to better develop region-wide DAC participation.

5.5.1 Outreach Activities

Beyond participation in the numerous outreach and involvement meetings outlined in *Section 5.3.1, Group Membership and Participation*, local stakeholders may become involved in the IRWM program through the following outreach mechanisms.

Website

A Coachella Valley IRWM website was developed – www.cvrwmg.org – as a key component of the regional outreach program. The website contains a wealth of information about the IRWM program, including: explanation of the IRWM program and funding opportunities; issues identification, goals and objectives, and other planning materials; the adopted IRWM Plan; information about potential IRWM projects to be included in Proposition 84 and 1E grant applications; information about the CVRWMG; Planning Partners, and Issues Group meeting agendas, summaries, and presentations; and other helpful links.

Newsletters

Information regarding upcoming meetings may be relayed to the general public via fliers posted at community facilities, city and county office buildings, and announcements published in local newspapers and organizational newsletters. An electronic newsletter may be produced quarterly and at major milestones of the IRWM program, as needed to ensure stakeholders are being engaged.

Press Releases

Local newspapers are encouraged to provide coverage of meetings or to provide updates on the progress of IRWM planning efforts. Media relations provide a credible and economic approach to achieving widespread dissemination of key project information. Studies show that information presented to the public through a third party, such as the media, is more readily believed by the public, as opposed to advertising or other methods of information coming directly from the source. Primary press outreach will be associated with kickoff and early awareness efforts early in the project. Press releases may be released quarterly and at major milestones of the IRWM program, including an open "Call for Projects" and IRWM Plan approval, but may be issued at other important junctures.

On-Line Project Database

To facilitate communications among planners and project proponents, the CVRWMG has commissioned an on-line project database aimed at providing universal access to information about IRWM projects in the Coachella Valley region. The project database allows project proponents and other interested parties to add, edit, and review project proposals throughout the region. This tool, coupled with the Public Workshops, is intended to connect stakeholders with one another to identify and enhance synergies among projects, hopefully leading to better integration and stronger partnerships. The on-line project database will also enhance CVRWMG efforts to inform the general public about "what is IRWM" through concrete project examples.

Correspondence

An electronic distribution list of stakeholders and interested parties, and any special subgroups, has been developed and maintained. E-mail notices, the primary method of communication, will be sent to announce the availability of new materials on the Coachella Valley IRWM website, meeting minutes, and upcoming meetings.

5.5.2 Effective Communication – Both Internal and External to Region

This section describes the various communications efforts that are fostered by the Coachella Valley IRWM Plan governance structure with the different functional groups within the CVRWMG, stakeholders, neighboring RWMGs, government agencies, and the public.

CVRWMG

The CVRWMGs two-way communication primarily occurs during the scheduled monthly business meetings. Communication with each of the members also occurs through correspondence via telephone, e-mail, and office visits. The CVRWMG communicates to Planning Partners, Issues Groups, and the public through email, at Planning Partner meetings, and public workshops. The CVRWMG also communicates with the public via their website (http://www.cvrwmg.org/) with information pertaining to the IRWM program.

Project Proponents

Potential project proponents were provided information on the "Call for Projects" through email, at Issues Groups meetings, Planning Partner meetings, and at public workshops. The "Call for Projects" was released via the email list serve and information was made available to all potential project proponents. One of the primary means of communication for project proponents is through an online project database. This database was created to facilitate communication among the project proponents, as well as provide universal access to information about the IRWM projects in the Coachella Valley region. Public workshops and DAC specific meetings were held to provide assistance and support for project proponents. The review and integration of proposed projects was done through communication between stakeholders, Issues Groups, Planning Partners, and the CVRWMG at meetings and all information is available on the website database.

Stakeholders and Public

Primary method of communication for stakeholders and the public is via email, meetings, and public workshops. This enables stakeholders and the public to help guide the actions and policies of the CVRWMG and support the development of the IRWM Plan. Both stakeholders and the public also communicate to the CVRWMG via representation from each of the individual Issues Groups.

Neighboring RWMGs

The CVGB and aquifers of the adjacent IRWM regions, listed in *Chapter 8, Agency Coordination* (see *Section 8.1.2, Neighboring and/or Overlapping IRWM Efforts*), do not have hydraulic connections, therefore planning efforts have remained separate from the Coachella Valley IRWM Plan. For a map of the agencies that may have existing or developing IRWM planning efforts that are adjacent to the Coachella Valley IRWM region, see Figure 8-1.

Since the stakeholders do not overlap and the surrounding planning regions are distinctly separate, the governance structure has not established means of formal communication with the adjacent RWMGs. Neighboring RWMG and IRWM representatives have been invited to attend public meetings and workshops on the Coachella Valley IRWM Plan, and representatives from the Anza Borrego and Mojave regions have attended. Formal discussion with neighboring RWMG is expected to occur in upcoming IRWM Plan Update timeframe. In addition, the ongoing outreach tasks proposed in the *Coachella Valley IRWM Planning Grant Proposal* will enable the CVRWMG to communicate and collaborate with these neighboring IRWM regions.

Government Agencies

State agencies, federal agencies, and NGOs who have an advisory role within the governance structure take part in the development and implementation IRWM process as Planning Partners, Issues Group members, and stakeholders. Government agencies which have direct or significant water-related missions have been invited to participate in the Planning Partners meetings. Local agencies such as the County of Riverside, Riverside County Flood Control and Water Conservation District, Valley Sanitary District, United States Bureau of Indian Affairs, Coachella Valley Association of Governments, and Colorado River RWQCB have an advisory role as part of the Planning Partners.

5.5.3 Open Door Policy

The CVRWMG provides a contact person on the program website and welcomes new stakeholders to contact them; the CVRWMG contact will orient them to the various IRWM processes, encourage them to access information about the IRWM Plan, and inform them how they can participate. The CVRWMG is working with the Issues Groups to ensure that they acknowledge the specialized needs of some participants. These extra efforts may include public meetings along transit access corridors, shifting meeting times so certain stakeholders can attend, or translation services. Further, the CVRWMG is committed to providing IRWM program information to all stakeholders regardless of their access to web-based or e-mail services. The Coachella Valley IRWM Plan is available at CVRWMG agency offices and local public libraries. The CVRWMG is also willing to provide access to material for any stakeholder that requests this information.

5.6 Disadvantaged Communities Outreach

This section defines local disadvantaged communities and describes how they are specifically invited to participate in the IRWM planning and implementation process.

The Coachella Valley has a wide range of disadvantaged communities (DACs) from different demographics, including migrant and seasonal farm workers, very low-income families, urban residents, and low-income seniors. Water management issues that have been identified to date by DAC representatives include arsenic contamination in drinking water supplies, sanitation needs to protect groundwater, health, and safety and, in general, affordability and accessibility of water. The goal of DAC outreach is to identify and obtain input from groups that may be otherwise limited from participating in the IRWM planning and implementation efforts due to financial constraints.

The State of California defines a DAC as a community with an annual median household income (MHI) that is less than 80% of the Statewide MHI. MHI's were estimated through 2000 U.S. Census Bureau data for Coachella Valley census tracts and with 2010 Nielsen Claritas data for census block groups. Census tracts are small, relatively permanent geographic entities within counties delineated by a committee of local data users. Mapping at the Census tract scale is only available using 2000 Census data; the 2010 Nielsen Claritas data was also analyzed to give more current and detailed information regarding the MHI of incorporated cities and unincorporated communities within the Region. According to 2000 Census data, statewide MHI in year 2000 was $47,493 and DACs are considered those who earned less than $37,994. Using 2000 Census tracts, **Figure 5-2** shows the DACs within the Valley using the 2000 U.S. Census data.

Using the 2006-2008 American Community Survey, the Statewide MHI was $61,654 and 80% of the Statewide MHI was $48,923[1]. MHI's for Coachella Valley cities are as follows (* indicates DACs):

- Cathedral City $38,887*
- Coachella $28,590*
- Desert Hot Springs $25,987*
- Indian Wells $93,986
- Indio $34,624*
- La Quinta $54,552
- Palm Desert $48,316*
- Palm Springs $35,973*
- Rancho Mirage $59,826

Using the information above, six of the nine Coachella Valley cities in the region would qualify in their entirety as DACs. In reality, however, the mosaic of DACs is much more complex and is affected by seasonality of crops and hospitality as well as other factors. The region identified a need for more detailed mapping and outreach to be conducted to ensure that significant areas of DACs, including unincorporated and otherwise isolated communities, such as small and unpermitted mobile home communities, are captured.

According to the 2010 Nielsen Update Demographics model, the Statewide MHI for 2010 was $62,401, and DACs are therefore communities with an MHI less than $49,921. Using this information, all nine cities in the Coachella Valley contain pockets of communities that would qualify as DACs. In addition, this dataset shows that the unincorporated communities of Desert Edge, North Shore, Mecca, Oasis, Sky

[1] U.S. Census Bureau, 2006-2008 American Community Survey. American FactFinder: California.
http://factfinder.census.gov/home/saff/main.html?_lang=en

Valley, Thermal, Thousand Palms, and Vista Santa Rosa also qualify as DACs. **Figure 5-3** shows DACs at the census block group-level using the 2010 Nielsen Claritas data.

Many communities within the East Valley are dependent on on-site drinking water wells that are reported as having elevated arsenic levels. Moreover, these communities pay relatively high rates for their groundwater supply, and in many instances must travel long distances to purchase alternative bottled water. Lack of transportation creates an additional barrier to purchase of bottled water. Some DAC areas within the Coachella Valley contain remote or difficult to serve areas that are not within the path of development or close to municipal services for water and wastewater service. These communities have special difficulties in affordability of water-related services.

The goal of DAC outreach is to identify and obtain input from groups that may be otherwise restricted from participating in the IRWM planning and implementation efforts due to financial and other constraints. Through targeted outreach, the CVRWMG seeks to learn more about the major water-related concerns facing these groups such that long-term implementation of the IRWM Plan is responsive to those needs. This effort builds upon the work conducted by the Disadvantaged Community Planning Group, established in 2007 to track the progress of DAC programs under Proposition 84.

Numerous local and State-wide DAC organizations were targeted during outreach for the Coachella Valley IRWM program:

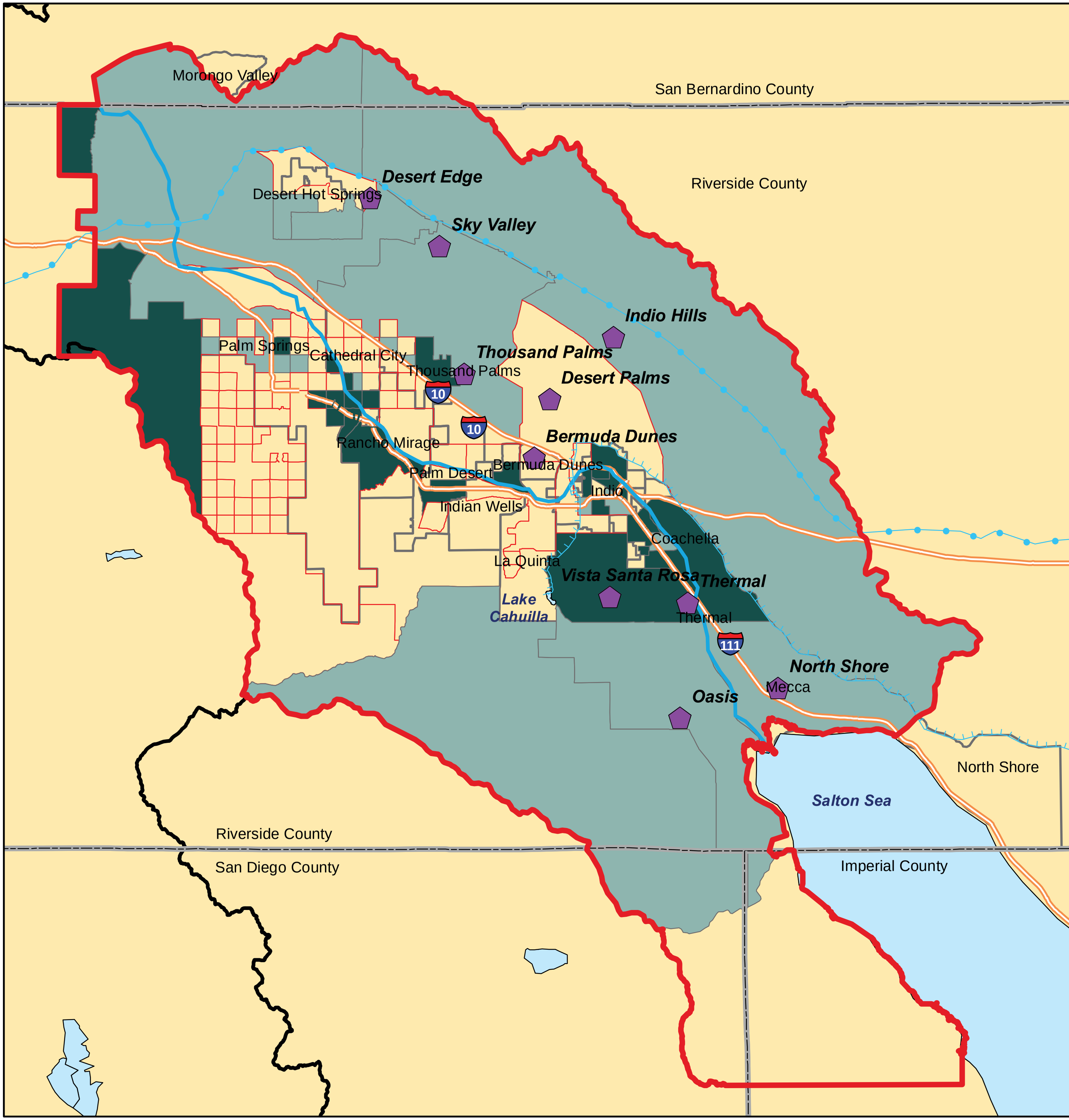
- California Rural Legal Assistance Inc. / Foundation (CRLA)
- Clean Water Action
- Community Water Center
- Desert Alliance for Community Empowerment
- Desert Edge Community Council
- Environmental Justice Coalition for Water (EJCW)
- Pueblo Unido CDC
- Poder Popular
- Inland Congregation United for Change (ICUC)

Environmental justice (EJ) is defined by the USEPA as "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and environmental of environmental laws." Outreach to organizations also involved with EJ issues ensures that water management activities implemented under the Coachella Valley IRWM program do not unduly burden DACs (e.g., through facility location decisions).

Communities targeted as part of the DAC and EJ outreach are groups that have historically been disproportionately impacted with respect to the development, implementation, or enforcement of environmental laws, regulations, and policies due to race, culture, or income. The CVRWMG will work to tailor a more regionally-specific definition of a DAC and identify representatives of those communities. **Table 5-5** above provides a list of participants in the DAC Issues Group.

Disadvantaged Communities

Figure 5-2

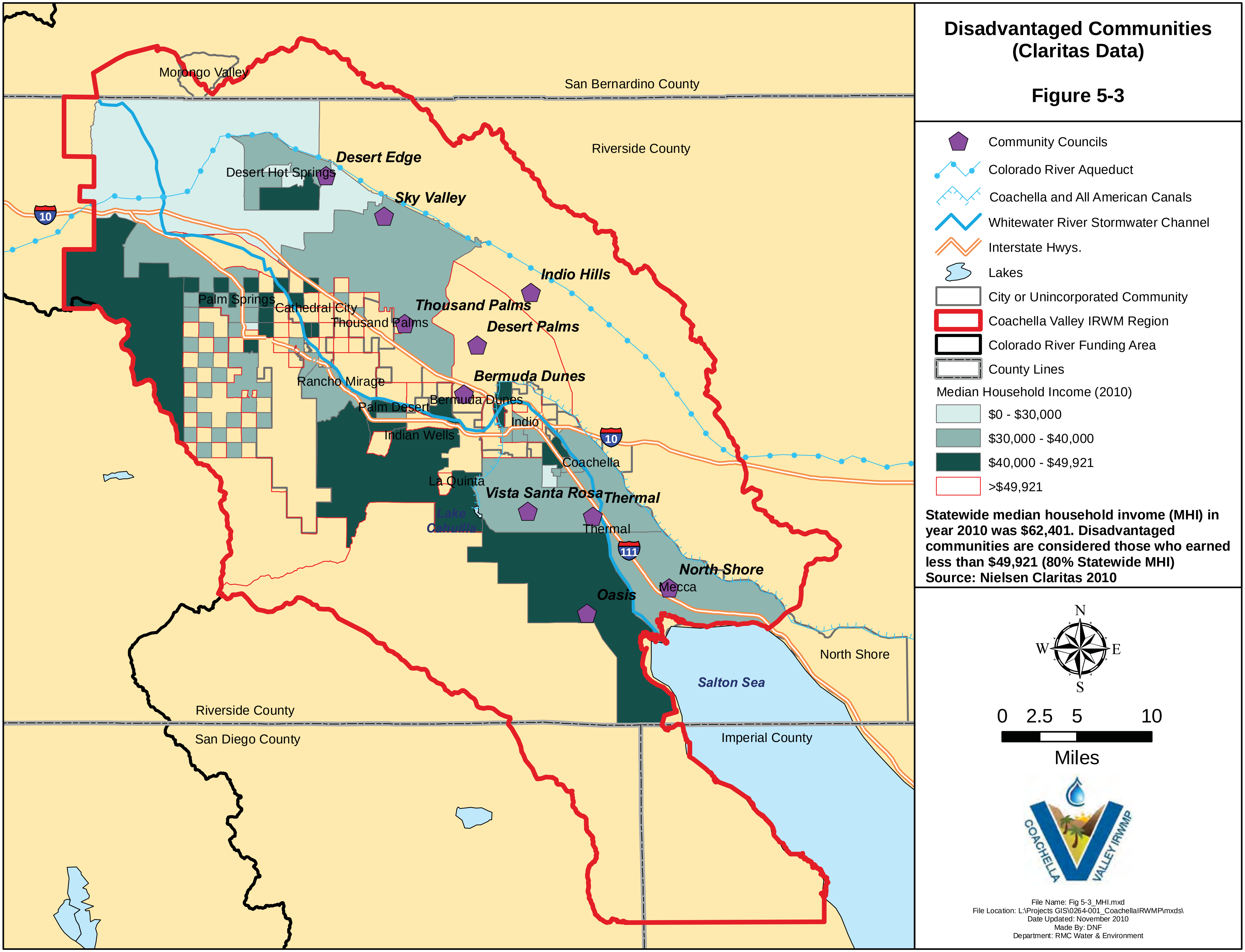


Statewide median household invome (MHI) in year 2000 was $47,493. Disadvantaged communities are considered those who earned less than $37,994 (80% Statewide MHI)

File Name: Fig 5-2_MHI.mxd
File Location: L:\Projects GIS\0264-001_CoachellaIRWMP\mxds\
Date Updated: Nov 2010
Made By: DNF
Department: RMC Water & Environment

Disadvantaged Communities (Claritas Data)

Figure 5-3



Statewide median household invome (MHI) in year 2010 was $62,401. Disadvantaged communities are considered those who earned less than $49,921 (80% Statewide MHI)
Source: Nielsen Claritas 2010

File Name: Fig 5-3_MHI.mxd
File Location: L:\Projects GIS\0264-001_CoachellaIRWMP\mxds\
Date Updated: November 2010
Made By: DNF
Department: RMC Water & Environment

5.6.1 Outreach Activities

DAC/EJ Outreach Meetings

The CVRWMG may host up to six (6) meetings with DAC/EJ members to better understand their critical water supply and water quality needs and to identify potential solutions. Initial meetings will focus on bringing any groups that were not involved in the earlier efforts up to speed and informing all groups about recent activities and opportunities. Subsequent meetings will expand the methods of outreach in DAC/EJ communities, update those groups which may not be able to attend or participate in broader Planning Partners meetings, and develop IRWM planning efforts to meet the needs of each community.

Meetings will be held at times convenient for DAC/EJ representatives (recognizing that this may include evenings and/or weekends) and in different geographic locations within the Region.

Meeting preparation will include public meeting notices and invitations, development and distribution of presentations, meeting handouts and minutes, and coordination of speakers/presenters.

Notices and Newsletters

CVRWMG staff will work with community leaders to identify appropriate methods for notifying members of DAC/EJ communities of the current state of the Valley's water-related resources, the IRWM program, and solutions being generated to address their needs. These methods may include techniques such as notices at community gathering sites, multi-lingual newsletters, mailings, phone surveys, door-to-door surveys, or public meetings within the communities. The focus of these efforts will be to identify the critical needs of the targeted communities. Once identified, these critical needs will be translated into long-term targets for the IRWM Plan. In addition, one-on-one communication between representatives from DACs and the CVRWMG will be used to encourage participation in IRWM public meetings.

CVRWMG Coordination

One or more CVRWMG partner(s) will be identified as the liaison with DAC/EJ organizations, so it is clear how coordination and communication will occur. Additionally, if the CVRWMG and Planning Group determine that a permanent advisory group is appropriate and desired, at least one DAC/EJ representative should be designated to serve on the advisory group.

DAC Outreach Demonstration Program

The CVRWMG has identified the opportunity for more comprehensive efforts relating to DAC outreach and has submitted a DAC Outreach Demonstration Program proposal to DWR for potential funding. If funding is approved, the following additional goals will be achieved as part of the DAC Outreach effort:

- Development of a DAC Community Planning Group to represent one of the Issues Groups;
- At least five (5) DAC Workshops addressing specific community needs;
- Coordination with Community Leaders;
- Flood Control Mapping in DAC Areas;
- Preparation of a DAC IRWM Plan Element;
- DAC Outreach Demonstration Project White Paper.

Correspondence

DAC or EJ communities will have direct connection with a CVRWMG liaison and possibly an advisory group representative. Communication will be conducted mainly via telephone and email; however, office visits may be arranged as feasible. Through one-on-one communication, the CVRWMG will encourage participation by DAC representatives in IRWM public meetings.

5.7 Tribal Outreach and Coordination

This section defines local tribes and describes how they are specifically invited to participate in the IRWM planning and implementation process.

As described in *Chapter 2, Region Description*, most lands within the Coachella Valley are either private lands, public lands administered by the U.S. Bureau of Land Management, or Native American tribal lands. Major Native American reservation lands include (refer to Figure 2-16):

- Torres-Martinez Desert Cahuilla Indians Reservation, Cahuilla
- Cabazon Band of Mission Indians Reservation, Indio
- Augustine Band of Cahuilla Indians Reservation, Coachella
- Agua Caliente Band of Cahuilla Indians Reservation, Palm Springs
- Twenty-Nine Palms Band of Mission Indians Reservation, near Palm Springs
- Santa Rosa Tribal Lands, in Southern Coachella Valley
- Morongo Tribal Lands, which are located just west of the IRWMP region

Additionally, though the Morongo Band of Mission Indians Reservation does not lie directly within the Coachella Valley Region boundary, the tribe was invited to participate in regional planning efforts because it does draw from the underlying groundwater basin and has a vested interest in the Region.

The goal of engaging the Valley's tribal governments is to better understand their critical water resources issues and needs. Through targeted outreach, the CVRWMG seeks to learn more about the major water-related concerns facing the tribes such that long-term implementation of the IRWM Plan is responsive to those needs.

Tribal participants were contacted based on input from currently identified tribal representatives and the Ad-Hoc Planning Group. The five Native American tribes listed above – as well as the Morongo Band of Mission Indians, which borders the region – were targeted during outreach for the IRWM program. Additionally, meetings included the Bureau of Indian Affairs or other tribal coordinating agencies or groups as appropriate.

5.7.1 Outreach Activities

Tribal Outreach Meetings

The CVRWMG may host up to six (6) meetings with tribal representatives to better understand their critical water supply and water quality needs and to identify potential solutions. Tribal outreach meetings, however, will be based on the interest and availability of the tribal representatives. Tribal outreach meetings will inform the tribes about the IRWM program and its purpose, the local IRWM planning process, and upcoming funding opportunities. They will focus on clarifying the tribe's water resources issues and needs, and identifying integrated project concepts that address those needs. In addition, tribal outreach meetings will carefully review the different coordination issues needed for Sovereigns in the Coachella Valley IRWM region.

Tribal outreach meetings will be coordinated with the DAC outreach meetings, as appropriate for the issues being discussed. Individual meetings with tribal leaders and staff will also be held, if needed.

Notices and Newsletters

CVRWMG staff will work with community leaders to identify appropriate methods for notifying members of the tribes of the current state of the IRWM program and timing of project submittals. These methods may include techniques such as notices at community gathering sites, newsletters, or mailings. The focus of these efforts will be to identify the tribes' critical water resources needs and how those are represented in the IRWM Plan. In addition, one-on-one communication between tribal representatives and the CVRWMG will be used to encourage participation in IRWM public meetings.

CVRWMG Coordination

One or more CVRWMG partner(s) will be identified as the liaison with tribal governments, so it is clear how coordination and communication will occur. Additionally, if the CVRWMG and Planning Group determine that a permanent advisory group is appropriate and desired, at least one tribal representative should be designated to serve on the advisory group.

Correspondence

Tribal members will have direct connection with a CVRWMG liaison and possibly an advisory group representative. Communication will be conducted mainly via telephone and email; however, office visits may be arranged as feasible. Through one-on-one communication, the CVRWMG will encourage participation by tribal representatives in IRWM public meetings.

5.8 IRWM Plan Adoption

This section describes adoption of the IRWM Plan.

A public review draft of the 2010 Coachella Valley IRWM Plan was released on November 3, 2010. A press release for this document, as well as an announcement to the stakeholder mailing list, was made available on this day. In addition, an electronic version of the public review draft IRWM Plan was made publically available on the program website (http://www.cvrwmg.org/). The 20-day public comment period for this document extended from November 3, 2010 to November 22, 2010.

The CVRWMG published notices of intent to adopt the IRWM Plan in accordance with Government Code §6066 and CWC §10543. As such, the CVRWMG published two reoccurring notices of intent to adopt the IRWM Plan in a local newspaper, and allowed for a 20-day public comment period prior to public meetings held by CVRWMG member agencies. The CVRWMG will continue to comply with these codes in all future updates of the IRWM Plan.

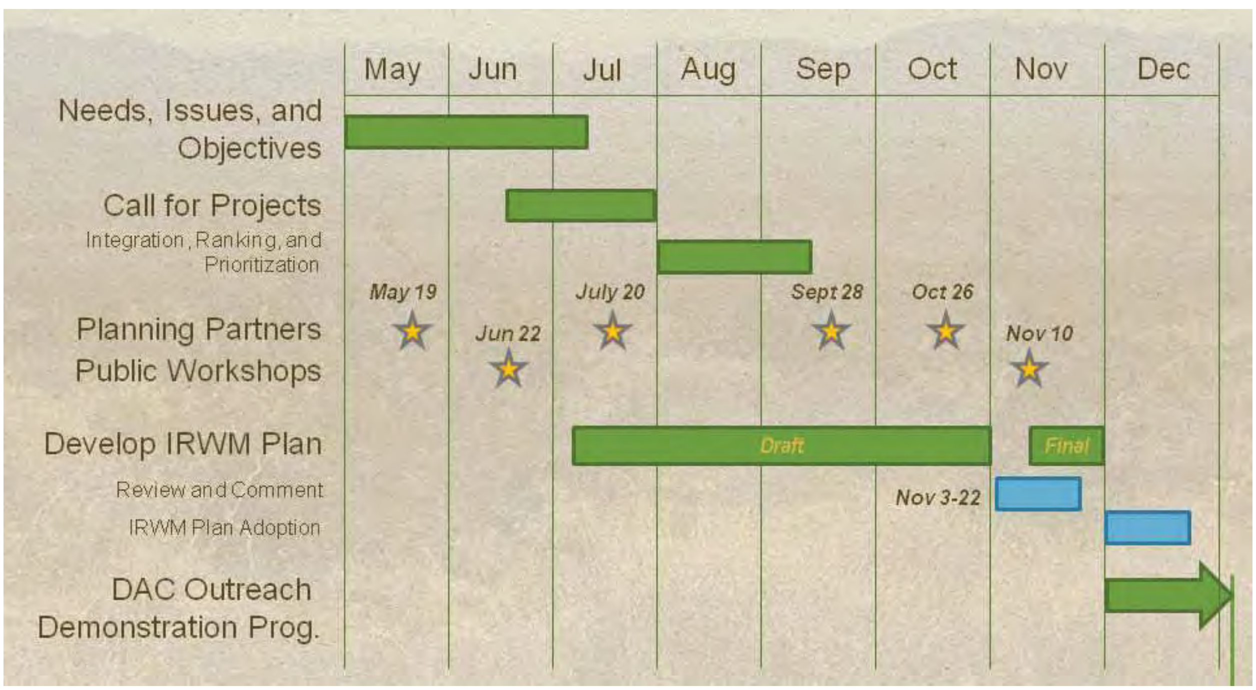
The timeline for Plan preparation and adoption can be seen below in **Figure 5-4**. The Planning Partners and members of stakeholder groups have provided information, projects, and comments in an ongoing process leading up to the public draft.

The CVRWMG agencies will consider approval of the final IRWM Plan as follows:

- The Coachella Water Authority Board of Directors will adopt the Plan at a public meeting on December 8, 2010 at 6:00 p.m. at 1515 6th Street, Coachella CA 92236,
- The Coachella Valley Water District Board of Directors will adopt the Plan at a public meeting on December 14, 2010 at 9:00 a.m. at 85-995 Avenue 52, Coachella CA 92236,
- The Desert Water Agency Board of Directors will adopt the Plan at a public meeting on December 7, 2010 at 8:00 a.m. at 1200 Gene Autry Trail South, Palm Springs CA 92264,
- The Indio Water Authority Board of Directors will adopt the Plan at a public meeting on December 7, 2010 at 4:00 p.m. at 100 Civic Center Mall, Indio CA 92201, and
- The Mission Springs Water District Board of Directors will adopt the Plan at a public meeting on December 20, 2010 at 3:00 p.m. at 66575 Second Street, Desert Hot Springs CA 92240.

In addition, each of the project proponents listed in the upcoming Proposition 84-Round 1 implementation grant application, the City of Cathedral City and Pueblo Unido, will adopt the IRWM Plan in December 2010. Project proponents listed in future IRWM grant applications for Coachella Valley will also adopt the IRWM Plan prior to application submittal.

Figure 5-4: 2010 Timeline for Coachella Valley IRWM Plan



5.9 Long-Term Implementation of IRWM Plan

This section describes how the governance structure helps ensure implementation of the IRWM Plan in the long-term.

The CVRWMG is committed to long-term water resources sustainability and IRWM planning efforts, and to continuously work together with the community to maintain and implement the IRWM Plan. This commitment is evidenced by the base premise in the MOU (see **Appendix E**): *"the partners anticipate the potential need for future agreements on specific projects or programs and with other affected agencies to further coordinate long term water supply planning."*

Evidence of the regional commitment to long-term sustainable IRWM planning includes the significant efforts undertaken to date:

- Negotiation and approval of the MOU to establish the CVRWMG and develop the IRWM Plan,
- Coordination and planning for the IRWM Plan and other programs (such as the Mission Creek-Garnet Hill Water Management Plan collaborative effort), and
- Commitment of cooperative funding of IRWM planning (including development of this IRWM Plan and submittal of a Planning Grant Proposal for the IRWM Plan Update).

In addition, the CVRWMG is committed to ongoing planning efforts not limited to the following:

- Submitting an Implementation Grant Proposal to implement the priority projects identified in this IRWM Plan,
- Preparing a 2012 IRWM Plan Update for the Coachella Valley, and
- Continuing IRWM programs that are valuable to the region and sustainable.

Fortified by the relationships established through the IRWM effort, the CVRWMG is committed to working together on water supply and water quality programs which extend through the 20-year planning horizon. The CVRWMG partners collaborate on various sustainable water supply and treatment programs, including regional surface water treatment or conservation/efficiency programs. The partners have also recognized that conversion of septic systems to sewer or other methods of groundwater treatment is a regional priority that can be implemented in collaborative ways. Finally, all CVRWMG agencies are focused and committed to long term basin management to assure future groundwater supplies to meet Valley needs.

5.9.1 Updating or Amending the IRWM Plan

In accordance with the MOU and the Groundrules, the CVRWMG has identified the following mechanisms for addressing new information that might suggest modifications to the Plan (**Appendix E**). The changes would be developed in the same process as the existing Plan and include Planning Partner, Issues Groups and stakeholder consensus.

Non-Substantive Changes – Non-substantive changes may be made to the IRWM Plan to correct errors or make changes which do not modify the initial intent or implementation of the Plan upon consensus of the CVRWMG and recommendation of the Planning Partners.

Additional Information Availability by Addendum – Addendums will be developed by the CVRWMG to provide additional information gathered from stakeholders, expanded scientific understanding, or other information that updates or expands the IRWM Plan without changing intent or implementation of the Plan upon consensus of the CVRWMG and recommendation of the Planning Partners.

Informal Updates and Substantive Changes – Within the authority provided by the MOU, informal substantive changes may be made by concurrence of the five CVRWMG agencies (**Appendix E**). Such changes should be vetted and recommended by the Planning Partners.

Formal Updates – The Coachella Valley IRWM Plan will be formally updated every five years, or in accordance with DWR's IRWM planning cycle. Formal updates to the IRWM Plan must be based on a stakeholder-driven, consensus based process involving the Planning Partners, Issues Groups, and general public. Formal updates must include a public review period with changes incorporated in accordance with the judgment of the CVRWMG partners. Formal updates to the Coachella Valley IRWM Plan must be adopted by the CVRWMG agencies governing bodies at a noticed public meeting.

Online Project Database

The Coachella Valley IRWM project list is continuously updated on the online project database as projects are completed, new projects are added, or changes are made to projects. Project changes can be made by the project proponents as new funding opportunities arise. **Appendix B** contains the Coachella Valley IRWM project list as of September 30, 2010. However, the project list is a living list and will be continuously updated as the Coachella Valley IRWM program continues forward.

Table 5-6: Coachella Valley IRWM Stakeholder List

Agency	Contacted	Stakeholder List	Planning Partner
Cities			
City of Cathedral City	✓	✓	✓
City of Coachella	✓	✓	✓
City of Desert Hot Springs	✓	✓	✓
City of Indian Wells	✓	✓	✓
City of Indio	✓	✓	✓
City of La Quinta	✓	✓	✓
City of Palm Desert	✓	✓	✓
City of Palm Springs	✓	✓	✓
County of Riverside			
Riverside County Transportation and Land Management Agency	✓	✓	
Riverside County Department of Health	✓	✓	
Riverside County Regional Park District	✓	✓	
Riverside County Economic Development Agency	✓	✓	
Riverside County Flood Control and Water Conservation District	✓	✓	✓
Supervisor Benoit's office	✓	✓	✓
Supervisor Ashley's office	✓	✓	✓
Community Councils	✓		
Bermuda Dunes Community Council	✓	✓	
Desert Edge Community Council	✓	✓	✓
Desert Palms Community Council	✓	✓	
Indio Hills Community Council	✓	✓	
Mecca Community Council	✓	✓	
North Shore Community Council	✓	✓	
Oasis Community Council	✓	✓	
Sky Valley Community Council	✓	✓	
Thermal Community Council	✓	✓	
Thousand Palms Community Council	✓	✓	
Vista Santa Rosa Community Council	✓	✓	
Elected Officials	✓		
Congresswoman Mary Bono Mack	✓		
Senator John Benoit	✓		
Senator Denise Moreno Ducheny	✓		
Assemblyman Brian Nestande (64th Dist.)	✓		
Assemblyman Manuel Perez (80th Dist.)	✓		✓
Resource Agencies	✓		
California Department of Fish and Game	✓	✓	
California Department of Water Resources	✓	✓	✓
Colorado River Regional Water Quality Control Board	✓	✓	✓
U.S. Bureau of Indian Affairs	✓	✓	✓
U.S. Bureau of Land Management	✓	✓	
Special Interests	✓		
Big Morongo Preserve	✓		
Bighorn Research Institute	✓	✓	
Building Industry Association	✓	✓	

Table 5-6: Coachella Valley IRWM Stakeholder List

Agency	Contacted	Stakeholder List	Planning Partner
Center for Natural Land Management (fringed toed lizard preserve)	✓	✓	
Coachella Valley Archaeological Society	✓	✓	
Coachella Valley Association of Governments	✓	✓	✓
Coachella Valley Conservation Commission	✓	✓	
Coachella Valley Mosquito and Vector Control	✓	✓	
Coachella Valley Mountains Conservancy	✓	✓	
Coachella Valley Parks and Recreation District	✓	✓	
Coachella Valley Resource Conservation District	✓	✓	
Deep Canyon Desert Research	✓	✓	
Desert Alliance for Community Empowerment	✓	✓	✓
Friends of the Desert Mountains	✓	✓	✓
Groundwater Guardians	✓	✓	
Hi-Lo Golf Course Superintendents Association	✓	✓	
League of Women Voters	✓	✓	
Sierra Club	✓	✓	
Wildlands Conservancy	✓	✓	
Tribes			
Agua Caliente Band of Cahuilla Indians	✓	✓	✓
Augustine Band of Mission Indians	✓	✓	✓
Cabazon Band of Mission Indians	✓	✓	✓
Morongo Band of Mission Indians	✓	✓	✓
Torres-Martinez Desert Cahuilla Indians	✓	✓	✓
Twenty-Nine Palms Band of Mission Indians	✓	✓	✓
Inter-tribal Council	✓	✓	
School Districts			
Coachella Valley Unified School District	✓	✓	
Desert Sands Unified School District	✓	✓	
Palm Springs Unified School District	✓	✓	
Other Water/Wastewater Companies			
Myoma Dunes Mutual Water Company	✓	✓	
Valley Sanitary District	✓	✓	✓
Private Pumpers and Large Irrigators			
Agricultural pumpers	✓	✓	
Home Owners' Associations	✓	✓	
Golf courses	✓	✓	
Nurseries	✓	✓	
Disadvantaged Community Organizations	✓		✓
California Rural Legal Assistance Foundation	✓		✓
Environmental Justice Coalition for Water	✓		✓
Poder Popular	✓		✓
Pueblo Unido CDC	✓		✓
Rural Community Assistance Corporation	✓		✓

6 Resource Management Strategies

*This chapter addresses the **Integration Standard** by describing how the CVRWMG intentionally creates a system where integration can occur, as well as the **Resource Management Strategy Standard** by defining the diversification of water management approaches in the Region.*

6.1 IRWM Integration Approach

This section outlines the integration principles and methods used during development of the IRWM Plan.

Integration is paramount in making certain that the planning process for this region results in projects that have the greatest benefit to the Coachella Valley. It is critical that the process include the integration of four key areas: stakeholders/institutions, resources, projects, and strategies. The following sections describe the types of integration that are occurring in the planning of projects for this region.

6.1.1 Stakeholder/Institutional Integration

Any successful regional planning effort requires the participation and input from many diverse groups of stakeholders as it builds shared ownership into the planning process. It is critical that IRWM plans contain governance structures and processes that enable diverse groups of stakeholders to participate in all levels of a planning effort. Regional planning efforts rely on collaborative efforts and projects must develop in a manner that balances interests of stakeholders regardless of their ability to contribute financially. Structures and processes to find this balance have been included in all stakeholder involvement portions of this plan and include public workshops to discuss IRWM planning milestones, direct contact with known stakeholders, discussion of projects and integration opportunities with stakeholders, and stakeholder buy-off on key decisions. The Planning Partners play a critical role in the planning process as they serve in an advisory capacity to the CVRWMG, reviewing and contributing to the identification of water management issues, the development of regional goals and objectives, the project solicitation, review, and selection process, and the Plan implementation framework.

Collaboration between stakeholders in the planning process has the added benefit of building trust overtime, allowing for greater collaboration at the project level. Greater collaboration on projects results in a project with broader buy-in, increasing project viability. Additionally, having many different "voices" involved will ensure that more of Valley's water management needs are heard and addressed. For more information regarding collaboration and integration, please refer to *Chapter 5 Stakeholder Involvement*, *Section 5.3 Structure and Organization,* which describes the various structures of the Coachella Valley IRWM planning process that allow for the integration process to occur.

6.1.2 Resource Integration

Several agencies working together have significantly more resources than one does alone, hence the integration of resources has the ability to enhance the outcome of any project. Resource integration – which may include sharing data, technical expertise, or infrastructure – is critical to the success of water management projects for this region. Using the stakeholder outreach methods described above, the region has encouraged all project teams to collaborate between experts, staff, and infrastructure from multiple agencies, resulting in regional water management projects that utilize the best possible combination of resources amongst the agencies and thus yield the best possible results. Entities having differing strengths collaborating on projects have a higher probability of developing solutions that most creatively address the issues and concerns of the region.

6.1.3 Project Integration

The IRWM planning process brings together various groups in order to discuss and better understand the shared needs and opportunities of the region. Local water and wastewater agencies, flood control agencies, planning entities, and open space, recreation, and habitat preservation interests all collaborate to discuss integrated water management objectives and compile a list of implementation projects. During this process, inter-agency collaboration and input allow for the review of local project objectives, their comparison to regional needs, and subsequently the expansion or revision of projects to enhance benefits and effectiveness through identification of regional project partnership opportunities.

Through stakeholder discussions of projects, entities have the opportunity to join together and collaborate on a number of projects rather than duplicate efforts. Additionally, interrelationships between projects can be utilized to implement individual projects as integrated efforts, in order to maximize the potential benefits and minimize the potential impacts of these projects for the region. Implementation of individual projects as integrated groups is beneficial because it utilizes resources and facilities within individual agencies to augment systems and provide benefits that can be shared throughout multiple agencies within the region. Additionally, project collaboration and integration will result in cost savings as it minimizes the duplication of efforts and resources that would occur had those projects been implemented separately.

Projects can also be integrated geographically, such as upstream and downstream within a watershed or by combining multiple projects throughout a subregion. Geographic integration of projects has the ability to maximize benefits to the region, save duplicative administrative costs, and prevent accidental conflicts that arise when multiple single-purpose management strategies are implemented in proximity. For example, project proponents seeking to improve flood protection in the mid-watershed may inadvertently increase flood velocities and subsequently result in erosion or scour of habitat restoration areas downstream. Development of an integrated watershed project would recognize these potential conflicts and plan for mitigation of downstream impacts.

6.1.4 Strategy Integration

The resource management strategies considered as part of this IRWM Plan (see Table 6-2 below) may be combined to effectively address the regional goals established in *Chapter 4, Objectives*. By implementing resource management strategies that complement one another, the participating water resources management entities can help ensure that each goal is fully addressed. While single resource management strategies may address particular aspects of a regional goal, combining multiple resource management strategies will establish a comprehensive, multi-faceted solution that will stand up to circumstances that might otherwise compromise the integrity of a single-pronged solution. By integrating resource management strategies to achieve regional goals, multiple economic, environmental, and long-term water security benefits for the region can be achieved.

6.2 Resource Management Strategies

This section describes all RMS covered in the California Water Plan 2009 Update (DWR 2009).

A comprehensive range of resource management strategies (RMS) were considered in order to achieve the goals and objectives identified for the Coachella Valley IRWM region. This section:

- identifies the RMS considered within this IRWM Plan;
- documents the selection process of the RMS; and
- describes each RMS and any relevant efforts within the Coachella Valley IRWM region (if any).

This section describes all RMS covered in the *California Water Plan 2009 Update* (DWR 2009), assesses the thirteen IRWM Plan objectives outlined in *Chapter 4, Objectives*, and then determines how the resource management strategies from the *California Water Plan 2009 Update* (DWR 2009) can work together to achieve them.

6.2.1 Resource Management Strategies

The Coachella Valley IRMW Plan considered each RMS listed in the *California Water Plan Update 2009* as stated by *Proposition 84 and Proposition 1E IRWM Guidelines* (DWR 2010). The *California Water Plan Update 2009* identified seven categories of RMS applicable to water management in California.

Table 6-1 presents the seven categories of RMS considered for the Coachella Valley IRWM Plan. These strategies include all the resource management approaches identified by the *California Water Plan Update 2009*, as well as the Education and Outreach strategy which was identified by Coachella Valley stakeholders. A variety of approaches to water management must be considered to fully address the regional goals and objectives of the Coachella Valley IRWM region. Though all the RMS identified by the *California Water Plan Update 2009* were considered not all are appropriate for meeting Coachella Valley's IRWM plan goals and objectives. RMS not considered appropriate for the Coachella Valley include: crop idling for water transfers, dewvaporation or atmospheric pressure, desalination, fog collection, irrigated land retirement, rainfed agriculture, and waterbag transport/storage technology.

6.2.2 Objectives Assessment

Table 6-2 presents the RMS and how they contribute to meeting each of the IRWM Plan regional objectives, including an additional strategy identified during the development of this Coachella Valley IRWM Plan. The table illustrates which strategies can be integrated to achieve a specific objective. Most objectives have multiple strategies that can be integrated to form a successful project to fulfill one or multiple regional goals. Descriptions of each RMS, including those not appropriate for the Coachella Valley IRWM plan, can be found in *Section 6.4: Overview of Resource Management Strategies*.

Table 6-1: All Resource Management Strategies Considered

Reduce Water Demand	Improve Flood Management
Agricultural Water Use Efficiency	Flood Risk Management
Urban Water Use Efficiency	**Practice Resources Stewardship**
Improve Operational Efficiency and Transfers	Agricultural Lands Stewardship
Conveyance- Delta	Economic Incentives (Loans, Grants and Water Pricing)
Conveyance- Regional/Local	Ecosystem Restoration
System Reoperation	Forest Management
Water Transfers	Recharge Area Protection
Increase Water Supply	Water-Dependent Recreation
Conjunctive Management and Groundwater Storage	Watershed Management
Desalination	**Other Strategies**
Precipitation Enhancement	Crop Idling for Water Transfers*
Recycled Municipal Water	Dewvaporation or Atmospheric Pressure *
Surface Storage- CALFED	Desalination *
Surface Storage- Regional/Local	Fog Collection *
Improve Water Quality	Irrigated Land Retirement *
Drinking Water Treatment and Distribution	Rainfed Agriculture *
Groundwater Remediation/Aquifer Remediation	Waterbag Transport/Storage Technology *
Matching Quality to Use	Education and Outreach **
Pollution Prevention	
Salt and Salinity Management	
Urban Runoff Management	

* RMS not appropriate for the Coachella Valley IRWMP region
** RMS identified by Coachella Valley Stakeholders
Source: DWR 2009

Table 6-2: Resource Management Strategies that Achieve IRWM Plan Objectives

IRWM Plan Objectives	Resource Management Strategies												
	Agricultural Lands Stewardship	Agricultural Water Use Efficiency	Conjunctive Mgmt and Groundwater Storage	Conveyance –Delta	Conveyance—Regional/Local	Desalination	Drinking Water Treatment & Distribution	Economic Incentives	Ecosystem Restoration	Flood Risk Management	Forest Management	Groundwater /Aquifer Remediation	Land Use Planning and Management
A. Provide reliable water supply for residential and commercial, agricultural community and tourism needs.		●	●	●	●	●	●	●				●	
B. Manage groundwater levels to manage and reduce overdraft, manage perched water and minimize subsidence.	○	●	●			○	○	○				●	○
C. Secure reliable imported water supply, including restoring/improving reliability of State Water Project supply and securing other imported water supplies.			○	●	●	○	○	○				○	
D. Maximize local supply opportunities, including water conservation, water recycling and source substitution, and capture of infiltration of runoff.	○	●	●			●		●		○			○
E. Protect groundwater quality and improve, where feasible.	●	●	●			○		○	○	○		●	●
F. Preserve and improve surface water quality by maintaining integrity of agricultural drainage systems, protecting the quality of natural runoff used for potable supply, and reducing pollution in storm water runoff.	●	●				●		●	○	○			●
G. Preserve water-related local environment and restore, where feasible.	●								●	○			●
H. Manage flood risks, including current acute needs and needs for future development.	○				○		○			●			○
I. Optimize conjunctive use of available water resources.			●	○	○		○			○			○
J. Maximize stakeholder involvement and stewardship in water resource management.	○	○	○	○	○	○	○	●	○	○	○	○	●
K. Address water-related needs of local Native American culture.	○	○	○	○	○	○	●	●	○	●	○	●	●
L. Address water and sanitation needs of disadvantaged communities, including those in remote areas.	○	○	○	○	○	○	●	●	○	●	○	●	●
M. Maintain affordability of water.	○	○	○	○	○	○	●	●	○	○	○	●	●

● Resource management strategy primarily and directly supports attainment of the IRWM Plan objective
o Resource management strategy indirectly helps to achieve the IRWM Plan objective

Table 6-2: Resource Management Strategies that Achieve IRWM Plan Objectives (cont.)

IRWM Plan Objectives	Resource Management Strategies														
	Matching Water Quality to Use	Pollution Prevention	Precipitation Enhancement	Recharge Area Protection	Recycled Municipal Water	Salt and Salinity Management	Surface Storage—CALFED	Surface Storage—Regional/Local	System Reoperation	Urban Runoff Management	Urban Water Use Efficiency	Water Transfers	Water-Dependent Recreation	Watershed Management	Other Strategies
A. Provide reliable water supply for residential and commercial, agricultural community and tourism needs.	●			●	●	●	●	●	●		●	●			
B. Manage groundwater levels to manage and reduce overdraft, manage perched water and minimize subsidence.	●			●	●	●			○		●	●		●	
C. Secure reliable imported water supply, including restoring/improving reliability of State Water Project supply and securing other imported water supplies.				○		●	●	●	○			○			
D. Maximize local supply opportunities, including water conservation, water recycling and source substitution, and capture of infiltration of runoff.	●	●		○	●	●		●	○	●	●	○		○	
E. Protect groundwater quality and improve, where feasible.	●	●		●	○	●			○	●	●	○		●	
F. Preserve and improve surface water quality by maintaining integrity of agricultural drainage systems, protecting the quality of natural runoff used for potable supply, and reducing pollution in storm water runoff.	●	●		○		○				●	●			●	
G. Preserve the water-related local environment and restore, where feasible.		○				○				○				●	
H. Manage flood risks, including current acute needs and needs for future development.		○		○						●				○	
I. Optimize conjunctive use of available water resources.				○				○	○						
J. Maximize stakeholder involvement and stewardship in water resource management.	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
K. Address water-related needs of local Native American culture.	○	○	○	○	○	●	○	○	○	●	○	○	○	○	○
L. Address water and sanitation needs of disadvantaged communities, including those in remote areas.	○	○	○	○	○	●	○	○	○	●	○	○	○	○	○
M. Maintain affordability of water.	○	○	○	○	○	●	○	○	○	○	○	○	○	○	○

● Resource management strategy primarily and directly supports attainment of the IRWM Plan objective

o Resource management strategy indirectly helps to achieve the IRWM Plan objective

6.3 Documenting the Process

This section considers and documents which RMS will help achieve the IRWM Plan objectives.

The identification of which RMS are included in this IRWM Plan is based on a review of all 32 resource management strategies identified by the *California Water Plan Update 2009* and the *Proposition 84 and Proposition 1E IRWM Guidelines*. The CVRWMG, Planning Partners, and stakeholders have determined that 26 RMS, including one identified by stakeholders, were selected to be included in the Coachella Valley IRWM Plan as they are either currently being utilized or will be utilized in the management of water resources in the IRWM region.

The process of identifying RMS that address the regional goals and objectives identified for the Coachella Valley IRWM Plan consisted of an evaluation of all strategies by the CVRWMG, Planning Partners, and stakeholders. The evaluation consisted of reviewing and discussing all 32 RMS required by the *Proposition 84 and Proposition 1E IRWM Guidelines* and how applicable each strategy is in meeting the Coachella Valley IRWM Plan objectives. *Section 6.4 Overview of Resource Management Strategies*, below, provides the reasoning for incorporation of each RMS into the Coachella Valley IRWM Plan.

6.4 Overview of Resource Management Strategies

This section presents the RMS considered for the IRWM Plan.

The RMS in **Table 6-2** encompasses the Coachella Valley's water management approach for meeting the IRWM Plan's regional objectives. This section describes these strategies in further detail and provides examples (if any) of current efforts in the Coachella Valley IRWM region that apply to each strategy.

The RMS described within the following sections are consistent with the Region Description (herein *Chapter 2, Region Description*), Plan Objectives (herein *Chapter 4, Objectives*), and Governance (herein *Chapter 5, Stakeholder Involvement*) requirements set forth in the IRWM Grant Program Guidelines (DWR 2010). In addition, each section below acknowledges where the RMS are currently being implemented in accordance with the Region's identified issues and needs (*Chapter 3, Issues and Needs*).

6.4.1 Reduce Water Demand

CVRCD Mobile Lab Providing Irrigation Strategies

Agricultural Water Use Efficiency

Agricultural water use efficiency can achieve reductions in the amount of water used for agricultural irrigation. This strategy could increase the Coachella Valley IRWM region's net water savings, improve water quality, provide environmental benefits, improve flow and timing, and increase energy efficiency.

Several strategies recommended by the *California Water Plan Update 2009* to achieve agricultural water savings and benefits include:

- improving irrigation system technology and management of water, both on-farm and at the irrigation district level to minimize water losses;

- adjusting irrigation schedules to decrease the amount of water applied;
- installing remote monitoring to allow districts to measure flow, water depth and improve water management and controls; and
- developing community educational conservation activities to foster water use efficiency.

Coachella Valley Efforts

A few select examples of current agriculture water use efficiency strategies employed by the Coachella Valley IRWM region are listed below.

- **Coachella Valley Water Management Plan**. This plan includes an aggressive conservation program promoting the use of scientific irrigation techniques to improve agricultural water use efficiency. This includes a strong support for continued studies on optimal irrigation and drainage techniques for the Coachella Valley. At present, more than 50 percent of irrigated acreage is irrigated by drip system.
- **Coachella Valley Resource Conservation District (CVRCD) Mobile Lab**. Since 1985, the mobile lab program, created by the CVRCD/Natural Resource Conservation Service (NRCS), utilizes technologies to conduct on-site system evaluations that measure agricultural water use efficiency. Based on these on-site evaluations, the mobile lab team suggests modifications in the irrigation system to increase irrigation efficiency, reduce water loss, increase crop health, and decrease water, power, and fertilizer costs.
- **Daily Local Agricultural Weather Forecast**. Local weather forecasting services are provided to growers, including evapotransporation estimates, rain, wind and temperature to better manage irrigation water application.
- **Prohibition on Tailwater**. Local district regulations prohibit tailwater runoff.

Re-Landscaping in City of La Quinta With Water Efficient Plants

Urban Water Use Efficiency

Due to Coachella Valley's growing population and consequently expanding urban development, it is vital that urban water use efficiency strategies are adopted to reduce pressure on the region's groundwater supply. Urban water use efficiency strategies can reduce water demand through technological and behavioral improvements by decreasing indoor and outdoor residential, commercial, institutional, and industrial water use.

Several approaches recommended by the *California Water Plan Update 2009* to increase urban water use efficiency include:

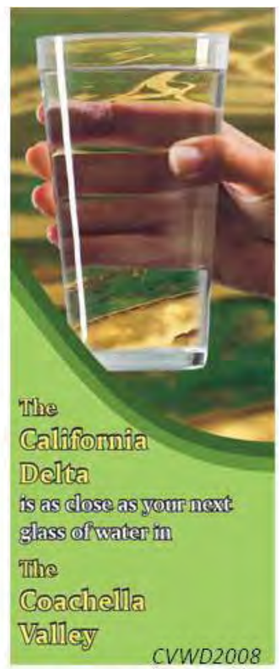
- implementing programs such as Best Management Practices (BMPs);
- reviewing the Urban Water Management Plan to ensure 20 percent water use reductions are achieved by 2020;
- installing water efficient landscapes;

- encouraging gray water and rain water capture to increase water conservation and improve water quality;
- increasing public outreach and encouraging community involvement; and
- funding incentive programs for small districts and economically DACs.

Coachella Valley Efforts

At present, various aggressive measures to increase urban water use efficiency in the Coachella Valley IRWM region are underway. A select few examples of these strategies are listed below.

- **Valley-wide Model Landscape Ordinance.** Most Valley cities, Riverside County, and water districts have adopted a Valley-wide Model Landscape Ordinance which sets a limit on the amount of water used for landscaping based on evapotransporation and irrigation efficiency appropriate for desert climates.
- **Tiered Conservation Water Rates.** The majority of Valley water users are on a tiered water rate, whereby use above that needed for basic living and desert appropriate landscape irrigation is billed in increasing multiples of the base water rate.
- **Water Wise Landscape Rebates and Discounts**. CVWD and City of La Quinta started a citywide Landscape Water Management Program to assist residents to reduce landscape water use and help eliminate sprinkler runoff down city streets by providing rebates and discounts. The IWA has a similar program for the City of Indio.
- **Xeriscape Demonstration Gardens**. To demonstrate low-water-use plants, CVWD maintains a xeriscape demonstration garden at its Coachella headquarters and at the Palm Desert facility. MSWD also has an 8,000 square foot water efficient demonstration garden adjacent to its administration building, featuring a variety of drought-resistant trees, shrubs and groundcover native to the local area. Brochures are distributed to provide explanation of each plant, specific environmental requirements, and to enable interested members of the public to take a self-guided tour of the garden. DWA's Operations Center has a demonstration garden with signage to identify common and botanical names of plants. DWA has also sponsored and participated in the creation of several other demonstration gardens within the service area.



CVWD Brochure Encouraging Water Conservation

- **Water Conservation Programs**. DWA, IWA, and CVWD have irrigation controller programs. DWA also conducts water audits, has a hotel conservation program, and has an education/outreach program for water conservation. The MSWD website also provides residents with resources for improving indoor and outdoor water efficiency, and educational activities and literature for children (https://www.mswd.org/conservation.aspx).

6.4.2 Improve Operational Efficiency and Transfers

Conveyance- Delta

Sacramento-San Joaquin Delta water is of high demand and critical to sustaining the State's economy. The Delta conveyance system supplies water to the San Francisco Bay Area, Central Valley, and Southern California. Careful management of Delta water is essential for meeting water quality standards and water supply needs throughout the state. Activities in the Coachella Valley IRWM region that affect or relate to water demands from the Delta conveyance system will require thoughtful consideration of the Delta ecosystem and how it will be impacted. Consideration of Delta restoration efforts and the preservation of native habitat and other native species are essential when selecting Delta conveyance projects/strategies. Several benefits associated with Delta conveyance strategies include: maintaining or increasing water supply reliability, protecting water quality for aquatic and riparian, and maintaining in-stream flows.

Several delta conveyance strategies identified by the *California Water Plan Update 2009* include:

- establishing performance metrics that record quantity of water deliveries for agricultural and urban users;
- utilizing Delta Vision Task Force and Bay-Delta Conservation Plan recommendations to increase operational flexibility and conveyance reliability to benefit water supply and aquatic ecosystems; and
- developing strategies that maintain channel capacity in the Delta.

Coachella Valley Efforts

The long-term reliability of the SWP and associated conveyance systems is critical to meeting water demands in the Valley.

- **SWP Extension Project Development Plan**. CVWD and DWA began a formal planning effort regarding the feasibility of constructing an aqueduct to connect the Coachella Valley to the SWP in August 2007 with Phase 1 of the SWP Extension Project Development Plan.

Conveyance- Regional/Local

The Coachella Valley IRWM region relies on the Coachella Canal (a branch of the All-American Canal) and the Colorado River Aqueduct for replenishing groundwater supplies, as well as numerous local conveyance infrastructures (water supply and recycled water pipelines) to deliver water. Improving operational efficiency and transfers will require improvements in water supply reliability and conveyance infrastructure. Several benefits of improving regional/local conveyance infrastructure include: maintaining/increasing water supply reliability, protecting water quality, augmenting current water supplies, and providing water system operational flexibility.

Several strategies identified by the *California Water Plan Update 2009* for improving regional/local conveyance of water supplies include:

- improving aging infrastructure, increasing existing capacities, and/or construction of new conveyance facilities;
- replacing or improving canal structures to improve an irrigation district's ability to manage and control water in the district and reducing spillage; and

- constructing alternative water conveyance pipelines to improve water supply reliability.

Coachella Valley Efforts

Examples of current regional/local conveyance strategies employed by the Coachella Valley IRWM region are listed below.

- **Coachella Canal Lining Project**. This project constructed a new 34.8 mile section of concrete waterway to replace earthen sections of the Coachella Canal to increase water conservation and preserve water supplies.
- **Highway 86 Pipeline Project**. This project constructed a 30-inch diameter pipeline to bring drinking water to the Oasis and Valerie Jean communities. The goal of this new pipeline is to bring reliable, high-quality drinking water and improve water service to the Coachella Valley IRWM region.
- **Mid-Valley Pipeline Project.** CVWD recently completed this project which entailed the installation of a $75 million non-potable distribution system to expand its recycled water/Colorado River water system. This will replace the use of groundwater for irrigation at approximately 50 golf courses. It is estimated this project will reduce groundwater pumping by 50,000 AFY.
- **DWA Transmission Main CIP.** The DWA General Plan suggested that a Belardo Road Pipeline be installed in 2008; however due to budget restraints, the project was postponed. There is a need to install infrastructure to increase the efficiency of the distributions system. This installation of pipeline will connect two sections of 24" pipeline allowing DWA to move water from north to south as intended in the general plan. Currently the water must flow through smaller pipelines, increasing head loss and reducing flow capacity.

Coachella Canal Lining Project

System Reoperation

System reoperation strategies change existing operation and management procedures for existing reservoirs and conveyance facilities to increase water related benefits from these facilities. Changes in water demands and changing climate would require consideration of reoperation of existing facilities to increase project yield or address climate change impacts. System reoperation strategies will require making changes to how projects operate to best meet the changing needs of the Coachella Valley IRWM region. Some of the potential benefits of system reoperation strategies include: increasing water supply reliability, additional flexibility to respond to extreme hydrologic events, and improving the efficiency of existing water uses.

Several system reoperation strategies identified by the *California Water Plan Update 2009* include:

- establishing a baseline hydrology and enhanced description of present water management system components;
- considering possible climate change effects in reoperation projects; and

- collaborating between federal, state, and local agencies on system reoperation studies.

Coachella Valley Efforts

Examples of system reoperation strategies employed by the Coachella Valley IRWM region are listed below.

- **Water-Ordering Procedures**. The CVWD's Colorado River irrigation distribution system restructured its irrigation water-ordering procedures allowing water to be turned on and off at any time to increase efficiency and operational flexibility for irrigators in the Coachella Valley. Previously, the CVWD procedures required orders to be placed in advance and turn-on and turn-off's allowed only at certain times of the day.
- **Lake Cahuilla Operations**. CVWD operates Lake Cahuilla to regulate storage for the Coachella Canal. The lake helps balance daily water orders by supplying or storing the difference in amounts of water released by USBR several days before arriving in the Coachella Valley.

Water Transfers

Water Transfers are temporary or long-term change in the point of diversion, place of use, or purpose of use due to transfer or exchange of water or water rights (DWR 2009) in response to water scarcity. Benefits to establishing water transfers include improving economic stability and environmental conditions for receiving areas. Compensation for water transfers can fund beneficial projects/activities for the IRWM region, reduce water rates, and/or improve facilities.

Several water transfer strategies identified by the *California Water Plan Update 2009* include:

- developing and implementing groundwater management plans, monitoring programs,
- allowing community participant for identifying and responding to conflicts caused by transfer,
- refining current methods on identifying and quantifying water savings for transfers using crop idling, crop shifting, and water use efficiency measures, and
- improving coordination and cooperation among the local, state, and federal agencies to facilitate sustainable transfers

Coachella Valley Efforts

The Coachella Valley has employed various water transfer strategies including:

- **MWD SWP Exchange Agreement**. CVWD and DWA have an agreement with MWD to trade their SWP Table A allotments for an exact amount of MWD's Colorado River water. The Coachella Valley taps into the Colorado River Aqueduct (CRA) where it crosses the Whitewater River, and is then diverted to the Whitewater Spreading Area to replenish groundwater. The CRA also crosses the Whitewater River near Desert Hot Springs adjacent to Mission Creek where it is diverted to the Mission Creek Spreading Area to replenish groundwater.
- **Mission Creek-Garnet Hill Water Management Plan**. A groundwater management plan is in development for the Mission Creek and Garnet Hill Subbasins through the collaborative work of CVWD, DWA and MSWD. The Plan will provide the Mission Creek/Garnet Hill Basin Management Committee an adaptive, long-term vehicle for managing the subbasins, while facilitating conjunctive use operations and ongoing monitoring in coordination with water transfers and exchange agreements.

- **Berrenda Mesa Water Transfer**. This strategy involved the transfer of 16,000 AFY of unused SWP from the Berrenda Mesa Water District (BMWD). This water transfer allows the region to acquire a total of 16,000 AFY which would go through the existing exchange agreement with the MWD for an equal amount of Colorado River Water released to the Coachella Valley.
- **Kern County Water Purchase.** DWA partnered with CPV Sentinel LLC to purchase 8,350 acre feet of water to ensure adequate water supply for a proposed power plant. CPV Sentinel is in the process of permitting and building a power generating facility south of Desert Hot Springs and north of Palm Springs. In order to avoid any potential impacts to existing water supplies, CPV has teamed up with DWA to secure additional imported water supplies to meet the replenishment needs of the power generation project. DWA facilitated and CPV funded the purchase, which is the first of several planned to ensure water supplies for the proposed facility. Water was transferred from North Kern County Water Storage District via the California Aqueduct to MWD. DWA exchanged this water with MWD for Colorado River water with deliveries to DWA's Mission Creek Spreading Basins.

6.4.3 Increase Water Supply

Conjunctive Management and Groundwater Storage

The reliability of the Coachella Valley's water supplies can be improved through conjunctive use of both surface and groundwater supplies. Conjunctive Management and Groundwater Storage refers to the coordinated and planned use and management of both surface water and groundwater resources to maximize the availability and reliability of water supplies in a region to meet various management objectives. The conjunctive management and groundwater storage strategy seeks to increase water supply reliability and groundwater sustainability. Several benefits of utilizing conjunctive management and groundwater storage strategies include: improving water supply reliability and sustainability, reducing groundwater overdraft and land subsidence, protecting water quality, and improving environmental conditions.

Several conjunctive management and groundwater storage strategies identified by the *California Water Plan Update 2009* include:

- implementation of monitoring, assessment, and maintenance of baseline groundwater levels,
- encouraging local water management agencies to coordinate with tribes and other agencies involved in activities that might affect long term sustainability of water supply and water quality, and
- local groundwater monitoring and management activities and feasibility studies to increase the coordinated use of groundwater and surface water.

Groundwater Recharge Areas at the Thomas E. Levy Groundwater Replenishment Facility

Coachella Valley Efforts

Conjunctive management and groundwater storage strategies being considered by the Coachella Valley IRWM region are listed below.

- **Groundwater Recharge Areas**. Four groundwater recharge areas are located in the Coachella Valley IRWM region: the Whitewater Spreading Area, Mission Creek Spreading facility, Thomas E Levy (Dike No. 4) recharge facility, and the Martinez Canyon Pilot Recharge Project. For detailed information on the recharge areas see *Chapter 2: Region Description, Section 2.2.2 Water Systems and Distribution, Groundwater*.
- **Stormwater Capture.** Preparation of the Mission Creek-Garnet Hill Water Management Plan has identified the opportunity for capturing stormwater runoff from the Little San Bernardino Mountains for recharge into the Mission Creek Subbasin. Such recharge has the possibility to provide positive impacts to the water supply and to offset water quality impacts of recharge water, through dilution.
- **Groundwater Storage**. MWD stores available surplus water in the CVGB. Thus far it has been a successful conjunctive use program that had been able to store water when it is available either through direct recharge or in-lieu use and recovered through exchanges effectively from the basin during drought periods. MWD benefits by increasing its dry-year water supply and the Coachella Valley benefits from MWD financed facilities and higher water levels. This program allows the MWD the right to withdraw 100,000 to 150,000 AFY of stored water over a ten year cycle.

Desalination

Desalination has been identified as a potential solution for increasing water supplies and reducing groundwater overdraft for the Coachella Valley IRWM region. However, desalination requires complicated technologies and is a high energy consuming technology. Desalination offers many potential benefits including: increases water supply and reliability during drought periods, reduced dependency on imported supplies by developing a local supply source, protection of public health, and facilitates more recycling and reuse, given the lower salinity of the source.

Several recommendations identified by the *California Water Plan Update 2009* to facilitate desalination strategies include:

- Desalination projects should be given the same funding opportunities as other water supply and reliability projects,
- Ensure most economical and environmentally appropriate desalination technology is utilized,
- Project sponsors need to ensure planning of desalination projects is a collaborative process that engages key stakeholders, the general public, and permitting agencies.

Coachella Valley Efforts

Desalination strategies being considered by the Coachella Valley IRWM region are listed below.

- **CVWD Desalination Pilot Project**. CVWD recently received a grant from DWR’s Proposition 50 Water Desalination Proposal. The proposal requested funds for a pilot desalination project to compare reverse osmosis with solar still “dewvaporation” of agricultural drainage runoff within the Coachella Valley. CVWD will receive $596,000 from the program and will match the same for a total pilot project cost of approximately $1.2 million. The plan is to have 11,000 AFY of agriculture drain water be desalted to a quality equivalent to canal water and delivered for irrigation use by 2030.

Precipitation Enhancement

Precipitation enhancement strategies seek to artificially stimulate clouds to produce more rainfall or snowfall than would naturally occur. The benefit of this strategy is primarily to increase water supply. Several recommendations identified by the *California Water Plan Update 2009* for implementing precipitation enhancement projects include:

- seeking State support for development and funding of new projects;
- collecting data and evaluations of existing California precipitation enhancement projects to perform research on the effectiveness of the technology; and
- investigating the potential of augmenting Colorado River Water supply through cloud seeding.

Coachella Valley Efforts

Precipitation enhancement strategies implemented by the Coachella Valley IRWM region are listed below:

- **Colorado River Watershed Precipitation Enhancement.** CVWD, through participation in the Colorado River Six Agency Committee (the six California water agencies with contracts for Colorado River water), funds cloud seeding programs for enhancement of snow-pack in areas tributary to the Colorado River.

Recycled Municipal Water

One way to offset current and future water demands for the Coachella Valley IRWM region is to treat and reuse recycled wastewater. Recycled municipal water strategies should seek to increase the usefulness of water by reusing a portion of the existing water supply.

Installation of 54-inch Mid-Valley Pipeline for Delivering Recycled Water

The use of recycled water in the Coachella Valley IRWM region began in 1965 mainly for the irrigation of golf courses (see Figure 2-4 for a map of the current recycling plants in the IRWM region). Since 1965, recycled water use has increased from 500 AFY to 14,000 AFY at present (CVRWMG 2009). Increasing recycled water use can be a potential significant local resource that could be used to help reduce groundwater overdraft and imported water demand.

For the Coachella Valley IRWM region, expanding recycled water use can provide the following benefits/potential uses:

- additional water source for surface irrigation (primarily golf courses and greenbelt areas), a source of nutrients for crops or landscape plants,
- reduction of excess nutrient discharge into surface waters,
- increased groundwater recharge,
- cooling of industrial and commercial applications,
- impoundments for recreation, fish hatcheries, and landscape ponds, and
- for toilet flushing, fire fighting, soil compacting, mixing concrete, among many other uses

Several recycled municipal water strategies identified by the *California Water Plan Update 2009* and *Water Recycling 2030: Recommendations of California's Recycled Water Task Force* include:

- increasing funding availability for water reuse/recycling facilities and infrastructure and;
- creating education curriculum for public schools and institutions of higher learning to educate on recycled water;
- engaging the public in an active dialogue and encouraging participation in the planning process of water recycling projects,
- providing resources (i.e. funding) to agencies that will perform comprehensive analysis of existing water recycling projects to estimate costs, benefits, and water deliveries, and
- assessment of water recycling technology to determine least costly and environmentally appropriate technology based on location and need.

Coachella Valley Efforts

Examples of water recycling strategies employed by the Coachella Valley IRWM region are listed below.

- **Mid-Valley Pipeline Project**. CVWD recently completed this project which entailed the installation of a $75 million non-potable distribution system to expand its recycled water/Colorado River water system. This will replace the use of groundwater for irrigation at approximately 50 golf courses. It is estimated this project will reduce groundwater pumping by 50,000 AFY.
- **Water Reclamation Plants.** The Coachella Valley IRWM region has four water reclamation plants: WRP-7, WRP-9, WRP-10, and DWA. Further detailed information on each of the plant can be found in *Chapter 2: Region Description, Section 2.2.4.: Recycled Water*. Combined, the facilities produce 28.9 MGD of secondary treated water and 20.7 MGD of tertiary treated water.

  Further, MSWD and IWA are currently preparing for development of their recycled water capabilities. MSWD has included treatment of influent to tertiary levels in design for the next expansion of Horton Wastewater Treatment Plant. IWA is planning for development of a water reclamation plant in cooperation with VSD.

Sacramento-San Joaquin Delta

Surface Storage- CALFED

Potential benefits from CALFED surface storage include releases of new storage and system flexibility such that other facilities' operations can be modified without reducing current benefits. The additional water storage can be used to improve ecosystem functions, conditions for target species, improve water quality, and supply reliability for water users.

The Coachella Valley primarily benefits from surface storage in the Delta. Thus, projects that support aquatic and riparian ecosystem restoration in the Delta and its tributaries, water conservation, improving water quality would benefit the Coachella Valley IRWM region.

Several CALFED surface storage strategies identified by the *California Water Plan Update 2009* include:

- Decreasing demand of imported water through water conservation programs
- Engaging stakeholders, potential projects participants, tribes, the public, and agencies in identifying, evaluating, and quantifying potential projects that address the CALFED surface storage goals and their effects (positive and negative).
- Developing alternatives and potential future scenarios that incorporate alternative delta conveyance, operations, and possible climate change effects to allow potential participants to assess their interest in specific projects.
- Developing mechanisms that provide assurance projects are being operated in a manner consistent with the objectives of CALFED surface storage.

Coachella Valley Efforts

Although CALFED surface storage is important for assuring water supply reliability for the Coachella Valley IRWM region, there are no CALFED storage efforts underway by local agencies.

Surface Storage- Regional/Local

Though the majority of water used in the IRWM region is primarily groundwater, the region's imported water supply is held in Lake Cahuilla for system regulation prior to recharge into the aquifer. Projects that address this strategy focus on regional and local surface storage alternatives/expanding surface storage capacity. Several additional benefits of expanding regional/local surface storage include: improved flood management, ecosystem management, emergency water supply, river and lake recreation, capture of surface water runoff, and water supply reliability against catastrophic events and droughts.

Lake Cahuilla Regional Park

Several regional/local surface storage strategies identified by the *California Water Plan Update 2009* include:

- development of a comprehensive methodology for analyzing project benefits and costs by local agencies,
- continued studies, research, and dialogue to identify a common set of tools for determining cost and benefits of surface storage projects,
- adaptively manage operations of existing surface storage facilities,
- rehabilitation and/or enlargement of existing surface storage infrastructure, and
- developing water purchasing agreements to buy water from other agencies that own storage reservoirs with substantial water supplies.

Coachella Valley Efforts

An example of a regional/local surface storage strategy employed by the Coachella Valley IRWM region is listed below.

- **Lake Cahuilla**. In 1968, the CVWD built Lake Cahuilla (approximately 135-acres) to provide a place to store Colorado River water, to meet changing needs, and avoid wasteful spills.

6.4.4 Improve Water Quality

Drinking Water Treatment and Distribution

Providing a reliable supply of safe drinking water is critical for protecting the public health. Though the Coachella Valley IRWM region provides high-quality drinking water that needs almost no treatment, to ensure the public's health is protected, public water systems must continue developing and maintaining adequate water treatment and distribution facilities. Several benefits of drinking water treatment and distribution strategies include: improving public health, reducing water distribution delivery problems, and ensuring delivery of high-quality drinking water.

Several drinking water treatment and distribution strategies identified by the *California Water Plan Update 2009* include:

- Working closely with CDPH to quantify the total needs for water system infrastructure improvement and replacement;
- regionalizing and consolidating of public water systems;
- developing incentives to allow water systems to reduce waste of limited water resources;
- researching and developing of new treatment technologies;
- providing additional funding for water supply, water treatment, and infrastructure projects to ensure safe and reliable supply of drinking water for individuals and communities;
- public water systems joining the California WARN program which provides mutual aid and assistance more quickly that through SEMS; and
- creation of source control and reduction programs to address pharmaceuticals and personal care products.

Coachella Valley Efforts

Drinking water treatment and distribution strategies employed by the Coachella Valley IRWM region are listed below.

- **CVRWMG Drinking Water Systems**. All of the water purveyors that constitute the CVRWMG have water systems that provided a total of approximately 674,950 AFY throughout the Region in 2010. For specific information regarding the potable water systems of each CVRWMG agency, please refer to *Chapter 2 Region Description, Section 2.4.1 Water Supply.*
- **Water Treatment Technology**. In 2009, Envirogen Technologies was contracted to improve the drinking water treatment system for residents in the Desert Oasis mobile home park. These new improvements are meant to improve the water quality of water delivered to the park and create a better quality of life for the residents. One of the major improvements to the drinking water treatment system is the addition of coagulation-filtration technology that will aid in removing source contaminants, such as Arsenic.
- **Monitoring**. Water purveyors in the Coachella Valley IRWM region monitor drinking water regularly according to state (CDPH) and federal (USEPA) regulations.
- **Nitrate Remediation**. In cooperation with the CDPH and through funding from the American Recovery and Reinvestment Act, MSWD has resolved nitrate contamination issues for Whispering Sands Mobile Home Park. Significant engineering challenges had to be overcome in order to connect the Park to the District's potable water system.

Groundwater Remediation/Aquifer Remediation

Groundwater is a valuable local resource. However, portions of aquifers have degraded water quality that does not support beneficial use of groundwater. Groundwater Remediation/Aquifer Remediation strategies should seek to improve the quality of degraded groundwater for beneficial use. Groundwater contamination can come from a multitude of sources such as: heavy metals, salts, organic and inorganic pollutants, nitrates, arsenic, pesticides, septic systems, urban and agricultural activities. Several benefits of adopting groundwater remediation/aquifer remediation strategies include: availability of additional water supplies, avoiding purchasing alternate water supplies, and storage of excess surface water supplies in remediated aquifers.

Several groundwater remediation/aquifer remediation strategies identified by the *California Water Plan Update 2009* include:

- limiting potentially contaminating activities in recharge areas;
- identifying historic commercial and industrial sites with contaminated discharges and responsible parties to remediate sites;
- implementing source water protection measures; and
- establishing and supporting funding for detecting emerging contaminants by commercial laboratories and installation of wellhead treatment systems.

Coachella Valley Efforts

Groundwater remediation strategies employed by the Coachella Valley IRWM region are listed below.

- **Recycled Water Program**. The primary use of recycled water in the Coachella Valley is for turf irrigation. Studies with the University of California Turf Grass Research Center have shown turf to be effective in removing nitrogen from recycled irrigation water. When recycled water is applied to turf grass, nitrogen is taken up by the plant, greatly reducing what would otherwise percolate into the groundwater basin. Golf course managers in the Valley account for nitrogen in recycled water by reducing the application of chemical fertilizers.
- **East Valley Groundwater Assessment**. The Rural Community Assistance Corporation (RCAC) conducted four drinking water system assessments in community systems located within mobile home parks of small groundwater systems used to supply drinking water. This assessment found arsenic to be a major water quality problems. One of the recommendations provided by the RCAC for improving water quality was to utilize groundwater remediation technology at the point of use.
- **Septic to Sewer Conversion**. MSWD, DWA, and the cities of Palm Springs and Cathedral City have converted a large number of septic systems to municipal sewer in order to protect the underlying aquifer from nitrate contamination.
- **Remediation for Uranium**. Due to high uranium levels, MSWD has removed a production well (900 GPM) from service and placed wellhead treatment on a second production well (2000 GPM). The second well will also be removed from the potable water distribution system when a replacement is constructed.

Matching Quality to Use

Matching water quality to use is directly linked to four other resource management strategies: Pollution Prevention, Recycled Municipal Water, Salt and Salinity Management, and Groundwater/Aquifer

Remediation because maintaining water to its highest quality allows for greater potential uses of the water. Matching quality to use strategies recognize that water quality should suitably match its intended use such that water quality constituents do not adversely affect the intended use of the water. Several benefits of maintaining and matching water quality to use include: reduction of disinfection byproducts in delivered drinking water sources, opportunities for blending water sources through improvements in treated water quality, potential to reduce energy use due to the avoidance of needing to treat water to higher quality, and avoiding costly treatment procedures.

Several strategies for matching water quality to use identified by the *California Water Plan Update 2009* include:

- managing water supplies to optimize and match water quality to the highest possible use and to the appropriate technology;
- encouraging upstream users to minimize the impacts of non-point urban and agricultural runoff and treated wastewater discharges;
- supporting the development of salt management plans;
- reviewing projects to determine the potential impacts from wastewater elimination into local streams; and
- supporting research into solutions to the potential conflicts between ecosystem restoration projects and the quality of water for drinking water purposes.

Coachella Valley Efforts

Projects and programs that match quality to use in the Coachella Valley IRWM region are listed below.

- **CVWD Desalination Project**. As summarized in the Desalination section above, this project is currently being planned by the CVWD and one of its main purposes is to treat and reuse agricultural drain water at a quality appropriate for agricultural irrigation.
- **Uses of Non-Potable Water.** MSWD wells with high uranium that cannot be part of the potable distribution system will not be abandoned. They may be called into service to provide construction water in anticipation of future building activity or to provide water for industrial uses such as power plants.
- **Coachella Valley Salt and Nutrient Management Plan Strategy**. Through a collaborative effort, the CVRWMG and other stakeholders will be developing a salt and nutrient management plan strategy for the Coachella Valley IRWMP region. Plan completion is anticipated in 2013.
- **Regional Recycled Water Use**. The primary use of recycled water in the Coachella Valley is for turf irrigation. When recycled water is applied to turf grass, nitrogen is taken up by the plant, greatly reducing what would otherwise percolate into the groundwater basin.

Pollution Prevention

Pollution prevention strategies are vital for protecting and improving water quality at its source and reducing the need for costly water treatment options. Preventing pollution throughout the watershed ensures water supplies can be used, and reused for a broad number of uses by downstream water users. Several benefits of implementing pollution prevention strategies include:

- reducing the need and cost of other water management and treatment strategies;
- protecting surface water quality to increase opportunities for water contact recreation, water sources for desalination plants, and maintaining suitable habitat for wildlife; and

- preventing further degradation of surface and groundwater quality.

Several pollution prevention strategies identified by the *California Water Plan Update 2009* include:

- developing proper land management practices that prevent sediment and pollutants from entering source waters;
- establishing drinking water source and wellhead protection programs to protect drinking water sources and groundwater recharge areas from contamination;
- identifying communities relying on groundwater contaminated by anthropogenic sources for drinking water and take appropriate regulatory action; and
- addressing improperly destroyed, sealed and abandoned wells that can serve as potential pathways for groundwater contaminants.

Coachella Valley Efforts

Examples of current pollution prevention strategies employed by the Coachella Valley IRWM region are listed below.

City of Indio Pollution Prevention Materials Identify Over-Irrigation as Violation of NPDES Permit

- **Whitewater River Watershed MS4 Program.** RCFCWCD, the County of Riverside, CVWD, and the cities of Cathedral City, Coachella, Desert Hot Springs, Indian Wells, Indio, La Quinta, Palm Desert, Palm Springs, and Rancho Mirage have joined forces to implement the NPDES permit and encourage business and the general public to employ BMPs to prevent water pollution. This program has seven subprograms for improving stormwater management and preventing water pollution:
  - *Illicit Connection/Illegal Discharge (IC/ID) Program*- is designed to detect and eliminate improper discharges to the municipal storm drain system. The program includes BMPs to manage stormwater runoff and non-stormwater discharge, training for municipal staff, and an outreach component.
  - *Commercial/Industrial Program*- is designed to conduct source identification and outreach to reduce discharge of pollutants from both commercial businesses and industrial operations.
  - *New Development/Redevelopment and Construction Activities*- focuses on integrating stormwater management measures into current development review processes within the Permittees' Planning and Public Works Departments.
  - *Municipal Agency Activities*- targets improving municipal operations and activities throughout the watershed. Employee training activities are a key aspect of stormwater management at the municipal agency level.
  - *Residential Program*- focuses on public education, encouraging watershed awareness, individual responsibility, and offering practical alternatives for citizens to properly dispose of household hazardous waste (HHW).

- *Public Education Program*- is a media campaign to develop and increase public awareness of urban runoff issues on a regional scale.
- *Water Quality Monitoring*- focuses on increasing water quality sampling and analysis throughout the watershed to characterize runoff and establish baseline data.

- **Surface Water Protection**. DWA has an extensive security program in place to protect surface water supplies from pollution.

Salt and Salinity Management

Accumulation of salt in the soil can impair crop productivity, particularly in arid regions such as Coachella Valley, thus salinity management is a critical concern for local farmers. Salinity management strategies should understand the dynamics of salt movement and seek to establish or improve its management in the Coachella Valley IRWM region. Several potential benefits of establishing or improving salt and salinity management strategies include: protecting water resources and improving water supplies, securing, maintaining, expanding, and recovering usable water supplies, and avoiding future significant costs of treating water supplies and remediating soils.

Several salt and salinity management strategies identified by the *California Water Plan Update 2009* include:

- developing a regional salinity management plan, and interim and long-term salt storage, salt collection, and salt disposal management projects;
- monitoring to identify salinity sources, quantifying the level of threat, prioritizing necessary mitigation action, and working collaboratively with entities and authorities to take appropriate action;
- reviewing existing policies to address salt management needs and ensure consistency with long-term sustainability;
- collaborating with other interest groups to optimize resources and effectiveness;
- identifying environmentally acceptable and economically feasible methods for closing the loop on salt; and
- funding for research and projects- prioritized funding based on greatest needs.

Coachella Valley Efforts

An example of a current salt and salinity management strategy employed by the Coachella Valley IRWM region is listed below.

- **Tile Drain System.** Portions of the CVGB have a shallow confining layer of clay which creates a perched water table. An extensive system of collector drains has been installed to drain the soil below the root zone and allow the removal of accumulated salts in the soil. Draining the perched groundwater layer reduces the downward migration of surface contaminants to underlying drinking water aquifers.
- **Mobilized Salinity Assessment Platform (Salt Sniffer)**. CVRCD assists farmers in salinity management by conducting on-site detailed assessments of soil salinity content on individual fare source management strategies utilizing the Mobilized Salinity Assessment Platform (Salt Sniffer). The salt sniffer measures salinity levels of fields using electromagnetic field sensors and using a GPS it records salinity levels and locations as it passes over the ground. Detailed maps can then be created of the vertical and horizontal salinity patterns which can help farmers analyze and

manage irrigation and drainage problems and variation in crop production rates due to salinity. Usually, CVRCD annually performs 12 surveys with the Salt Sniffer.

- **Coachella Valley Salt and Nutrient Management Plan Strategy**. Through a collaborative effort, the CVRWMG and other stakeholders will be developing a salt and nutrient management plan strategy for the Coachella Valley IRWMP region. Plan completion is anticipated in 2013.

Urban Runoff Management

Urban runoff management strategies should manage both storm water and dry weather runoff. To successfully manage urban runoff agencies need to incorporate other resource management strategies such as pollution prevention, land use planning and management, watershed management, urban water use efficiency, recycled municipal water, recharge area protection, and conjunctive management. Several potential benefits of urban runoff management strategies include: minimizing soil erosion and sedimentation problems, reducing surface water pollution, protecting natural resources, protecting and augmenting groundwater supplies, and improving flood protection.

Several urban runoff management strategies identified by the *California Water Plan Update 2009* include:

- coordinating efforts with agencies, stakeholders, and the public to decide how urban runoff management should be integrated into work plans;
- encouraging public outreach and education concerning funding and implementation of urban runoff measures;
- designing recharge basins to minimize physical, chemical, or biological clogging;
- working with community to identify opportunities to address urban runoff management;
- providing incentives for the installation of low impact development features on new and existing developments; and
- emphasizing source control measures and strong public education/outreach efforts as being the most effective way to manage urban runoff in this highly arid region.

Coachella Valley Efforts

- **Valley-wide Model Landscape Ordinance**. The Model Landscape Ordinance adopted by most Valley agencies prohibits irrigation systems that allow overspray to the streets. A non-irrigated buffer zone is required between the curb and walks to prevent water going to the street.
- **Tiered Conservation Water Rates**. The majority of Valley water users are on a tiered water rate whereby use above that needed for basic living and desert appropriate landscape irrigation is billed in increasing multiples of the base water rate. This is a disincentive to allowing run-off.
- **Dry Weather Investigations**. Caltrans conducted weekly field investigations of Caltrans facilities in the CVSC to document dry weather runoff, if any, that Caltrans activity contributes. To prevent any future dry weather discharges, it was recommended Caltrans inspect and monitor their irrigation systems. Additionally, it was recommended that Caltrans should work with local governing agencies to make property owners aware of BMPs to reduce urban runoff pollution.

6.4.5 Improve Flood Management

Flood Risk Management

The Coachella Valley IRWM region is subject to severe floods and alluvial-fan flash flooding. Managing of flood risk in the IRWM region is currently done through a series of flood control systems that consist of debris basins, levees, storm drains, retention basins, dry wells, and stormwater channels. Reducing flood risk will require management strategies that enhance flood protection through projects and programs that assist in managing floodflows and to prepare for, respond to, and recover from floods. Several potential benefits of establishing or improving salt and salinity management strategies include:

- reducing risk to lives and property from flooding events;
- enhancing water quality using strategies that reduce sediment loads;
- increasing water supply from structural improvements and detention of floodwaters; and
- enhancing terrestrial and aquatic habitat and providing ecosystem restoration benefits through floodplain restoration and setting back levees.

CVWD's Stormwater Facilities Provide Flood Protection

Several flood risk management strategies identified by the *California Water Plan Update 2009* include:

- Structural approaches that can consist of:
    - Setting back levees
    - Modifying channels to include lining (i.e. concrete, rip rap) to improve conveyance of floodflows
    - High flow diversions into adjacent lands to temporarily store flows
    - Improved coordination of flood operations
    - Maintaining facilities to secure the long-term preservation of flood management facilities
- Land use management approaches that consist of:
    - Floodplain function restoration to preserve and/or restore the natural ability of undeveloped floodplains to absorb, hold, and release floodwaters
    - Floodplain regulation
    - Development and redevelopment policies
    - Housing and building codes
- Disaster Preparedness, Response, and Recovery for flood risk management approaches such as:
    - Information and education
    - Disaster preparedness
    - Post-flood recovery

Coachella Valley Efforts

- **Federal Flood Management Program**. Buildings and new developments are required to be designed in conformance with the National Flood Insurance Program and local ordinances implementing the program. Planning agencies and flood agencies review developments prior to approval.

- **CVWD Stormwater Facilities**. CVWD provides flood protection for 590 square miles of the IRWM region. Within the boundaries, there are 16 stormwater protection channels and several dikes and levees that have been designed and built to collect rapidly moving floodwaters moving onto the valley floor. CVWD is actively involved in securing funding for further flood control protection and improvements on the Valleys stormwater system.

6.4.6 Practice Resources Stewardship

Agricultural Lands Stewardship

Agricultural lands stewardship is the practice by land managers of conserving and improving land for various conservation purposes as well as protecting open spaces and rural communities. This strategy should allow landowners to maintain their farms and ranches rather than being forced to sell their land due to pressures from urban development. Several potential benefits of agricultural lands stewardship management strategies include: protecting environmentally sensitive lands, recharging groundwater, improving water quality, providing water for wetland protection and restoration, increasing carbon sequestration within soil, and reducing costs of flood management.

Several agricultural land stewardship strategies identified by the *California Water Plan Update 2009* include:

- stabilizing streambanks to slow bank erosion and filter drainage water from the fields;
- installing windbreaks (i.e. trees and/or shrubs) along field boundaries to help control soil erosion, conserve soil moisture, improve crop protection among many other benefits;
- performing conservation tillage to increase water infiltration and soil water conservation and reduce erosion and water runoff; and
- encouraging irrigation tailwater recovery to help capture and reuse irrigation runoff water to benefit water conservation and off-site water quality.

Coachella Valley Efforts

- **Farmer Education Meetings**. CVRCD, along with NRCS, DWR, University of California Cooperative extension, CVWD and County of Riverside, coordinates and carries out workshops that teach farm owners, managers, and irrigators concepts in irrigation water and salinity management as well as promote new technology to help the conservation effort.

Economic Incentives (Loans, Grants and Water Pricing)

Economic incentives can influence water management, amount of water use, time of use, wastewater volume, and source of supply. The types of incentives include low interest loans, grants, and water rates and rate structures. Free services, rebates, and use of tax revenues to partially fund water services have a direct effect on the prices paid by water users. Several potential benefits of establishing or improving salt and salinity management strategies include: promoting efficient water management practices and encouraging the adoption/improvement of water efficient/ on-site water recycling technologies.

Several urban runoff management strategies identified by the *California Water Plan Update 2009* include:

- instituting loans and grant programs that support better regional water management;

- adopting policies that promote long-run water use efficiency;
- developing modeling tools for economic analyses of economic incentives as well as guidelines and ranking criteria for grant and loan awards; and
- exploring innovative financial incentives.

Coachella Valley Efforts

- **Water Audits and Irrigation Controllers**. CVWD and DWA provide water audits for farms, golf courses, and homeowner associations. Significant savings on water use have been realized through these audits, as they bring wasteful water use to the attention of the user and provides recommendations for greater efficiency. The CVRWMG agencies also provide irrigation controllers at discounted rates to encourage landscape conversions.
- **HOA Irrigation Loans** CVWD sets aside $500,000 to issue loans to homeowner associations at a 3% interest over a five year period loan for updating and modifying irrigation systems.
- **Tiered Conservation Water Rates**. The majority of Valley water users are on a tiered water rate whereby use above that needed for basic living and desert appropriate landscape irrigation is billed in increasing multiples of the base water rate.
- **MSWD Financial Assistance Program.** Since the 1970s, MSWD has formed six sewer assessment districts to facilitate the abatement of septic systems and connection to the municipal wastewater collection system. Through MSWD financial assistance programs, customers can finance connection fees and abatement costs, with repayments made on their monthly bill. The program provides positive results by reducing septic discharge to the aquifer; as well, the District has experienced no debt write-off.
- **USDA Conservation Programs**. This is a cost-share program through the NRCS that is specific to the conservation of water and soil on agricultural land. The program funds a percentage of the cost for the installation of conservation projects and the remaining portion of the cost of the project is funded by the program applicant. The NRCS office in Indio provides assistance to farmers within the Coachella Valley. For 2004 and 2005, the Indio NRCS office signed 25 EQIP contracts with Coachella Valley farmers, which includes the allocation of $350,000 of funds for water and soil conservation projects.

Ecosystem Restoration

Ecosystem restoration strategies are vital for improving our modified natural landscapes and biological communities. Restoration of aquatic, riparian, and floodplain ecosystems are of primary concern as those are most directly affected by water and flood management actions and likeliest to be affected by climate change. Several potential benefits of establishing ecosystem restoration strategies include: improves water quality and quantity for wildlife, aquatic species, and human consumption, and increases diversity of native species and biological communities.

Several ecosystem restoration strategies identified by the *California Water Plan Update 2009* include:

- increasing the use of setback levees and floodwater bypasses;
- creating programs that support and fund the identification of stream flow needs;
- establishing biological reserve areas that connect or reconnect habitat patches;
- expanding riparian habitat;
- devising climate change adaptation plans that benefit ecosystems, water, and flood management;

- reproducing natural flows in streams and rivers;
- controlling non-native invasive plant and animal species; and
- filtering of pollutants and recharging aquifers.

Coachella Valley Efforts

- **CVMSHCP and Water Management Planning.** Sensitive habitat areas that are key to the CVMSHCP can be found throughout the Valley. Additionally, the Mission Creek Subbasin is a significant water source for the Plan, as well as the primary source of water for MSWD customers. To keep those two factors in balance, the Mission Creek-Garnet Hill WMP is being developed with minimizing environmental impacts as one of its four Plan objectives. MSWD participates in the Reserve Management Oversight Committee, which is charged with providing direction for monitoring and management of the CVMSHCP reserve lands.

Forest Management

Forest management strategies should focus on activities that are designed to improve the availability and quality of water for downstream users on both publicly and privately owned forest lands. Water produced by forest has an economic value that equals or exceeds that of any other forest resource (CWP 2009). Several potential benefits of establishing forest management strategies include: interception of rainfall, reduction of urban runoff, energy-efficient shade during hot weather, reduce flooding and increase dry-season base flows, and protection from surface erosion and filtering pollutants.

Several forest management strategies identified by the *California Water Plan Update 2009* include:

- establishing long-term monitoring to understand hydrologic changes resulting from possible climate change effects through the installation of stream gages, precipitation stations, water-quality and sediment monitoring stations, and long-term monitoring wells;
- increasing research efforts into identifying effective BMPs for forest management and the effects of wildfires;
- assessing sediment sources and erosion processes in managed and unmanaged forested watersheds;
- increasing multi-party coordination of forest management;
- improving communication between downstream and upstream water users; and
- developing public education campaigns for water users.

Coachella Valley Efforts

Although local water purveyors currently have no responsibility to manage the San Gorgornio forested areas that drain to the Valley, protection of those headlands is important for ensuring high quality surface runoff supplies.

Recharge Area Protection

Recharge areas provide the primary means of replenishing groundwater. Strategies to protect recharge areas ensure the continual capability for the area to recharge rather than become covered by urban infrastructure and prevent pollutants from entering groundwater. Protecting recharge areas requires the implementation of urban runoff management strategies, groundwater remediation strategies, and conjunctive management strategies. The Coachella Valley primarily depends on groundwater for local water supplies. Several potential benefits of establishing ecosystem restoration strategies include: protecting and maintaining high-quality groundwater, increased amount of groundwater storage, reduction of urban runoff, and some removal of microbes and chemicals through percolation.

Several recharge area protection strategies identified by the *California Water Plan Update 2009* include:

- expanding research into surface spreading and the fate of chemicals and microbes in recharge water;
- increasing funding for the identification and protection of recharge areas;
- creating education and media campaigns to increase public awareness and knowledge on the importance of recharge areas and relevancy to groundwater;
- requiring source water protection plans; and
- developing methods for analyzing the economic benefits and costs of recharge areas.

The Coachella Valley has four groundwater recharge areas, including one at Windy Point.

Coachella Valley Efforts

- **Groundwater Recharge Areas**. The IRWM region operates four groundwater recharge areas: the Whitewater Spreading Area, Mission Creek Spreading Facility, Thomas E. Levy Recharge Facility, and Martinez Canyon Pilot Recharge Project. The process used to select these recharge areas aims at maximizing recharge area protection by considering factors such as development densities and pollution generation, including avoidance of septic systems and industrial activities. In addition, the CVRWMG agencies monitor groundwater near recharge areas to ensure that the recharge areas retain their effectiveness, and to assess groundwater quality within recharge areas. For detailed information see *Chapter 2: Regional Description*, *Section 2.2.2: Water Systems and Distributions, Groundwater, Recharge Areas*.

Water-Dependent Recreation

Water-dependent recreation strategies are vital to ensuring people today and in the future can enjoy water recreation activities. Maintaining and protecting water-dependent activities such as fishing, swimming, birding, boating, among many others is economically, environmentally, socially beneficial as well as improve human health. Other potential benefits of water-dependent recreation strategies include:

- providing visitors and residents a variety of fun activities and healthy outdoor activities;
- refreshing and relaxing the mind and body;
- providing a chance for exercise and relaxation, water-dependent recreation; and
- increasing economic benefits through the creation of jobs, programs, and services surrounding the water recreation industries from both residents and visitors.

Several water-dependent strategies identified by the *California Water Plan Update 2009* include:

- using existing data and new surveys to determine recreational needs;

- partnering with schools to provide drowning prevention programs primarily aiming at youth from urban and low income families;
- developing partnerships with universities to coordinate monitoring of public recreation use, equipment, and emerging water recreation trends;
- developing a procedure to incorporate climate change assessments within all infrastructure planning, budgeting, and project development;
- researching, identifying, and mitigating impacts of stream flows that prevent Native Americans from participating in their traditional cultural activities; and
- developing invasive species preventative measures.

Coachella Valley Efforts

- **Lake Cahuilla**. There are various recreational opportunities available to residents and visitors in and/or around Lake Cahuilla, these include: boating, water sports, fishing, horseback riding, hiking, camping, and picnicking.
- **Whitewater Preserve**. Whitewater Preserve is a 2,851 acres parcel owned by the Wildlands Conservancy which features the Whitewater/Mission Creek drainage. The trailhead is 4.5 miles from Interstate 10 on Whitewater Canyon Road.
- **Hot Mineral Water.** The Desert Hot Springs Subbasin provides highly desirable hot mineral water that fuels the Desert Hot Springs spa industry and about 50 RV/mobile home parks in the Desert Crest area. MSWD supports the local Hoteliers Association's efforts to promote and enjoy the hot water resource. The population served by the mobile home parks constitutes a DAC and is characterized by fixed incomes, compromised health, and advanced age. Adding to the complexity is the transient, seasonal nature of the population. MSWD's outreach to these communities includes public information campaigns and efforts to benefit the communities whenever possible as land use projects are developed.

Lake Cahuilla's fishing and recreational activities are overseen by the County of Riverside.

Watershed Management

Watershed management strategies increases and sustains a watershed's ability to provide for the diverse needs of the communities that depend on it. Managing at the watershed scale has proven effective in coordinating and integrating the management of numerous physical, chemical, and biological processes. Watershed management provides a basis for greater integration and collaboration among those policies and actions. Several potential benefits of adopting watershed management strategies include:

- maintaining, restoring, or enhancing the many functions in the natural systems within a watershed;
- maintaining reliable quantities of clean water and agriculture;
- avoiding costs by reducing flood or fire damages; and
- increasing or maintaining biological diversity.

Several watershed management strategies identified by the *California Water Plan Update 2009* include:

- creating a scientifically valid tracking and reporting method to document changes in the watershed;
- assessing the performance of projects and programs;
- providing watershed information to better inform local land use decision makers on how to maintain and improve watershed functions; and
- using watershed approaches in which all RMS strategies are coordinated.

Coachella Valley Efforts

The Coachella Valley's IRWM region is part of the Whitewater River watershed. An example of a current watershed management strategy underway in the IRWM region is listed below.

- **Coachella Valley Preserve Tamarisk Control**. The Nature Conservancy implemented a tamarisk control effort in the Coachella Valley Preserve to protect and restore critical watershed functions. Non-native tamarisk was drying up springs that provided water supply to native wildlife. Removal of tamarisk was accomplished by volunteers and California Conservation Corps crews, and has restored natural habitats and water flows to the preserve.

6.4.7 Other Strategies

The *California Water Plan Update 2009* and the *Proposition 84 and Proposition 1E IRWM Guidelines* (DWR 2010) identified other potential RMS that can aid in meeting water management goals and objectives however these strategies are currently limited in their capacity for addressing long-term regional water planning needs. These strategies consist of crop idling for water transfers, dewvaporation or atmospheric pressure desalination, fog collection, irrigated land retirement, rainfed agriculture, and waterbag transport/storage technology. Due to their limited ability to address Coachella Valley's IRWM plan goals and objectives these RMS were not selected for inclusion in the IRWMP.

Crop Idling for Water Transfers

Crop idling is a strategy that removes lands from irrigation and makes water available for transfer. Several of the potential benefits from implementing this strategy includes: enhancing water supplier reliability by making water available for redistribution, enhancing water quality, protecting and restoring fish and wildlife, and helping farm communities (as well as urban areas) infuse money into the local economy while increasing the reliability of water supply for urban consumers.

Several crop idling strategies identified by the *California Water Plan Update 2009* includes:

- developing necessary coordination structures to satisfy agency policy requirements;
- consulting with agencies and entities that will be leading crop idling programs; and
- understanding the local community impact and third party impacts to develop and implement necessary actions for maintaining economic stability of local communities and mitigating socioeconomic impacts.

Coachella Valley Efforts

With a crop production value in 2010 of over $575 million dollars which generates more than an equal amount of secondary economic activity, agriculture is a significant economic driver is the Coachella Valley. Almost all crops grown yield a value in excess of $1,000 per acre and many yield between

$10,000 and $20,000 per acre. Because few low value crops are grown, crop idling is not a feasible RMS for the Coachella Valley IRWM region.

Dewvaporation or Atmospheric Pressure Desalination

The dewvaporation or atmospheric pressure desalination strategy would heat brackish water until deposits of fresh water as dew are collected from the opposite side of a heat transfer wall. The heat sources for this strategy can be derived from multiple sources (i.e. fuel, solar, waste heat) and the energy required for evaporation can be supplied by the energy released from the dew formation.

Though dewvaporation technology is still being developed in California, Arizona State University (ASU) currently has a dewvaporation pilot project underway. The potential benefits of this technology include the ability to provide small amounts of water in remote locations (basic tests have produced up to 150 gallons per day) and the ability to reclaim salt water at relatively low costs.

Coachella Valley Efforts

Dewvaporation or atmospheric pressure desalination is not currently being planned or explored in the Coachella Valley IRWM region because it is not a feasible RMS for the Valley. Due to local climatic conditions, the Valley experiences very low amounts of dew, making dewvaporation or atmospheric pressure desalination unlikely water sources for the Region.

Fog Collection

Fog collection is a form of precipitation enhancement that has yet to be used in California though it does occur naturally along coastal vegetation. Though there is interest to use this strategy for increasing domestic water supplies in dry areas, such as California desert regions, this strategy is more appropriate for regions near the ocean.

The potential benefits of fog collection primarily include increasing water supplies. For example, a fog collection project in Chile yielded about 2,800 gallons per day from about 37,700 square feet of collection net. However, this strategy produces limited volumes of water supply.

Coachella Valley Efforts

Due to climactic conditions in Coachella Valley, which results in negligible amounts of fog, fog collection is not currently being planned or explored in the Coachella Valley IRWM region.

Irrigated Land Retirement

Irrigated land retirement is the removal of farmland from irrigated agriculture and increasing water availability for redistribution for other uses. The total water that can be made available for each retired acre can be 2 to 3.5 AFY assuming lands receive their water allocation. The potential benefits from retiring irrigated land includes: enhancing water supply reliability, enhancing water quality, protecting and restoring fish and wildlife resources, reducing drainage volume and associated costs due to drainage disposal.

Strategies for facilitating irrigated land retirement programs identified by the California Water Plan Update 2009 include:

- evaluating and ensuring urban areas receiving water made available from land retirement have exhausted all means of water conservation;
- making all land retirement programs voluntary;

- studying local community and third party impacts from land retirement such as from reduced agricultural production inputs, reduced farm income, and habitat restoration; and
- developing and implementing necessary actions for maintaining the economic stability of local communities and mitigating socioeconomic impacts.

Coachella Valley Efforts

Irrigated land retirement is not currently being planned or explored in the Valley. As explained above with crop idling, high agricultural productivity and resulting economic outputs from the agricultural industry in Coachella Valley make this RMS infeasible for the Coachella Valley IRWM region.

Rainfed Agriculture

The rainfed agriculture strategy is when all crop consumptive water use is provided directly by rainfall on a real time basis. Several of the potential benefits associated to rainfed agriculture include increases in water supply (though limited), improved post harvest/pre-planting soil management for winter crops, and decrease in soil erosion due to increases in soil moisture. However, due to the unpredictability of rainfall frequency, duration, and amount this strategy highly uncertain and risky. Additionally, the quantification of any potential water savings from rainfed agriculture, though small, will not be possible due to lack of available information.

Strategies for implementing rainfed agriculture programs identified by the *California Water Plan Update 2009* include:

- developing new technologies, management, and efficient water management practices for rainfed agriculture;
- providing technical and financial assistance for implementing rainfed agriculture technologies and management practices; and
- developing cooperative efforts to link rainfed agriculture runoff and water banking and conjunctive use activities and groundwater recharge.

Coachella Valley Efforts

With an average rainfall of 4-inches per year, and some years having no rainfall, agriculture is not possible without irrigation. Rainfed agriculture is not currently being planned or explored in the Valley.

Waterbag Transport/Storage Technology

The waterbag transport/storage technology involves diverting water in areas that have unallocated freshwater supplies, storing the water in large inflatable bladders, and towing them to an alternate coastal region. Currently, this strategy is not used in California though there have been various proposal for this technology worldwide. Several of the potential benefits associated to waterbag transport/storage technology includes: improvements in drought preparedness and water quality, reductions in groundwater overdraft, and provides environmental, energy and water supply benefits.

Coachella Valley Efforts

The Coachella Valley is an inland valley surrounded by mountains. Because the area lacks access to an ocean port, waterbag transport/storage technology is not currently being planned or explored in the Valley.

Education and Outreach

The education and outreach RMS was added by Coachella Valley stakeholders during the development of the IRWM Plan. This RMS is important because it improves awareness and support for local water management efforts.

Education and outreach programs are essential strategies for improving community involvement in water planning activities and increasing community awareness of watershed ecosystems and functions. Establishing education and outreach programs provide opportunities for community members to participate in water conservation and water quality protection activities such as ecosystem restoration and water quality monitoring projects. Several potential benefits of education and outreach strategies include: early identification of environmental problems in project developments and reduction of legal, environmental, and project costs from early and effective community engagement.

Several education and outreach strategies identified by the *California Water Plan Update 2009* include:

- developing community based surveys to identify effective education programs that will foster water use efficiency;
- incorporating an education and outreach component within each applicable RMS; and
- using media, newspaper, brochures, flyers, and the web to communicate education and outreach efforts and relevant water conservation and water quality protection information to the community.

Coachella Valley Efforts

Various education and outreach programs to promote water conservation and water quality protection are currently underway in the Coachella IRWM region. Examples of these existing education and outreach strategies are listed below.

- **Water Conservation Education**. The CVRWMG agencies reach out to thousands of children annually to educate on water conservation. There are multiple components to CVWD's programs, including in-class presentation and science fair promotion and sponsorship. MSWD is a Groundwater Guardian affiliate and shares the mission of public outreach to protect groundwater through class room programs and field trips in the watershed. DWA just completed a 2-year outreach conservation campaign. IWA has an ongoing outreach program that reaches school children in grades K-6.
- **Water Efficient Landscaping Guide Book**. CVWD staff along with Erick Johnson, one of California's leading desert landscape experts, published *Lush and Efficient: a Guide to Coachella Valley Landscaping* to provide Coachella Valley residents information on choosing desert plants and how to irrigate properly. Other CVRWMG agencies also produce literature encouraging water conservation, use of desert plants for landscaping, etc.
- **Living Wisely.** MSWD funds the Living Wisely program in conjunction with the electric and gas utility to promote conservation through water and energy efficient in-home practices. MSWD also has an active program to partner with homeowner's associations in identifying water conservation opportunities through plant selection and irrigation practices.
- **EYE Program**. In its fifth year, the Environmental Youth Experience (EYE) Program is conducted on a regional basis with high school youth. Students gather in the fall to explore and identify projects that have conservation and environmental benefits but are combined with service

to their communities. In spring, the students gather again to report on their project successes and experiences. MSWD is a lead community partner in EYE's success.

- **Riverside County Fair**. CVWD and IWA staff a water/conservation exhibit at the Riverside County Fair held in February of each year.

6.5 Adapting Resource Management Strategies to Climate Change

This section includes an evaluation of the adaptability of water management systems in the region to climate change.

The variability of location, timing, amount, and form of precipitation in California, suggested as a result of climate change, could present some uncertainty to the availability of future SWP's delivery capabilities and future SWP deliveries. DWR has determined that the Sierra snowmelt is shrinking and that melting is occurring earlier, shifting runoff from the spring further into the winter and causing winter flooding. Changes in precipitation pattern and quantity throughout the Southwest may also impact potential water supply availability from the Colorado River. Concerns about climate uncertainty have resulted in the need to adapt existing flood management and water supply systems in response to changing conditions.

The *2009 SWP Delivery Reliability Report* (DWR 2009) is intended to help local agencies, cities, and counties that use SWP water to develop adequate and affordable water supplies for their communities now and in the future. The information provided in this report can be used by local agencies in preparing or amending their water management plans and identifying the new facilities or programs that may be necessary to meet future water demands. A new feature of the *2009 SWP Delivery Reliability Report* is the estimation of possible reduction of SWP delivery reliability due to future climate changes and sea level rises. As vulnerability tools and assessments are developed, additional adaptation strategies will be identified to address the potential region-specific impacts of climate change.

Achievable "no regret" management practices for tackling climate change concerns that Coachella Valley can employ include:

- continued investment in local water conservation;
- diversification of local water supply portfolio;
- practicing integrated flood management;
- increasing conjunctive use of available water supplies;
- protecting and restoring water-related ecosystems;
- increasing water reuse and recycling;
- monitoring local and regional activities;
- tracking related legislation;
- investigating water supply/energy relationships and coordinating with larger water utilities; and
- following the State's required adaptation strategies and legislation.

In order to further address these predictions, the region may attempt to incorporate some of the strategies outlined in the *2009 California Climate Adaption Strategy Handbook* (CNRA 2009). The document summarizes the best known science on climate change impacts in seven specific sectors and provides recommendations on how to manage against those threats.

The *2009 California Climate Adaption Strategy Handbook* defines climate change adaptation as adjustments to the natural or human systems due to actual or expected climate changes in an effort to minimize harm or take advantage of beneficial opportunities (CNRA 2009), while climate change mitigation aims at directly reducing the sources of climate change, such as GHGs. To effectively address the impacts of climate change, both climate change adaptation and mitigation strategies should complement each other.

RMS that are implemented to manage water resources can also address climate change adaptation and/or mitigation. **Table 6-3** was extracted from the *California Water Plan Update 2009*; it categorizes resource management strategies and identifies GHG reduction opportunities associated with each RMS.

Finally, project-level CEQA analysis will include detailed climate change analysis, including generation and mitigation of GHG emissions. In preparing project-level GHG emissions analysis, project proponents should estimate GHG emissions from the project; establish significance criteria; identify those project components that may support carbon sequestration; and, if applicable, explain how the project may help in adapting to potential effects of climate change. Further, DWR will be a responsible agency for such project-level CEQA analysis, and project proponents shall follow the guidelines established by DWR with respect to project-level GHG analysis.

Table 6-3: Resource Management Strategies and GHG Reduction Opportunities

Management Objectives	Resource Management Strategy	GHG Reduction Opportunities
Reduce Water Demand	Agricultural Water Use Efficiency Urban Water Use Efficiency	Reduce dependency on energy to transport water resources
Improve Operational Efficiency and Transfers	Conveyance – Delta Conveyance – Regional/local System Reoperation Water Transfers	Decrease emissions by reducing operational efficiency/ transfer vehicle use and energy required for operations/transfers
Increase Water Supply	Conjunctive Management & Groundwater Desalination Precipitation Enhancement Recycled Municipal Water Surface Storage – CALFED Surface Storage – Regional/local	Localize water use, reduce imported water from far distances which require energy and GHG emissions
Improve Water Quality	Drinking Water Treatment and Distribution Groundwater Remediation/Aquifer Remediation Matching Quality to Use Pollution Prevention Salt and Salinity Management Urban Runoff Management	Stabilize water cycles by conserving water systems to their natural state
Improve Flood Management	Flood Risk Management	Controlling flooding so recharge can be redirected efficiently to prevent droughts will reduce a regions dependency on energy-intensive water importation in dry seasons
Practice Resources Stewardship	Agricultural Lands Stewardship Economic Incentives (Loans, Grants and Water Pricing) Ecosystem Restoration Forest Management Recharge Area Protection Water-Dependent Recreation Watershed Management	Provide opportunities for carbon sequestration, reforestation, curb climate changes by restoring/maintaining land surfaces
Other	Crop Idling for Water Transfers Dewvaporation or Atmospheric Pressure Desalination Fog Collection Irrigated Land Retirement Rainfed Agriculture Waterbag Transport/Storage Technology	Reduce energy requirements and GHG emissions from decreased demand of imported water.
Strategy Identified by Stakeholders	Education and Outreach	Reduce energy requirements and GHG emissions through water conservation education programs that decrease imported water demands.

Source: http://www.waterplan.water.ca.gov/cwpu2009/index.cfm

7 Project Evaluation and Prioritization

*This chapter addresses the **Project Selection Process Standard** which ensures the process used for submitting, reviewing, and selecting projects is documented and understandable for regional stakeholders and the public.*

In order to identify water resources management projects for implementation, the CVRWMG set forth an open “Call for Projects” for consideration in the IRWM Plan. Organizations from across the region submitted a total of 68 projects addressing a wide variety of water supply, water quality, flood management, and habitat protection needs. While all of these projects are considered to be important to effectively manage water resources in the region, a prioritization process has been established to help manage the project list and to determine which projects best meet regional needs. The prioritization process will allow a ranking of projects for implementation using a transparent and defensible method and will encourage the development of projects that are best suited for meeting the identified needs of the Coachella Valley.

7.1 Regional Priorities

Implementation priorities are those actions necessary to address immediate areas of need that have been identified through CVRWMG and Planning Partner meetings and public workshops. Meeting these priorities will continue to move implementation of the IRWM Plan forward and ensure that the Plan is representative of the region’s needs and responsive to key regional issues. The CVRWMG, with Planning Partners guidance, will be responsible for IRWM Plan implementation responsibilities.

In September 2010, the CVRWMG and Planning Partners identified seven short-term priorities for the Coachella Valley IRWM program. These short-term priorities are intended to direct the activities of the local IRWM program for the next three to five years. These implementation actions will move the Coachella Valley IRWM Region toward more integrated planning and will help the CVRWMG fully characterize and address critical water management needs.

Near-term IRWM Plan implementation will focus on the regional priorities identified through our facilitated consensus-based process. The *Coachella Valley IRWM Planning Grant Proposal* submitted by the CVRWMG in September 2010 addresses several of the regional priorities; others will be addressed through implementation projects or other program activities.

Priority 1: Address Water Quality in DACs

During the issues identification process with regional stakeholders, critical drinking water quality issues were raised by East Valley DACs. The CVRWMG is committed to developing a more thorough understanding of and identifying solutions for the groundwater quality issues in the Region’s DACs. Task 2-1 in the *Planning Grant Proposal* involves a technical evaluation to begin exploring these issues right away. Tackling this critical need head-on will address two of DWR’s Statewide Priorities: “Protect Surface Water and

Groundwater Quality" and "Ensure Equitable Distribution of Benefits". The Region's *Proposition 84-Round 1 Implementation Grant Proposal* includes a short-term arsenic treatment project to ensure that known mobile home communities who currently experience arsenic contamination are provided clean, safe drinking water as soon as possible.

Priority 2: Manage Flood Risk

Due to the Valley's susceptibility to flash flooding, the CVRWMG is committed to identifying and improving regional participation in flood protection programs. Task 2-3 in the Planning Grant Proposal includes development of an Integrated Flood Management Plan to address local flooding risks. This planning effort directly addresses emergency preparedness, flood protection, floodplain ecosystems, and low impact development techniques that comprise DWR's Statewide Priority "Practice Integrated Flood Management".

Priority 3: Improve Relationships with Tribes

Establishing new relationships between the IRWM program and local tribes will improve regional groundwater management. As demonstrated by establishment of the Native American Tribes Issues Group and Task 1-4 in the *Planning Grant Proposal*, the CVRWMG is committed to using the IRWM program as a forum for coordination and collaboration with the Valley's tribes. This consultation will help the Region attain DWR's Statewide Priority "Improve Tribal Water and Natural Resources".

Priority 4: Address Emerging Regulations

Recent changes in the regulatory environment – including the passage of AB1420 and SBX7-6, the State Board's Recycled Water Policy, and ongoing Total Maximum Daily Load (TMDL) efforts – have and will affect water management activities of the CVRWMG. The CVRWMG is committed to working together to address common interests and solutions to these new regulations. Task 2-2 in the *Planning Grant Proposal* involves development of a planning strategy for the Salt and Nutrient Management Plans required by the Recycled Water Policy. DWR's Statewide Priority "Protection Surface Water and Groundwater Quality" specifically promotes salt and nutrient planning as a component of an IRWM Plan. Task 2-4 in the *Planning Grant Proposal* involves development of a monitoring strategy for Groundwater Elevation Monitoring in compliance with SBX7-6.

Priority 5: Encourage Septic to Sewer Conversion

Because of their impacts on groundwater quality in the Valley, the CVRWMG is committed to implementing septic-to-sewer conversion projects through the IRWM program. Various conversion projects throughout the Valley may be coordinated under a larger, more efficient program to address DWR's Statewide Priority "Protect Surface and Groundwater Quality". The Region's *Proposition 84-Round 1 Implementation Grant Proposal* includes several septic-to-sewer projects that address critical groundwater quality issues related to nitrate contamination.

Priority 6: Address Reduced Reliability

Developing a better understanding of the State's SWP priorities and issues affecting reliability will help the Region coordinate its efforts and resources towards improving future supply reliability. In the meantime, the CVRWMG is committed to encouraging water conservation and source substitution projects to reduce demand on the imported water supply. For example, the CVRWMG recognizes the importance of expanding the region's recycled water systems to offset potable water demand. With this emphasis on water conservation and recycling, the CVRWMG will implement DWR's Statewide Priority

"Drought Preparedness" within the Valley. The Region's *Proposition 84-Round 1 Implementation Grant Proposal* includes a regional water conservation program to address the potential for reduced reliability and to achieve compliance with the State's 20x2020 Plan.

Priority 7: Create the Data Management System

The CVRWMG is committed to creating a Data Management System (DMS) that will help to manage water resources data and project performance. Over the next few years, the CVRWMG will expand the program website (www.cvrwmg.org) and online project database to provide additional functionality to the region's stakeholders. Refer to *Chapter 9, Framework for Implementation, Section 9.3 Data Management* for additional detail on the proposed DMS.

Implementation of these priorities will help to ensure that IRWM Plan implementation proceeds in a coordinated manner, the benefits of Plan implementation extend throughout the Region, and the Region makes inroads toward achieving the goals of this IRWM Plan.

7.2 Project Selection Process

This section describes the Project Selection Process, which includes three components: procedures for submitting a project to the IRWM Plan; procedures for review of projects to implement the IRWM Plan; and procedures for communicating the list(s) of selected projects.

Throughout the IRWM planning process, the CVRWMG has engaged stakeholders across multiple areas of water resources management to identify priorities for the region and to prioritize projects for implementation. As described below, the Planning Partners played an integral role in reviewing and selecting projects that best achieve the regional goals and objectives. This section presents the process for prioritization and selection of IRWM projects, including:

- Procedures for submitting projects to the IRWM Plan;
- Procedures for reviewing and prioritizing projects submitted to the IRWM Plan; and
- Procedures for selecting and communicating the final project list.

7.2.1 Project Submittal Process

The CVRWMG developed the project submittal process in May 2010. This process involves three major steps: solicitation, prioritization, and selection. Solicitation can be described as a "Call for Projects" that help meet the region's established goals and objectives. This step's objective is to compile a comprehensive list of water-related projects for the region. Any individual(s) that represent a public agency or non-profit organization with common water interests and needs can submit a project to the IRWM program via the project website (www.cvrwmg.org). An online project database was developed to assist in the management of project information (http://irwm.wrime.com/cvirwm/login.php). The database provided stakeholders with access to project information based on username/login functionality. Stakeholders accessed the online project database from the project website, entered and edited their project information, and submitted the projects for consideration in the IRWM Plan.

At a minimum, each project submitter must provide basic information about their project, including a project description, contribution to IRWM objectives, water-related benefits, estimated costs, status, and project details. The IRWM project website allows this project information to be reviewed, organized, and regularly updated by the CVRWMG and project proponents. Access to project summaries is available to all interested parties with the intention of improving transparency. **Figure 7-1** includes screenshots of the CVRWMG projects website and the online project database.

Project solicitation was discussed at the Planning Partners meetings held on May 19, 2010 and July 20, 2010, as well as at the DAC and Tribal Outreach meetings held on May 20, 2010 and July 28, 2010. Project solicitation was also announced and discussed at a Public Workshop held on June 23, 2010. At this time, the CVRWMG partners extended an offer to all project submitters to assist with input of their projects.

An open house was held for DAC representatives and other interested stakeholders on July 28, 2010 with computers available to help project proponents in entering project information into the database. Access to the online project submittal forms can be made available to those who do not have computer access. In addition, the CVRWMG may provide technical support to DAC and other representatives who are able to develop project materials on their own, in order to assist entities in submitting thorough project information.

Notices were sent on via email, advertisements on the website, and other media sources in order to reach all possible interested parties. A deadline for project submittals was set for Friday July 30, 2010 in order to receive, screen, and rank all projects for inclusion within the IRWM Plan.

In order to facilitate review and organization of the project submittals, the IRWM project website provides the option of printing or exporting a detailed list of all projects submitted. The CVRWMG used this project list in discussions of submitted projects with the Planning Partners and other stakeholders.

Figure 7-1 CVRWMG Project Submittal Website

The online project database is open at all times for receipt of new implementation projects as well as editing and revision of current implementation projects. As new funding opportunities arise, the CVRWMG will issue a new “Call for Projects” with a deadline appropriate for that funding application. Project concepts, ideas, and/or needs were accepted into the project submission process in order to identify needs within the region; however, these types of submittals were not considered for IRWM-related grant funding.

7.2.2 Project Review and Prioritization Process

After the July 30, 2010 deadline, projects submitted through the open “Call for Projects” were reviewed, ranked, and prioritized using a two-step screening and scoring approach. **Figure 7-2** below illustrates the overall process for screening of projects for the IRWM program.

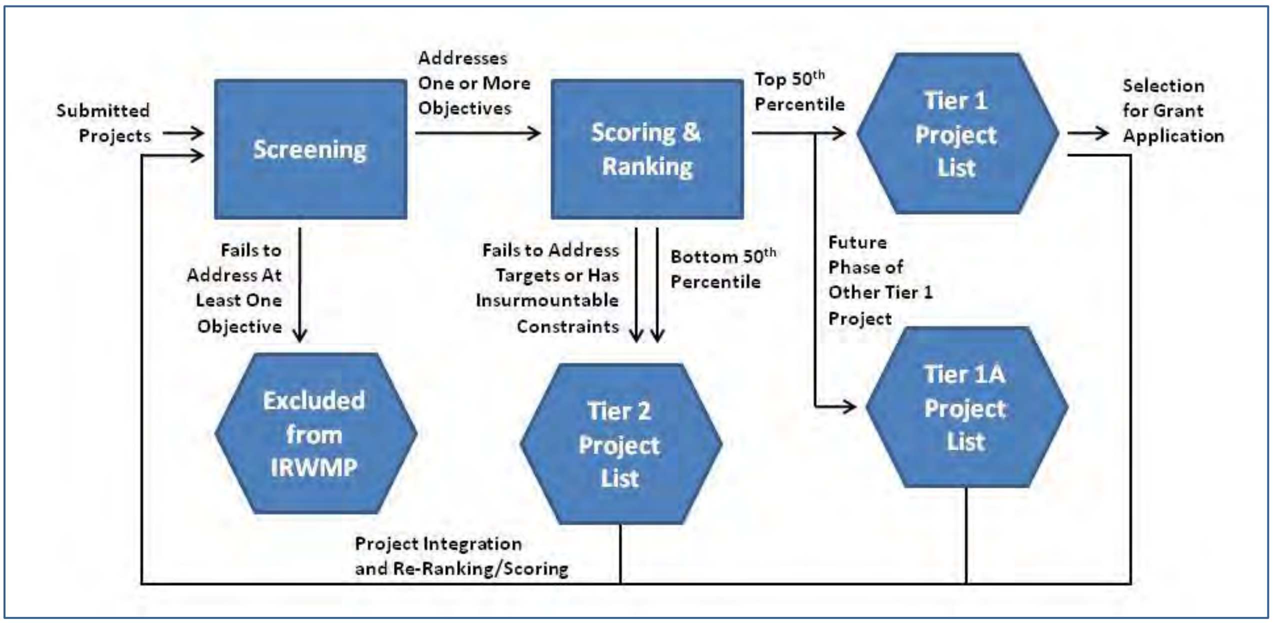
As shown in this **Figure 7-2,** projects were first evaluated for consistency with the regional objectives. Projects that did not meet any regional objectives were excluded from the IRWM Plan. Projects that were found to meet at least one objective passed the screening process and moved on to the next step of the project review process: scoring and ranking.

To evaluate and prioritize projects as part of the IRWM planning process, the scoring and ranking process takes into account three fundamental components:

- Principles of IRWM planning,
- Priorities of the Coachella Valley region,
- Feasibility of projects to proceed.

The relative priority of each criterion is established by its ability to contribute to the overall goals and objectives established for the Coachella Valley Region as illustrated in **Table 7-1**. Scoring for each submitted project was based on the responses provided in the online project database. In addition, the CVRWMG reviews each project individually for accuracy before they are ranked within the online project database.

Figure 7-2: Prioritization Process Overview



Through a consensus process, the CVRWMG and Planning Partners established the relative importance of each of these criteria. The approach to scoring projects and the relative importance of each criterion is presented in **Table 7-2.** Project scoring was developed to identify projects that:

- Address multiple IRWM Plan objectives;
- Integrate multiple resource management strategies;
- Address a Statewide Priority;
- Link to other projects;
- Involve more than one partner;
- Optimize water supply reliability;
- Protect or improve water quality;
- Manage flood risks;

- Optimize conjunctive use of surface and groundwater supplies;
- Directly benefit disadvantaged communities; and
- Identified in existing plans.

Each project was evaluated with respect to the criteria presented in **Table 7-2.** Based on the outcome of this evaluation, each project was assigned a score for each criterion for a total maximum score of 180. Projects were then be ranked with the highest-scoring project ranked by number one. The top 50^{th} percentile of projects (i.e., all project above the median) were considered Tier 1 projects that strongly contribute to the attainment of regional goals and objectives. Further, all future phases of Tier 1 projects were considered Tier 1A, such that only the ready-to-proceed Tier 1 projects were identified as regional priorities. The bottom 50^{th} percentile (i.e., all projects below the median) were considered Tier 2 projects that are necessary to manage water in the region, but not considered priorities under IRWM planning.

Tier 1 projects listed within the online project database will be moved forward for consideration in various IRWM funding applications.

On August 11, 2010, the CVRWMG participated in an Integration Workshop to review and discuss the complete list of submitted projects. The purpose of this meeting was to facilitate the pairing of similar projects to fulfill the integration requirements of the IRWM Plan (please see *Chapter 6 Resource Management Strategies, Section 6.1 IRWM Integration Approach* for a more detailed explanation of integration). The CVRWMG agreed that project integration and selection should occur with near-term regional and agency-wide benefits in mind. The focus of this IRWM Plan is to identify and address immediate needs that benefit the Coachella Valley.

After much discussion, several integration opportunities among the submitted projects were identified. The opportunities for greater project efficiencies were highlighted and projects that did not address IRWM Plan goals and objectives were noted. The CVRWMG noted that not all prioritized projects will be regional in scope; solutions could entail grouping projects into 'packages' or prioritizing individual projects based on critical water supply or water quality needs. Integration suggestions made by the five CVRWMG agencies at the meeting were transmitted to the project proponents for consideration. Project proponents were given two additional weeks to make any changes or updates to integrated projects in the online project database.

Stakeholder Input

Stakeholders have the ability to provide input and feedback on projects through the online project database, during project review sessions, at Planning Partners meetings, and through participation in project selection workgroups. The project selection process for Proposition 84-Round 1 funding was finalized at public meetings of the Planning Partners held on September 28, 2010 and October 26, 2010.

Table 7-1: Project Prioritization Criteria and Relationship to IRWM Goals and Objectives

Goals	Objectives	1. DWR IRWM Principles					2. Priorities of the Coachella Valley					3. Feasibility
		Addresses Multiple IRWM Plan Objectives	Integrates Multiple Resource Management Strategies	Addresses a Statewide Priority*	Linked to Other Projects	Involves More than One Partner	Optimizes Water Supply Reliability	Protects or Improves Water Quality	Manages Flood Risks	Optimizes Conjunctive Use of Surface and Groundwater Supplies	Directly Benefits Disadvantaged Communities	Identified in Existing Plan
1. Optimize water supply reliability.	A. Provide reliable water supply for residential and commercial, agricultural community, or tourism needs.	X	X	X	O	O	X	X			O	X
	B. Manage groundwater levels to reduce overdraft, manage perched water, and minimize subsidence.	X	X		O	O	X	X		O	O	X
	C. Secure reliable imported water supply, including restoring/improving reliability of State Water Project supply and securing other imported water supplies.	X	X		O	O	X	X		O	O	X
	D. Maximize local supply opportunities, including water conservation, water recycling and source substitution, and capture and infiltration of runoff.	X	X	X	O	O	X	X	O		O	X
2. Protect water quality.	E. Protect groundwater quality and improve, where feasible.	X	X	X	O	O	X	X		O	O	X
	F. Preserve and improve surface water quality by maintaining integrity of agricultural drainage systems, protecting the quality of natural runoff used for potable supply, and reducing pollution in stormwater runoff.	X	X	X	O	O	X	X		O	O	X

Goals	Objectives	1. DWR IRWM Principles					2. Priorities of the Coachella Valley					3. Feasibility
		Addresses Multiple IRWM Plan Objectives	Integrates Multiple Resource Management Strategies	Addresses a Statewide Priority*	Linked to Other Projects	Involves More than One Partner	Optimizes Water Supply Reliability	Protects or Improves Water Quality	Manages Flood Risks	Optimizes Conjunctive Use of Surface and Groundwater Supplies	Directly Benefits Disadvantaged Communities	Identified in Existing Plan
3. Provide stewardship of our water-related natural resources.	G. Preserve water-related local environment and restore, where feasible.	X	X	X	O	O		O			O	X
	H. Manage flood risks, including current acute needs and needs for future development.	X	X	X	O	O	X	X	X		X	X
4. Coordinate and integrate water resource management.	I. Optimize conjunctive use of available water resources.	X	X		O	O	X	O		X	O	X
	J. Maximize stakeholder involvement and stewardship in water resource management.	X			X	X	X	X	O	O	X	X
5. Ensure cultural and social sustainability of water in the Valley.	K. Address water-related needs of local Native American culture.	X	X	X	O	O	X	X			O	X
	L. Address water and sanitation needs of disadvantaged communities.	X	X	X	O	O	X	X			X	X
	M. Maintain affordability of water.	X			O	O	X	O		O	O	X
	Relative Ranking/Importance to Achieving IRWM Goals and Objectives	**A**	**A**	**B**	**C**	**C**	**B**	**B**	**B**	**B**	**B**	**A**

X = directly related
O = indirectly related
Proposed initial weighting: A = 25% (addresses 7+objectives), B=12.5% (achieves 2-6 objectives), C=6.25% (achieves <2 objectives directly).
* Statewide Priorities are:

- Drought preparedness
- Use and reuse water more efficiently
- Climate change response actions
- Expand environmental stewardship
- Practice integrated flood management
- Protect surface water and groundwater quality
- Improve tribal water and natural resources Ensure equitable distribution of benefits

Table 7-2: Project Scoring Guide

Component	Criterion	Scoring Procedure[1]	Points Assigned	Weighting	Subtotal
1. Principles of IRWM Planning	A. Addresses Multiple IRWM Plan Objectives	Score based on # of objectives addressed	4+ objectives = 20 pts 3 objectives = 15 pts 2 objectives = 10 pts 1 objective = 5 pts	11%	70
	B. Integrates Multiple Resource Management Strategies	Score based on # of strategies employed	8+ strategies = 20 pts 6-7 strategies = 15 pts 4-5 strategies = 10 pts 2-3 strategies = 5 pts	11%	
	C. Addresses a Statewide Priority	Score is based on Yes/No response	Yes = 10 pts No = 0 pts	6%	
	D. Linked to Other Projects	Score is based on Yes/No response	Yes = 10 pts No = 0 pts	6%	
	E. Involves More than One Partner	Score is based on Yes/No response	Yes = 10 pts No = 0 pts	6%	
2. Priorities of the Coachella Valley	A. Optimizes Water Supply Reliability	Score is based on Yes/No response	Yes = 20 pts No = 0 pts	11%	100
	B. Protects or Improves Water Quality	Score is based on Yes/No response	Yes = 20 pts No = 0 pts	11%	
	C. Manages Flood Risks	Score is based on Yes/No response	Yes = 20 pts No = 0 pts	11%	
	D. Optimizes Conjunctive Use of Surface and Groundwater Supplies	Score is based on Yes/No response	Yes = 20 pts No = 0 pts	11%	
	E. Directly Benefits Disadvantaged Communities	Score is based on Yes/No response	Yes = 20 pts No = 0 pts	11%	
3. Project Feasibility	A. Identified in Existing Plan	Score is based on Yes/No response	Yes = 10 pts No = 0 pts	6%	10
				Total	180

7.2.3 Project Selection Factors

The following subsections outline the project selection factors identified by DWR and used by the CVRWMG in the project selection process. Refer to *Chapter 6 Resource Management Strategies, Section 6.5 Adapting Resource Management Strategies to Climate Change* for more information regarding climate change adaptation and mitigation.

Contribution to IRWM Plan Objectives

As described above, one of the primary scoring criterion used for the project review process is to degree to which a project contributes to the regional objectives. The various projects submitted for this IRWM Plan were scored (Criterion 1A and 2A-E) based on how well each project contributes to the objectives, up to a maximum of 120 points. The established IRWM Plan Objectives are listed below:

A. Provide reliable water supply for residential and commercial, agricultural community, and tourism needs.
B. Manage groundwater levels to reduce overdraft, manage perched water, and minimize subsidence.
C. Secure reliable imported water supply, including restoring/improving reliability of State Water Project supply and securing other imported water supplies.
D. Maximize local supply opportunities, including water conservation, water recycling and source substitution, and capture and infiltration of runoff.
E. Protect groundwater quality and improve, where feasible.
F. Preserve and improve surface water quality by maintaining integrity of agricultural drainage systems, protecting the quality of natural runoff used for potable supply, and reducing pollution in stormwater runoff.
G. Preserve water-related local environment and restore, where feasible.
H. Manage flood risks, including current acute needs and needs for future development.
I. Optimize conjunctive use of available water resources.
J. Maximize stakeholder involvement and stewardship in water resource management.
K. Address water-related needs of local Native American culture.
L. Address water and sanitation needs of disadvantaged communities, including those in remote areas.
M. Maintain affordability of water.

The IRWM Plan also provides measurable targets for each IRWM Plan objective. These measurable targets provide a way to assess each submitted project's contribution to the regional goals and objectives established by the Valley's stakeholders. Each project's contribution to the IRWM Plan objectives will be measured and monitored during project implementation. On an annual basis, the CVRWMG will coordinate with project proponents to evaluate the status of each IRWM project and develop a summary of implementation progress for stakeholder review. By reporting each project's contribution to the measurable targets, the IRWM Annual Reports will provide the region with an understanding of how the Valley's water management issues and needs are being addressed each year through IRWMP. Projects which are undergoing planning, engineering, and construction will be updated to provide a comprehensive picture of their progress.

Appendix B provides a cross-walk of the submitted projects (as of September 30, 2010) and the Coachella Valley IRWM Plan objectives.

Relationship to RMS

The implementation projects included in **Appendix B** incorporate a wide range of resource management strategies (RMS) to achieve the region goals and objectives (see *Chapter 6 Resource Management Strategies* for a detailed discussion). Each RMS identified in the *California Water Plan Update 2009,* as well as others identified by Valley stakeholders, can contribute to the IRWM Plan goals and objectives.

Table 6-2 (in *Chapter 6, Resource Management Strategies*) presents Coachella Valley's regional objectives and their correlation to the RMS. Project submittals are required to identify both the regional goals and objectives and the specific RMS employed by each implementation project. The diversification of management strategies across the Valley's implementation projects will ensure that all critical water management needs are addressed without fail.

Appendix B provides a cross-walk of the submitted projects (as of September 30, 2010) and the RMS included within this Plan.

Statewide Priorities

The Statewide Priorities identified by DWR in their IRWM Grant Program Guidelines (August 2010) include a broad range of project types that address current water management issues. These Statewide Priorities are presented in **Table 7-3**. The Statewide Priorities were considered during development of the Coachella Valley's goals and objectives. However, regional needs and issues were of primary importance.

Appendix B provides a cross-walk of the submitted projects (as of September 30, 2010) and the Statewide Priorities.

Of the eight aforementioned priorities set forth by DWR, CVRWMG and the Planning Partners considered one priority, Climate Change Response Actions, separately from the other Statewide Priorities in the project review process. For specific information on how this priority was considered, please refer to the sections below.

Technical Feasibility

The CVRWMG and Planning Partners considered the technical feasibility of submitted projects during the review process. Technical feasibility is related to the knowledge of the project location; knowledge of the water system at the project location; or the material, methods, or processes proposed to be employed in the project. Technical feasibility of each project submittal was assessed through the following fields in the online project database: list regulatory permits; list CEQA/NEPA documents; list feasibility study(s); and describe need for project.

A list of regulatory permits will demonstrate how the project has developed. Dates of permitting will show how long the project has been underway and give the CVRWMG an idea of how much funding is required in order to complete the project. Greater understanding of the project will be achievable if permitting documentation is accounted for in the project prioritization process.

Table 7-3: Statewide Priorities

Statewide Priority	Description
Drought Preparedness	Proposals that contain projects that effectively address long-term drought preparedness by contributing to sustainable water supply and reliability during water shortages. Drought preparedness projects do not include drought emergency response actions, such as trucking of water or lowering well intakes. Desirable proposals will achieve one or more of the following: o Promote water conservation, conjunctive use, reuse and recycling o Improve landscape and agricultural irrigation efficiencies o Achieve long-term reduction of water use o Efficient groundwater basin management o Establish system interties
Use and Reuse Water More Efficiently	Proposals that include projects that implement water use efficiency, water conservation, recycling and reuse to help meet future water demands, increase water supply reliability and adapt to possible climate change. Desirable proposals include those with projects that: o Increase urban and agricultural water use efficiency measures such as conservation and recycling o Capture, store, treat, and use urban stormwater runoff (such as percolation to usable aquifers, underground storage beneath parks, small surface basins, domestic stormwater capture systems, or the creation of catch basins or sumps downhill of development) or projects outlined in PRC §30916 (SB 790) o Incorporate and implement low impact development (LID) design features, techniques, and practices to reduce or eliminate stormwater runoff
Climate Change Response Actions	Water management actions that will address the key Climate Change issues of: o Adaptation to Climate Change – Proposals that contain projects that when implemented address adaptation to climate change effects in an IRWM region. Desirable proposals include those that: • Advance and expand conjunctive management of multiple water supply sources o Use and reuse water more efficiently o Water management system modifications that address anticipated climate change impacts, such as rising sea-level, and which may include modifications or relocations of intakes or outfalls o Establish migration corridors, re-establish river-floodplain hydrologic continuity, re-introduce anadromous fish populations to upper watersheds, and enhance and protect upper watershed forests and meadow systems o Reduction of Greenhouse Gas (GHG) Emissions – Proposals that contain projects that reduce GHG emissions compared to alternate projects that achieve similar water management contributions toward IRWM objectives. Desirable proposals include those that: • Reduce energy consumption of water systems and uses • Use cleaner energy sources to move and treat water o Reduce Energy Consumption – Proposals that contain projects that reduce not only water demand but wastewater loads as well, and can reduce energy demand and GHG emissions. Desirable proposals include: • Water use efficiency • Water recycling

Table 7-3: Statewide Priorities

Statewide Priority	Description
	• Water system energy efficiency • Reuse runoff
Expand Environmental Stewardship	Proposals that contain projects that practice, promote, improve, and expand environmental stewardship to protect and enhance the environment by improving watersheds, floodplains, and instream functions and to sustain water and flood management ecosystems.
Practice Integrated Flood Management	Proposals that contain projects that promote and practice integrated flood management to provide multiple benefits including: o Better emergency preparedness and response o Improved flood protection o More sustainable flood and water management systems o Enhanced floodplain ecosystems o LID techniques that store and infiltrate runoff while protecting groundwater
Protect Surface Water and Groundwater Quality	Proposals that include: o Protecting and restoring surface water and groundwater quality to safeguard public and environmental health and secure water supplies for beneficial uses o Salt/nutrient management planning as a component of an IRWM Plan
Improve Tribal Water and Natural Resources	Proposals that include the development of Tribal consultation, collaboration, and access to funding for water programs and projects to better sustain Tribal water and natural resources.
Ensure Equitable Distribution of Benefits	Proposals that: o Increase the participation of small and disadvantaged communities in the IRWM process. o Develop multi-benefit projects with consideration of affected disadvantaged communities and vulnerable populations o Contain projects that address safe drinking water and wastewater treatment needs of DACs o Address critical water supply or water quality needs of California Native American Tribes within the region

Source: *Proposition 84 & Proposition 1E IRWM Grant Program Guidelines* (DWR 2010)

Providing proof of CEQA and NEPA documents will identify a project's environmental circumstances which can help pinpoint a project's technical feasibility. According to Section 21001 of the CEQA Guidelines, the CEQA environmental review process in intended to:

- Develop, maintain and enhance a high quality environment;
- Provide California's residents with clean air and water, and with historical, scenic, natural and pleasing visual amenities;
- Prevent the elimination of fish and wildlife species and communities for present and future generations;
- Provide long-term environmental protection plus a decent home and living environment to its citizens;

- Create and maintain harmony between people and nature so that short and long-term social and economic benefits can be gained;
- Develop standards and procedures designed to provide environmental protection;
- Consider short and long-term economic and technical costs and benefits when approving development proposals;
- Foster intergovernmental coordination and cooperation; and
- Enhance public participation in government planning and decision making.

CEQA/NEPA documentation will include project background, methods, goals, data, environmental risks, and other components that will help project proponents gauge the technical feasibility of their projects. Per Section 15262 of the CEQA Guidelines, this IRWM Plan qualifies as a planning study and does not have a legally binding effect of the participating agencies. As such, programmatic environmental analysis under CEQA is not required.

The existence of a technical feasibility study will provide greater efficiency in project selection. The feasibility study will provide CVRWMG with an evaluation of the potential impacts of the proposed project. The analysis will help CVRWMG determine how likely the project will achieve regional and statewide goals and objectives.

A list of projects needs can provide significant guidance for project selections. As described later in the chapter, if project needs touch upon critical issues of the regions (i.e. DAC/tribal lands water quality, environmental justice) then, greater consideration will be taken. This information was considered both during project review and scoring, as well as during consideration of projects for specific funding applications.

Projects submitted as part of this IRWM Plan are expected to be in varying stages of implementation, including planning, feasibility study, design and engineering, restoration, and construction. Several implementation projects may be considered “technical feasibility studies” to prepare for future construction projects that meet the Valley’s water management needs. Additionally, several projects may be land acquisition projects that would not require a demonstration of technical feasibility.

Appendix B provides a description of the technical feasibility of the submitted projects (as of September 30, 2010). They will be demonstrated in either the form of 1) published feasibility studies, master plans, pre-design studies and/or 2) by successful implementation and operation of other similar projects.

Critical Issues in DACs

As described above, the project selection process considered if a project helps to address critical water supply and water quality needs of DACs within the IRWM region. The various projects submitted for this IRWM Plan were scored (Criterion 1A and 2E) based on how well each project contributes to addressing DAC needs, up to a maximum of 40 points. The “Call for Projects” was opened for any public agency or non-profit organization, including DACs, who wanted to submit water projects within the Coachella Valley region. *Chapter 5, Section 5.6, Disadvantaged Communities Outreach* provides an overview of DAC geography and demographics. *Chapter 3, Issues and Needs, Section 3.1.8 Issues Groups* includes an explanation of important water and wastewater issues pertinent to Coachella Valley DACs.

The affordability of water, improvement of water quality, and lack of water and wastewater infrastructure are among the main concerns in DACs. All implementation projects that address these concerns were given allocated points in the scoring process.

A total of 30 submitted projects (approximately 44%) addressed critical DAC needs. The CVRWMG provided local representatives from DAC organizations – primarily the East Valley collaborative between Pueblo Unido CDC, Poder Popular, and CRLF – with technical support in developing project information for submittal to the IRWM Plan.

Appendix B provides a cross-walk of the submitted projects (as of September 30, 2010) and their benefits to DACs in the Coachella Valley.

Critical Issues on Tribal Lands

There are six Native American tribes located in or near the Coachella Valley region, as shown in Figure 2-16: Tribal Lands (see *Chapter 2, Region Description*). Tribes were included and participated in the "Call for Projects" during development of this IRWM Plan. As explained in *Chapter 3 Issues and Needs* Coachella Valley tribal lands suffer from a lack of adequate water and wastewater infrastructure and high costs associated with improving it. There is a lack of basic water and wastewater infrastructure on some tribal lands in the East Valley. For instance, private sewer facilities are undersized or inadequate in low percolation areas.

Of the 68 submitted projects, one was submitted by a tribal government; this project promotes wetland expansion in Desert Cahuilla located on the northwest shore of the Salton Sea. Further, several additional IRWM projects – specifically those improving local groundwater conditions – provide benefits to tribal governments.

Appendix B provides a cross-walk of the submitted projects (as of September 30, 2010) and their benefits to tribes in the Coachella Valley.

Environmental Justice Considerations

Environmental justice is defined in California law (Government Code section 65040.12) as "the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws and policies." Environmental justice in water management includes:

- Supporting community health, as well as a clean and safe environment,
- Diversifying the decision-making process by calling for involvement of all people and communities,
- Encouraging a more equitable distribution of economic benefits,
- Empowering communities themselves to take action towards improving their environment,
- Increasing awareness, understanding and effective cooperation within and among communities, and,
- Ensuring the right of all people to equal and fair treatment under the laws and regulations of the United States.

IRWM Plan projects that support water supply diversity and water quality improvement ensure equitable water supply reliability, quality, safety, and economic benefits for all water users within the Valley, regardless of ethnicity or economics. Disadvantaged communities (along with the region's population as a whole) will benefit from floodplain management projects that address current flooding issues.

Stakeholder outreach programs (see *Chapter 5 Stakeholder Involvement*) used to develop this IRWM Plan support the inclusion of DACs located within the region's municipalities and unincorporated areas. The CVRWMG will also have frequent Planning Partners meetings in which all DACs will be invited.

Planning Partners include the County of Riverside, CVIRWM area cities, DAC representatives, Tribal staff, and other invited water-related organizations.

As described above, 30 of the submitted IRWM Plan projects address environmental justice by (1) creating safe and reliable water supply for disadvantaged communities, (2) improving water quality within disadvantaged communities, and/or (3) reducing flood risks within disadvantaged communities.

Project Costs and Financing

Estimated costs and project implementation information presented within this IRWM Plan (see *Chapter 9, Framework for Implementation, Section 9.5 Finance*) were derived from project proponents, so costs for all projects presented herein should be considered preliminary planning estimates. Project costs will be subject to refinement and adjustment in future plan updates and in future grant funding applications.

Project information on benefits, impacts, technical feasibility, and schedules were also provided by project proponents. Additional analysis of submitted project information will be required as part of future funding prioritization efforts to (1) confirm the submitted project information, and (2) to ensure consistency in the methods used to develop the project information.

Appendix B provides a cross-walk of the submitted projects (as of September 30, 2010) and their minimum and maximum project costs, grant funding needed, local cost share, and annual operations and maintenance costs.

Economic Feasibility

As part of the project selection process, the economic feasibility of each project was considered. Project proponents were asked to submit information about minimum and maximum project costs, grant funds requested, estimated local match amount, match type, and annual operations and maintenance costs. Completing this information indicates that the project proponents has developed a complete scope and budget necessary for project implementation. Further, additional information on cost effectiveness and certainty of local cost share was requested from project sponsors during deliberation of the funding application package.

A full economic-benefits analysis will be developed as part of the IRWM implementation grant application process. According to DWR's Economic Analysis Guidebook, the objective of economic analysis is to determine if a project represents the best use of resources over the analysis period (that is, the project is economically justified). The test of economic feasibility is passed if the total benefits that result from the project exceed those which would accrue without the project by an amount in excess of the project costs, according to the guidebook. For more information regarding the economic feasibility, please refer to *Chapter 9 Framework for Implementation, Section 9.5.1 Sources and Certainty of Funding.*

Project Status

Project status, also known as "readiness to proceed," is completed in the project database by the project proponents. This field is considered during project prioritization; however, readiness to proceed is not necessarily a reason for project exclusion from an IRWM Plan. As the planning horizon for an IRWM Plan is 20-years, even a conceptual project should be considered as it may be projected to have benefits that would be worth realizing by implementing the project or by developing an alternate, integrated, or modified project.

Project status may have to be reconsidered as implementation projects are matched with sources of grant funding. Funding sources may want projects completed within certain time limits. However, it is also true that some funding sources may cover planning or developmental phases of a project. The CVRWMG will keep in mind conditions of the specific funding opportunities and will communicate this information to all project proponents during the “Call for Projects” and subsequent project selection processes.

Appendix B provides a cross-walk of the submitted projects (as of September 30, 2010) and readiness to proceed with near-term funding opportunities.

Strategic Considerations

Integrating similar projects – based on geographic or RMS similarities – have and will be considered by the CVRWMG, Planning Partners, and other stakeholders before proceeding with project selection. The CVRWMG has taken full advantage of the principals of IRWM planning by combining or modifying local projects into regional projects or ‘packages.’

At the CVRWMG Integration Workshop held on August 11, 2010 and a Planning Partners meeting on September 28, 2010, brainstorming sessions occurred and the resulting suggestions for integration were communicated to project proponents. For example, project proponents have collaborated to integrate multiple septic conversion projects, water quality related projects, and/or water recycling projects. Recommendations that projects within geographic proximity be combined were also communicated and implemented.

The online project database requested information from project sponsors on identifying linkages with other projects. **Appendix B** provides a cross-walk of the submitted projects (as of September 30, 2010) and various strategic considerations.

Climate Change Adaptation

For additional detail on climate change considerations, please refer to *Chapter 2, Region Description, Section 2.8 Climate Change* and/or *Chapter 6 Resource Management Strategies, Section 6.5 Adapting Resource Management Strategies to Climate Change.* Climate change concerns are acknowledged and incorporated into long-term planning related to water supply, water quality, and flood management in the Valley. The CVRWMG recognizes that climate change could affect future water supply availability and reliability. Therefore, the CVRWMG will consider projects that aim to conserve and manage future sustainability of the region’s water supply.

Appendix B provides a cross-walk of the submitted projects (as of September 30, 2010) and climate change adaptation strategies.

Climate Change Mitigation

The CVRWMG recognizes the relationship between energy consumption, GHG emissions, and water resources management. Consideration is given in the project selection process to projects that incorporate GHG emission reduction strategies. GHG reduction methods such as CARB strategies (please see *Chapter 2, Region Description, Section 2.8.1 Legislative and Policy Context)*, participation in the California Climate Action Registry, and carbon sequestration (where practical) are recommended to agencies and organizations participating in IRWM planning.

Appendix B provides a cross-walk of the submitted projects (as of September 30, 2010) and climate change mitigation efforts.

7.3 List of Selected Projects

This section describes how the submitted project list(s) will be stored, maintained, and shared.

Periodic updates of the Coachella Valley IRWM project list must be made to ensure current projects are considered for each new funding opportunity. Updating the project list will allow new projects to be added, as regional conditions or the State's regulatory setting changes. This will also allow project proponents to update and revise their project submittals as necessary. The online project database developed for this IRWM Plan will remain open and available to project proponents for updates, additions, and revisions over time. As new funding opportunities arise, the CVRWMG will communicate new project submittal deadlines and other relevant information.

The Coachella Valley IRWM project list – as of September 30, 2010 – is included in **Appendix B** of this Plan. After that date, the updated project list will be accessible through the online project database (http://www.cvrwmg.org/projects.php). The online project database allows project proponents to update project information, review other projects and identify integration opportunities, and add additional features so the projects provide multiple benefits. This online project database allows the project list to remain "live", always available for review and update. The Coachella Valley IRWM Plan does not require re-adoption following changes to this project list.

When the CVRWMG identifies each new funding opportunity, it will work with the Planning Partners to review, score and rank, and select projects for the funding application. All grant applications will be submitted to the Planning Partners for review and approval prior to submission to the CVRWMG governing bodies and grant agency.

Modification Process

Chapter 5, Stakeholder Involvement presents an overview of the CVRWMG's governance structure overseeing Plan implementation. The CVRWMG will similarly be responsible for conducting periodic IRWM Plan reviews and updates. The list of projects to be considered for implementation identified in this section will be subject to review and revision as part of the periodic Plan updates. Over time, it is expected that some projects included in this Plan will be implemented, and other projects not currently included in this Plan will be added to for the project database for implementation (see *Chapter 5, Stakeholder Involvement, Section 5.9.1 Updating or Amending the IRWM Plan* for more information).

7.4 Grant Funding Proposal Prioritization

This section describes how the submitted project list(s) will be prioritizes for future grant funding proposals.

Projects selected for grant funding packages will be selected using a funding proposal prioritization process that goes beyond the IRWM prioritization process presented above. The prioritization process presented above described the prioritization process used to identify top implementation projects. While this process ranked projects based on ability to address Regional objectives and other criteria, the process does not identify specific groups of projects for which funding should be sought. The reason for this is twofold:

1. Prioritizing projects for a specific funding proposal in the Plan would limit the versatility of the prioritization process for use in identifying projects for future funding opportunities; and
2. As this IRWM Plan is intended to be a living document, the prioritization process presented in this Plan should remain flexible, such that it may be adapted to changing regional needs.

A supplemental prioritization process must be implemented to identify appropriate projects from the implementation project list to be included in future funding proposals as they arise. The details of this process are fluid, and should reflect the specific needs and requirements of the given funding opportunity.

As each new funding opportunity arises, the CVRWMG shall convene a Workgroup made up of CVRWMG members, Planning Partners, and/or other appropriate stakeholders to review and evaluate the IRWM Plan project list against the funding solicitation. During this evaluation process, the following criteria will likely be used identifying high priority projects:

- **Grant Program Preferences:** Funding programs frequently outline specific goals and objectives. Projects selected for inclusion in a funding proposal should conform to the details of the specific funding program.
- **Regionalism**: Some projects may have only local beneficiaries, while other projects may benefit stakeholders throughout the entire Region. Projects with Region-wide benefits may be preferable to those with only local beneficiaries when applying for funding as a region.
- **Cost-Effectiveness:** As the cost of doing business continues to increase, agencies are challenged to identify cost-effective solutions. Both short- and long-term cost-effectiveness, as well as potential externalized costs to the public, may be a factor for consideration in funding proposal prioritization.
- **Readiness to Proceed**: Some funding opportunities require projects to be at a specific point in development, such as design or construction, while other opportunities may be targeted toward planning-level projects.

As appropriate, the CVRWMG will incorporate these and other prioritization criteria to narrow the pool of high priority projects from the Plan-level prioritization to develop funding proposals. These criteria may be applied in multiple ways. Some prioritization criteria are essential to a project's success in achieving the Region's objectives and/or being eligible for funding. The specific criteria used, and precise method for applying the criteria, will be determined on a case-by-case (i.e., funding opportunity by funding opportunity) basis using a consensus-based approach among the Workgroup.

All projects included in the IRWM Plan have been determined to contribute to achieving the regional objectives, and therefore provide benefits to the Region. As a result, if projects included in the implementation project list do not address the specific criteria set forth for a given funding opportunity, appropriate projects may be added as the IRWM planning process moves forward.

8 Agency Coordination

*This chapter addresses the **Coordination Standard**, as well as the **Relation to Local Water Planning Standard** and the **Relation to Local Land Use Planning Standard**.*

8.1 Agency Coordination

This section discusses the process by which local project proponents and stakeholders can coordinate their IRWM related activities and efforts; coordination with neighboring IRWM efforts; and coordination with other State and federal agencies.

This IRWM Plan is developed in accordance with IRWM planning guidance developed by DWR (August 2010). During Plan development, the CVRWMG coordinated with the State through DWR staff participation in CVRWMG business meetings, Planning Partners and Issue Group meetings, and public workshops. Implementing the IRWM Plan will require coordination between the CVRWMG and project proponents and a number of state and federal agencies, including regulatory agencies, land management agencies, and resource agencies. The CVRWMG will also coordinate with local land use agencies in implementing the program and preparing future Plan updates.

8.1.1 Coordination of Activities within IRWM Region

The IRWM planning process is intended to coordinate and share information concerning water supply and water quality, planning programs and projects, and to improve and maintain overall communication among the partners involved. The CVRWMG has gained support for the IRWM program through a proactive approach that implements public outreach and distributes information widely. The CVRWMG has initiated a stakeholder outreach process to help support the development and adoption of an IRWM Plan. This outreach process is discussed in greater detail in *Chapter 5, Stakeholder Involvement*. Specifically, Chapter 5 contains detailed information regarding stakeholder coordination, public involvement, participants involved in the IRWM planning process, outreach efforts, and outreach specifically pertaining to disadvantaged communities and tribal lands.

The IRWM planning process will provide a mechanism for:

- Coordinating, refining, and integrating existing local water resources planning efforts within a comprehensive, regional context;
- Identifying specific regional priorities for implementation projects; and
- Generating funding support for the local plans, programs, projects, and priorities of existing agencies and stakeholders.

Outreach mechanisms used to improve general awareness of the Coachella Valley IRWM program and provide means for all interested parties to stay engaged during the planning process and plan implementation are mentioned below. The *Public Outreach and Communications Plan* (see **Appendix C**) is organized into the following components:

- Stakeholder Coordination and Public Involvement
- Disadvantaged Communities Outreach
- Tribal Outreach and Coordination

The Coachella Valley IRWM program enables local project sponsors to upload their proposed projects and programs to the online project database (http://cvrwmg.org/projects.php). The CVRWMG website also hosts all IRWM program deliverables and meeting agendas, materials, and notes for use by regional stakeholders. Through these mechanisms, Valley stakeholders have opportunities to combine activities and/or eliminate redundant efforts.

8.1.2 Neighboring and/or Overlapping IRWM Efforts

Agencies that may have existing or developing IRWM planning efforts that are adjacent to the Coachella Valley IRWM region include (see **Figure 8-1**):

- Borrego Valley IRWM Plan, led by Borrego Water District (BWD)
- Imperial Valley IRWM Plan, led by Imperial Irrigation District (IID)
- Mojave IRWM Plan, led by Mojave Water Agency (MWA)
- Santa Ana Watershed Project Authority (SAWPA) IRWM Plan, involving San Gorgonio Pass Water Agency (SGPWA)
- Salton Sea Authority (SSA) Conceptual Plan

Hydraulic connections do not exist between the Coachella Valley Groundwater Basin and aquifers of the aforementioned agencies, making their planning efforts different from Coachella Valley's IRWM program. Therefore, it is appropriate that these agencies' IRWM efforts remain separate from Coachella Valley's IRWM program.

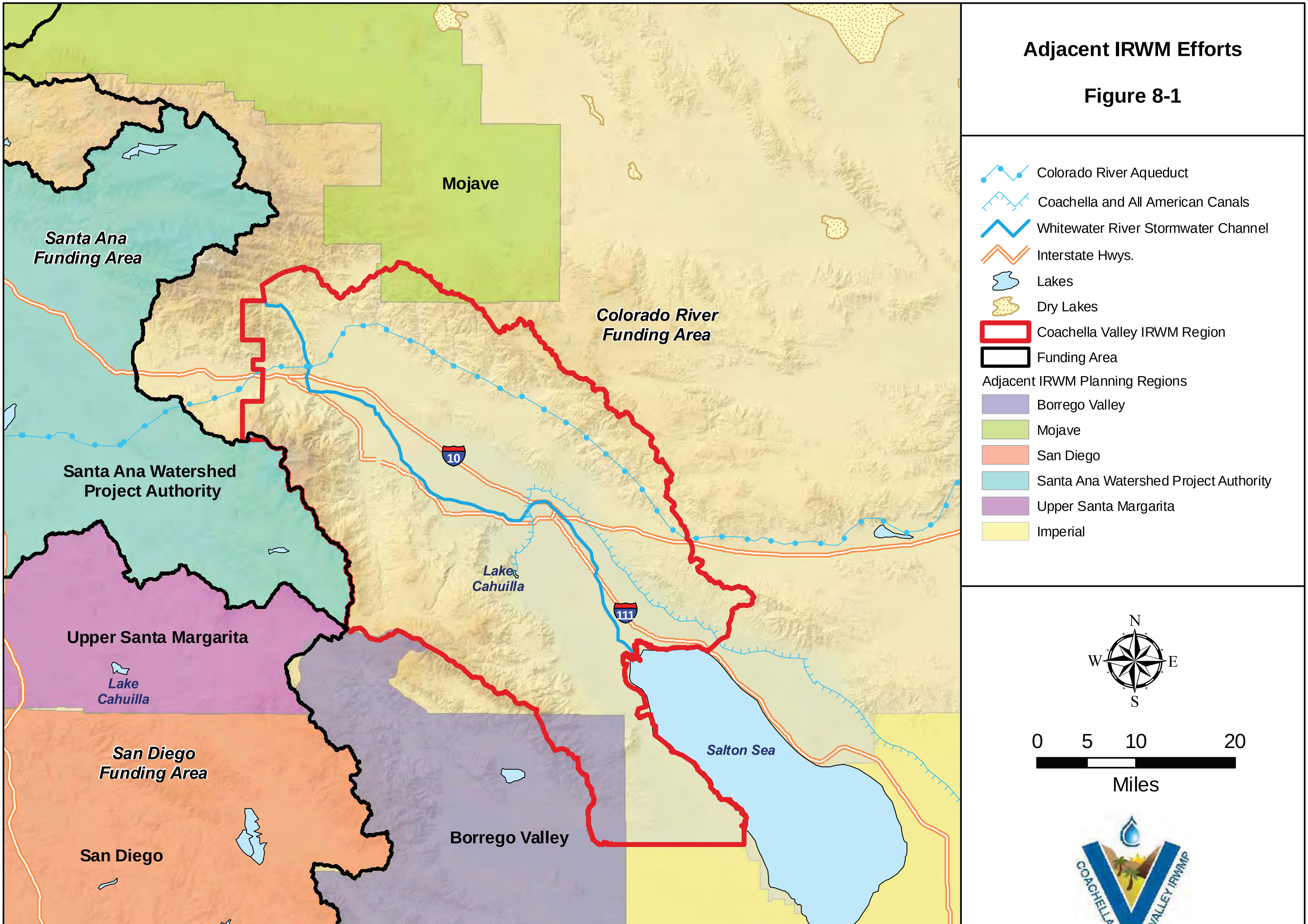
Since the stakeholders do not overlap and the surrounding planning regions are distinctly separate, the Coachella Valley IRWM governance structure has not yet established means of formal communication with the adjacent RWMGs. However, neighboring RWMG and IRWM representatives have been invited to attend public meetings and workshops on the Coachella Valley IRWM Plan, and representatives from the Anza Borrego and Mojave regions have attended. Formal discussion with neighboring RWMG is expected to occur in upcoming IRWM Plan Update timeframe.

Borrego Valley IRWM Plan

BWD serves the desert community of Borrego Springs and is located in the Borrego Valley, an isolated region of San Diego County, 85 miles northeast of San Diego, California, and 60 miles southwest of Coachella, California. It is geographically separated from the Coachella Valley IRWM region by the Santa Rosa Mountains, the Coyote Mountains, and the Coyote Creek Fault. BWD is the water service provider for the area and provides potable water to approximately 2,000 residential and commercial customers via deep wells and a pressurized distribution system. BWD also provides sewer service, flood control and gnat abatement to the community of Borrego Springs.

Adjacent IRWM Efforts

Figure 8-1



File Name: Fig 8-1_Adjacent IRWM Efforts.mxd
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Date Updated: July 2010
Made By: DNF
Department: RMC Water & Environment

BWD's sole source of water is groundwater from the Borrego Valley Aquifer which has been in overdraft for approximately 60 years. In 2002, the BWD Board of Directors adopted a groundwater management plan to address the overdraft and associated issues. BWD is actively developing an IRWM Plan and has undertaken an extensive stakeholder process. A hydraulic connection does not exist between the Coachella Valley Groundwater Basin and the Borrego Valley Aquifer, and the two planning areas are separated by prominent geographical features. BWD's stakeholder groups do not overlap with Coachella Valley stakeholder groups. Because the two planning regions are so distinctly separate, it is appropriate that the two planning efforts should remain separate as well.

Imperial Valley IRWM Plan

IID supplies water for the Imperial Valley, located at the southerly end of the Salton Sea in Imperial County. The Imperial Valley is geographically separated from the Coachella Valley IRWM region by the Salton Sea. With more than 3,000 miles of canals and drains, IID is the largest irrigation district in the United States, and delivers up to 3.1 million acre-feet of IID's Colorado River water allotment annually to nearly one-half million irrigated acres. Of the water IID transports, approximately 97 percent is used for agricultural purposes. The remaining three percent of its water deliveries supply seven municipalities, one private water company and two community water systems as well as a variety of industrial uses and rural homes and businesses. IID's water supplies are independent of the Coachella Valley's water supplies. The Imperial Valley does not have a viable groundwater aquifer.

A hydraulic connection does not exist between the Coachella Valley Groundwater Basin and the Imperial Valley, and the two planning areas are separated by a prominent geographical feature, the Salton Sea. The stakeholder groups do not overlap. It is appropriate, that because the issues of the two planning regions are so distinctly separate, that the two planning efforts should remain separate as well. Please refer to Exhibit 13 of the RAP (available at www.cvrwmg.org); letter dated April 28, 2009, from Mike King, Water Department Manager of the Imperial Irrigation District.

Mojave IRWM Plan

MWA is located in the Mojave Desert in San Bernardino County. Formed in 1960, MWA is responsible for managing groundwater resources in the Mojave River Basin and Morongo Basin, and providing alternate water sources to the region as needed to ensure a sustainable supply of water for present and future use. Only the southern portion of MWA is located within the Colorado River Funding Region. The region's southern most boundary extends to the Yucca Valley area approximately 30 miles north of Palm Springs.

MWA is geographically separated from the Coachella Valley Groundwater Basin by the San Bernardino and Little San Bernardino Mountains except for a small portion of their boundary that overlaps the CVRWMG Management Region in the unpopulated mountains south of the Warren Valley subbasin (Bulletin 118). MWA is responsible for implementing its service area adjudication. Most of the area served by MWA is experiencing severe groundwater overdraft. Since 1991, the MWA has been importing SWP water from the California Aqueduct to recharge the groundwater basins from which local water companies and other well owners derive water for all uses: domestic, agricultural, industrial and recreational. MWA has a 4,900 square mile service area and is governed by a seven-member elected Board of Directors.

The groundwater basins of MWA are not connected to the Coachella Valley Aquifer and their imported water supplies are independent of the Coachella Valley's imported water supplies. The two planning areas are geographically separated by the San Bernardino and Little San Bernardino Mountains. The stakeholder groups do not overlap. It is appropriate, that because the issues of the two planning regions are so distinctly separate, that the two planning efforts should remain separate as well. Please refer to Exhibit 11 of the RAP (available at www.cvrwmg.org); letter dated April 21, 2009, from Norman T. Caouette, Assistant General Manager of the Mojave Water Agency.

SAWPA IRWM Plan

SGPWA is located east of and adjacent to the Coachella Valley IRWM region and is only partially within the Colorado River Funding Area. Formed in 1961, SGPWA is a regional water agency that imports SWP water into the Pass area, sells water to local water retailers, and helps protect groundwater basins within its region that extends from Calimesa to Cabazon through the cities of Calimesa, Beaumont, and Banning and the Riverside County areas form Cherry Valley to Cabazon. SGPWA is a water wholesaler governed by a five-member Board of Directors elected to four-year terms.

The groundwater basins of SGPWA are separated from the Coachella Valley Groundwater Basin by geological features near Fingal Point, and their water supplies are independent of the Coachella Valley's imported water supplies. The two planning areas are separated by a political boundary and do not share customers. The stakeholder groups do not overlap. SGPWA is mostly outside of the Colorado River Funding Area and is actively participating in the SAWPA IRWM Plan.

SSA Conceptual Plan

SSA is a joint powers agency chartered by the State of California by a Joint Powers Agreement on June 2, 1993 for the specific purpose of ensuring continued beneficial uses of the Salton Sea. The SSA is composed of CVWD, IID, County of Imperial, County of Riverside, and the Torres-Martinez Desert Cahuilla Indians. The SSA was formed to work with State agencies, Federal agencies, and the Republic of Mexico to develop programs that would continue beneficial use of the Salton Sea. In June of 2006, after years of in-depth study and analysis, the SSA adopted the Executive Summary of the Salton Sea Authority Conceptual Plan as the superior alternative to provide wildlife habitats, improve water quality, protect air quality, and provide economic and recreational benefits to the region.

The Executive Summary of the SSA Conceptual Plan identifies the unique and complicated issues of the Sea and provides a cost estimate for the chosen alternative of $2.2 billion over a period of approximately 20 years. Currently the primary goal of the SSA is to work with state and federal agencies to provide funding for the chosen alternative. The issues of the Salton Sea are unique and implementation of the chosen alternative would overwhelm the resources for all other IRWM Plan goals and priorities; therefore, it is appropriate that any Salton Sea Authority planning efforts remain separate from the Coachella Valley IRWM effort.

8.1.3 Coordination with State, Federal, and Local Agencies

Key input to this IRWM Plan has been provided to the CVRWMG through a series of coordinating Planning Partner meetings and contacts with DWR staff. Government agencies which have direct or significant water-related missions have been invited to participate in the Planning Partners meetings. Local agencies such as the County of Riverside, RCFCWCD, VSD, U.S. Bureau of Indian Affairs, CVAG, and Colorado River RWQCB have an advisory role as Planning Partners.

Local Agencies

As the regional planning authority within the Coachella Valley, CVAG was involved in this IRWM Plan as a member of the Planning Partners. In addition, this Plan was developed with input from various public works departments of cities throughout the Coachella Valley Region.

State Agencies

The Colorado River RWQCB is the primary state water quality regulatory authority within the Region, and is responsible for protecting beneficial uses and establishing and enforcing water quality standards within the Region. This IRWM Plan was developed in coordination with RWQCB staff as part of the Planning Partners, and targets achieving compliance with RWQCB water quality standards, stormwater discharge standards, non-point source regulations, and wastewater/recycled water regulations. Continued coordination with the RWQCB will be required to implement the IRWM Plan, and the RWQCB will be invited to continue participation in the Planning Partners.

DWR establishes a framework for statewide water resources management within the *California Water Plan Update 2009*. Regional IRWM planning represents one of the key initiatives of the *California Water Plan Update 2009*. As such, DWR administers the State's IRWM Grant Program and has developed Statewide IRWM Grant Program Guidelines (August 2010). This IRWM Plan meets the Plan Standards established by DWR in the IRWM Grant Program Guidelines. The CVRWMG coordinated with DWR in developing the Plan through DWR staff participation in CVRWMG business meetings, Planning Partner and Issue Group meetings, and public workshops. Continued coordination with DWR will occur to implement the Plan and seek sources of funding to assist in financing proposed IRWM projects.

Implementation of the Coachella Valley IRWM Plan and priority projects may also require coordination with several additional State agencies, including:

- **California Environmental Protection Agency (CalEPA).** CalEPA oversees and coordinates public health and environmental regulation within six State of California departments: Air Resources Board, Department of Pesticide Regulation, Department of Toxic Substances Control, Integrated Waste Management Board, Office of Environmental Health Hazard Assessment, and the State Board.
- **Department of Fish and Game (CDFG).** CDFG oversees implementation of the federal Endangered Species Act and regulates activities that may impact endangered species and their habitats.
- **California State Parks.** California State Parks operates a number of state beaches, state parks, and coastal preserves and recreational areas within the Region.
- **California Department of Forestry.** California Department of Forestry is charged with fire fighting, resource management (including administering state and federal forestry assistance programs), and protecting and enhancing California's forest lands.
- **California Department of Transportation (Caltrans).** Caltrans is responsible for planning, maintaining, and constructing surface transportation facilities including highways, roads, bike paths, bridges, and rail transportation facilities. Caltrans addresses land use, air, and water quality impacts of such surface transportation facilities.
- **California Natural Resources Agency (CNRA).** CNRA manages the California Adaptation Strategy process, which summarizes the best known science on climate change impacts and provides recommendations on how to manage against potential climate change threats.
- **California State Lands Commission**. The State Lands Commission oversees lands held in public trust. In this capacity, the Commission manages a variety of public lands, including submerged lands under tidal and navigable waterways. The Commission is also involved in securing and maintaining public access to public lands.

Federal Agencies

Implementation of the Coachella Valley IRWM Plan and priority projects may require coordination with multiple federal agencies as well. Federal agencies that regulate water management planning and/or land management within the Region include:

- **U.S. Environmental Protection Agency (USEPA):** USEPA, through powers delegated to the Regional Board, implements the Clean Water Act and oversees Regional Board and State Board's implementation of federal NPDES permits, water quality standards, water quality enforcement, and water quality certification programs.
- **U.S. Fish and Wildlife Service (USFWS).** USFWS oversees implementation of the federal Endangered Species Act and regulates activities that may impact endangered species and their habitats.
- **U.S. Army Corps of Engineers (USACE).** The USACE has regulatory authority over all work within navigable waters, and regulates such projects through the issuance of permits. Additionally, the USACE reviews and approves Special Area Management Plans (SAMPs). With this background, the USACE can provide valued input to the Region's water management planning process.
- **U.S. Geological Survey (USGS).** USGS collects and analyzes regional hydrologic data, and coordinates with local agencies to perform special water resources studies.
- **U.S. Bureau of Land Management (BLM).** BLM manages federal lands within the Region, including lands proposed as future Wilderness Areas.
- **U.S. Forest Service (USFS).** USFS manages the San Bernardino National Forest, which comprises a significant portion of the upstream reaches of the larger watersheds of the Region.
- **Natural Resources Conservation Service.** The Natural Resource Conservation Service, a division of the U.S. Department of Agriculture, provides technical and financial assistance in a variety of areas related to the conservation of soil, water, and other natural resources.
- **U.S. Bureau of Reclamation (USBR).** USBR is involved in a variety of water resources management areas central to the IRWM Plan, including water supply, the reclamation of land and water resources, surface water storage, desalination, recreation, agricultural land stewardship, and water rights. USBR also administers funding for the Reclamation Wastewater and Groundwater Study and Facilities Act (Title XVI, Public Law 102-575).
- **U.S. Bureau of Indian Affairs.** The Bureau of Indian Affairs administers and manages lands held in trust for the Region's Native American Tribes.

Federal regulatory agencies will be invited to provide input to the Region's IRWM planning process. Coordination between the CVRWMG, project sponsors, and these agencies will be required to address regulatory compliance and permitting issues.

8.2 Relation to Local Water Planning

*This section complies with the **Relation to Local Water Planning Standard**, to ensure the IRWM Plan is congruent with local plans, and that the Plan includes current, relevant elements of local water planning and water management issues common to multiple local entities in the Region.*

Local water planning activities in the Coachella Valley are mainly conducted by the five CVRWMG partners: CWA, CVWD, DWA, IWA, and MSWD. These agencies coordinate regularly at both management and staff levels by participating in Joint Board meetings, CVRWMG business meetings, and other specialized efforts like Water Agencies of the Desert Region (WADR), a staff level inter-agency group that provides coordinated public outreach. Additionally, some partners meet periodically in joint session with local land use agencies (see *Section 8.3 Relation to Local Land Use Planning* below). The CVRWMG partners also provide each other with on-going opportunities to review and comment on the plans and studies described in this section. As applicable, the IRWM Plan incorporates water management issues and climate change adaptation and mitigation strategies from these local plans.

Additional water planning activities are carried out by other agencies as follows:

- The nine Coachella Valley cities and the County of Riverside have jurisdiction over local drainage within their service area boundaries. Local drainage is typically routed to existing regional facilities. Where regional facilities are not available, local drainage flows to dry wells or retention basins.
- RCFCWCD has regional flood control jurisdiction within its service area boundary in the Desert Hot Springs and Palm Springs areas of the Coachella Valley. CVWD has regional flood control jurisdiction for the rest of the Region. CVWD and RCFCWCD each have included the impacts of these flows in the design capacities of their regional facilities and each utilize their own permit approval processes for accepting local drainage.
- The City of Palm Springs and Valley Sanitary District are responsible for wastewater collection and treatment within their service area boundaries. The City of Palm Springs delivers treated effluent to DWA for recycling and distribution to golf courses, parks, medians, and other areas for irrigation.

In addition to the Coachella Valley IRWM planning effort, several key water planning efforts are underway in the Region:

- Coachella Valley Water Management Plan (CVWMP), which involves CVWD, City of Coachella, IWA, and DWA.
- Mission Creek-Garnet Hill Water Management Plan (Mission Creek-Garnet Hill WMP), which involves CVWD, DWA, and MSWD.
- Urban Water Management Plan (UWMP) 2010 Updates are being prepared by each of the five water purveyors.
- IWA's Water Resources Development Plan (see *Section 8.2.3 Additional Planning Efforts* under "IWA" for further discussion).

The CVRWMG is closely coordinating these efforts with the IRWM Plan development to ensure that Plan content is consistent, updates are incorporated, and that strategies synchronized. These and other related water planning efforts are briefly described in the following sections and are listed in **Table 8-1 (below)**.

The CVWMP, Mission Creek-Garnet Hill WMP, IRWM Plan, and UWMPs provide the basis for development of accurate and consistent Water Supply Assessments for the region. They also provide the opportunity for developing partnerships between agencies and stakeholders for other water management activities such as water recycling, source substitution, recharge programs, and conservation. CVWD is working to coordinate its planning efforts and ensure consistency between the Mission Creek-Garnet Hill WMP and the CVWMP Update.

8.2.1 Water Supply Planning and Groundwater Management

Effective, integrated, and consistent water planning and management is imperative to ensuring water supply reliability in the Valley. The CVRWMG is committed to ongoing coordination between the IRWM program and other regional planning efforts.

The following water supply and groundwater planning documents provided the foundation for *Chapter 2, Region Description* and *Chapter 3, Issues and Needs* of this IRWM Plan. The IRWM Plan is consistent with and reflects the technical assessments and conclusions provided within these plans; the technical evaluations in these plans provided a basis for establishment of the regional priorities. Updates to these plans will be incorporated by the CVRWMG into future IRWM Plan updates. Planning documents listed below are the most current and relevant studies completed by the agencies.

Coachella Valley Water Management Plan

In 2002, CVWD adopted the CVWMP and certified the final Program Environmental Impact Report (PEIR) (CVWD 2002). The goal of the 2002 Plan is to assure adequate quantities of safe, high-quality water at the lowest cost to Coachella Valley water users by stabilizing groundwater overdraft, maximizing conjunctive use opportunities, and minimizing adverse economic and environmental impacts. The CVWMP evaluates all the water demands and supplies in the Whitewater River Subbasin through 2040 for all water users including urban and agricultural, and golf, and provides a preferred alternative for meeting demands. The CVWMP evaluates long-term risks to water supplies such as, reduced SWP reliability, reduced Colorado River supplies, and provides contingencies for addressing these risks. The elements of the preferred alternative are, imported water supplies, recharge and source substitution, and conservation for urban, agricultural and golf course water users. The Plan identifies projects and programs that implement the plan elements.

In the months following September 2002, the CVWD Board of Directors and DWA Board of Directors adopted the “Coachella Valley Final Water Management Plan” (CVWD 2002). The CVWMP is periodically updated. The first update will be available in January 2011, and will include additional evaluations of climate change, water quality, and groundwater monitoring. Public meetings are conducted periodically to solicit input on plan development.

The City of Coachella, CVWD, IWA, and DWA have public water systems that rely on groundwater in the CVWMP planning area. Each of these agencies has relied on the data provided in the CVWMP for development of their UWMPs. These agencies have provided input on the plan and participate in some of the CVWMP projects and programs or have developed similar programs that implement elements of the plan. Further, the CVWMP considers buildout projections on tribal reservation lands in order to have a complete understanding of current and future impacts on the groundwater basin. CVWD coordinated with tribal representatives to incorporate tribal buildout projections into CVWMP modeling and analysis.

Mission Creek-Garnet Hill Water Management Plan

The Mission Creek and Garnet Hill subbasins of the CVGB lie north of the Banning Fault and outside the area included in the CVWMP. CVWD and MSWD have public water systems that rely on groundwater from the Mission Creek Subbasin, and MSWD has production facilities in the Garnet Hill Subbasin. CVWD and DWA have groundwater replenishment authority for this region, and conduct an active recharge program utilizing SWP water delivered by MWD's Colorado River Aqueduct via an Exchange Agreement. In December 2004, MSWD, CVWD, and DWA signed a Settlement Agreement, in which the agencies agreed to jointly prepare a Water Management Plan for the Mission Creek and Garnet Hill Subbasins. The purpose of the Mission Creek and Garnet Hill WMP is to manage the water resources to reliably meet demands and protect water quality in a sustainable and cost-effective manner. The four main objectives of the plan are:

- to meet water demands reliability,
- protect water quality,
- minimize environmental impacts, and
- deliver an affordable water supply.

Development of the Mission Creek-Garnet Hill WMP was initiated in August 2009 and is expected to be completed in 2011. Public meetings are conducted periodically to solicit input on plan development. CVWD, DWA, and MSWD will be able to utilize the data provided in the Mission Creek-Garnet Hill WMP in development of their UWMPs and will participate in programs that implement the elements of the plan. The General Managers of MSWD, CVWD, and DWA meet quarterly to discuss development of this plan and other water management issues. CVWD is also working to coordinate its planning efforts and ensure consistency between the Mission Creek-Garnet Hill WMP and the CVWMP Update. The plan will also evaluate the effects of climate change.

Engineer's Reports on Water Supply and Replenishment Assessment

Since 1973, CVWD and DWA have used Colorado River water exchanged for SWP water to replenish groundwater in the Upper Whitewater River Subbasin. In 2002, they began a similar replenishment program in the Mission Creek Subbasin. In 2004, CVWD began a replenishment program in the Lower Whitewater River Subbasin using Colorado River water delivered via the Coachella branch of the All American Canal (Coachella Canal). Each year both CVWD and DWA produce an Engineer's Reports that summarize their replenishment activites in each of these subbasins. The reports provide total estimated groundwater pumping and recharge water deliveries for the year, and provide a summary of each agency's total estimated costs to manage the replenishment programs. The reports also provide a calculation of the replenishment assessment rate per AF for the upcoming fiscal year for each area of benefit. Each of the CVRWMG partners are major groundwater pumpers and participate in these replenishment assessment programs. Other participants include agricultural pumpers, golf courses, and fish farms that pump more than 25 AFY within CVWD's boundary or more than 10 AFY within DWA's boundary.

The General Managers of CVWD, DWA, and MSWD meet quarterly to discuss water supply planning activities for the Mission Creek and Garnet Hill Subbasin. An East Valley Joint Powers Authority (JPA) meets periodically to discuss the East Valley replenishment program and to review the proposed assessment for the following year. Members of the JPA include CWA, CVWD, IWA, Cities, Tribes, and representatives from the agricultural industry that are affected by the rate.

Urban Water Management Plans

Each of the CVRWMG partners has an approved UWMP. These Plans define their current and future water use, sources of supply, source reliability, and existing conservation measures. The CVWMP is used as a reference for development of UWMPs within its study area. When the Mission Creek-Garnet Hill WMP is complete, it will also become a reference Plan for UWMPs within its study area.

Water Supply Assessments

Water Supply Assessments (WSAs) are evaluated by the water purveyors in the region to determine if sufficient water supplies exist long-term to sustain proposed development when the proposed development is 500 residential units or more or a large commercial project as defined in Water Code §10912(a). Generally, before a city or county determines what level of CEQA analysis is required for a proposed project, it requests that a WSA either be prepared by water purveyor or be prepared by the project proponent and subsequently approved by the water purveyor. The WSA includes a determination by the water service provider whether its total projected supplies will enable it to meet the projected water demands of the proposed project in normal, single-dry and multiple-dry years during a 20-year projection, in addition to all other existing and planned future uses.

In this Region, the CVRWMG partners prepare and/or evaluate WSAs for approval within their own service areas based on data presented in their UWMPs. Regional coordination on the current and future water planning effort described in this section will ensure that WSAs are consistent and that long-term water supply programs are carried out to ensure that projected water demands are met.

State Water Project Extension Project Development Plan

CVWD and DWA began a formal planning effort regarding the feasibility of constructing an aqueduct to connect the Coachella Valley to the SWP in August 2007 with Phase 1 of the SWP Extension Project Development Plan. The project partners include CVWD, DWA, MWD, MWA, and SGPWA. Phase 1 considered agency needs, pipeline corridors and alignments, engineering and environmental constraints, facilities requirements and costs. Through that effort, two of the four possible alignments were found to be infeasible. Phase 2 was authorized in September 2008 and focused on the other two possible alignments: the North Pass Alignment and the Modified North Pass Alignment.

The SWP Extension Project Development Plan identified a number of potential water resources management opportunities. It examined construction, reliability and operations of a possible extension, as well as alternative options for optimizing water supply in the Coachella Valley. This in-depth planning effort is near completion; however efforts will likely slow as SWP Contractors grapple with reliability in the project.

8.2.2 Non Potable Water Supplies

Agricultural Water Management

The CVRWMG Management Region has one agricultural Irrigation District known as Improvement District No. 1 (ID1). ID 1 was formed by the United States Bureau of Reclamation (USBR) for the purpose of funding the contract repayment obligations for the original construction and the operation and maintenance of the Coachella Canal, protective works (flood protection dikes and channels), irrigation distribution system and drainage system. The canal, protective works, and distribution system are owned by the USBR and maintained by CVWD. The drainage system is owned and maintained by CVWD. CVWD delivers an average of approximately 270,000 AFY of canal water for agriculture. In addition agriculture uses approximately 100,000 AFY of groundwater. Agricultural groundwater pumpers pay a replenishment fee and participate in the Lower Valley Replenishment program. In the CVWMP, CVWD has identified source substitution programs to reduce agricultural groundwater use by making canal water more available. In addition the CVWMP has identified conservation programs that improve irrigation efficiency for agriculture. An Agricultural Water Management Plan has not been adopted.

CVWD conducts monthly Grower's Meetings with agricultural community to encourage dialog between growers and CVWD regarding water issues. Growers also participate in the East Valley JPA, a group of affected users that meets periodically to discuss the East Valley replenishment assessment program.

Recycled Water and Canal Water

CVWD and DWA have ongoing recycled water programs. Recycled water in the region is used primarily for golf course irrigation. As described within *Chapter 2 Region Description, Section 2.2.4 Recycled Water*, DWA collaborates with the City of Palm Springs for collection, treatment, and distribution of recycled water. In addition, IWA and VSD recently entered into an MOU for a joint effort to develop a water reclamation facility for recycled water use to include landscape irrigation.

The Mid-Valley In-Lieu Program Draft Concept Paper (Bookman-Edmonston, 2004) proposes a delivery system for both recycled water and Colorado River water (The Mid-Valley Pipeline) to serve approximately 50,000 AFY of non-potable water to about 50 golf courses. CVWD completed Phase 1 of the Mid-Valley Pipeline in 2008. This project will maximize the use of recycled water and will reduce groundwater pumping by as much as 50,000 acre-ft/year. CVWD also has a Non-Potable Operations Manager who meets regularly with existing and future users to promote dialog and participates in the local golf organizations, like Hi-Lo Desert Golf Course Superintendents' Association.

Other Non Potable Water

The 2002 CVWMP recommends that a drain water desalination program be developed by 2015 with a 4,000 AFY facility. The facility would be expanded to 11,000 AFY capacities by 2025. Water would be taken for desalination from the agricultural drainage system and would be delivered to the Coachella Canal distribution system for non-potable use. A Brackish Groundwater Treatment Pilot Study and Feasibility Study (CVWD 2008c and 2008d) was completed in 2008.

8.2.3 Additional Water Planning Efforts

Regional Flood Control

Regional flood control is handled by two agencies in the Coachella Valley: RCFCWCD and CVWD. RCFCWCD is responsible for the western portion of the Coachella Valley, including the Palm Springs area west of the Whitewater River and the Desert Hot Springs Area north of the Whitewater River (refer to Figure 2-7: Stormwater Management in *Chapter 2, Region Description*). CVWD is the flood control agency for the cities east of Palm Springs and extending as far south as the Salton Sea.

Each district is responsible for identifying flood hazards, flood warning and early detection, regulating drainage and development in floodplains, regional flood control facility planning and development, and operation and maintenance of completed regional flood control facilities. The agencies work cooperatively to ensure consistent application of flood control and floodplain standards Region-wide.

Emergency Response Planning

Each of the CVRWMG partners is a member of the Riverside County Operational Area (RCOA), an intermediate level of the State emergency services organization, consisting of Riverside County and all political subdivisions within the county area. The Coachella Valley is designated as an operational area for the coordination of emergency activities and to serve as a communications link in the system of communications between the State's emergency operation centers and operational areas. The RCOA has an Emergency Operations Plan (EOP) that addresses the planned response to extraordinary emergency situations. The EOP establishes a framework for implementation of the California Standardized Emergency Management System (SEMS) and the National Incident Management System (NIMS) for Riverside County. The EOP facilitates multi-agency multi-jurisdictional coordination, particularly between Riverside County and local governments including water purveyors.

All of the partners in the CVRWMG have done extensive emergency response planning; however, for security purposes, those documents are confidential. The CVRWMG partners have collaborated to improve water system reliability in extraordinary emergency situations by constructing distribution system connections. These connections may be opened in instances where an agencies water supply has been compromised by a natural disaster. Connections exist between CVWD's and MSWD's water distribution systems and CVWD's and IWA's water distribution systems. CVWD and DWA are also considering a connection in the future. The CVRWMG partners have been engaged in discussion of mutual aid and emergency communications.

Ongoing efforts are underway by the Office of Emergency Services (OES) to have every water purveyor join the California Water and Wastewater Agency Response Network (CalWARN). CVWD is a member of CalWARN.

NPDES Permitting

The Colorado River RWQCB regulates the National Pollutant Discharge Elimination System (NPDES) program for the Coachella Valley Region. The NPDES program regulates point source discharge of wastewater to surface waters of the Region so that the highest quality and beneficial uses of these waters are protected and enhanced. Regulation is by issuance of a regional NPDES Municipal Separate Storm Sewer System (MS4) permit, which is updated every five years. The permits contain effluent limitations which ensure the protection of the quality of the receiving waters.

Since the early 1990's, NPDES MS4 permitting for the Coachella Valley Region has been pursued and maintained collaboratively, by County of Riverside, RCFCWCD, CVWD, and ten incorporated cities: Banning, Cathedral City, Coachella, Desert Hot Springs, Indian Wells, Indio, La Quinta, Palm Desert, Palm Springs and Rancho Mirage (the Permittees). The Permittees jointly submitted the first application for an NPDES MS4 permit on June 11, 1992 to the Colorado River RWQCB; the RWQCB adopted the initial permit for the Whitewater River watershed on May 22, 1996. Following submittal of a Report of Waste Discharge to the RWQCB, a second permit (No. 01-077) was subsequently adopted on September 5, 2001. Permit No. 01-077 incorporates the Permittees proposed Stormwater Management Plan (SWMP) which was developed during the initial Permit term, along with additional management programs that were subsequently developed. On May 21, 2008, the RWQCB adopted the Region's third term permit (Order Number R7-2008-0001). This new permit seeks to improve programs established in the previous term.

As a Principal Permittee, RCFCWCD regularly conducts activities to coordinate the efforts of the other Permittees and facilitate compliance with the NPDES MS4 permit. These activities include chairing monthly meetings of the Permittees NPDES advisory committee (Desert Task Force); administration of area-wide programs such as public education, household hazardous waste collection, hazardous material spill response, stormwater sample collection and analysis; and on-going program development and preparation of the Annual Report to the RWQCB.

California Statewide Groundwater Elevation Monitoring (CASGEM)In November 2009, the State legislature amended the Water Code with SBx7-6, which mandates a statewide, locally-managed groundwater elevation monitoring program to track seasonal and long-term trends in groundwater elevations in California's groundwater basins (as identified in DWR Bulletin 118). To achieve that goal, DWR developed the California Statewide Groundwater Elevation Monitoring (CASGEM) program. DWR will administer the CASGEM program through providing public outreach; creating and maintaining the CASGEM website and online data submittal system; and, supporting local entities through the process of becoming a Monitoring Entity and preparing Monitoring Plans.

In October 2010, DWR released draft CASGEM Groundwater Elevation Monitoring Guidelines and draft CASGEM Procedures for Monitoring Entity Reporting. CWC§ 10927 defines the types of entities that may assume responsibility for monitoring and reporting groundwater elevations as part of the CASGEM program. The CVRWMG will coordinate to identify and choose the prospective Monitoring Entity (or Entities) for the Coachella Valley.

Parks and Recreation

Much work has been done in the hills and mountains surrounding the Coachella Valley to develop hiking and riding trails. Policies for the management of these trails were recently developed as part of the preparation of the CVMSHCP. In 2001, in response to a need for trails on the Valley floor, CVAG oversaw the preparation of a Non-Motorized Transportation Plan which proposed a grid of bike trails and sidewalk trails that utilized the rights-of-way of the Whitewater River and Coachella Canal. In the CVAG Plan, the Whitewater River Trail served as the spine of the bikeway system, as well as providing a recreational trail for walkers and, potentially, equestrians.

The County of Riverside Department of Public Health, in collaboration with several trails and bicycle groups, identified and developed the Coachella Valley Urban Trails and Bikeways Map of safe routes for riders and hikers in the Coachella Valley (http://www.cvcta.org/existingtrails.htm). These trails and bikeways maps are included in General Plans for all local jurisdictions and trails maps have been prepared for inclusion in the Riverside County General Plan Update. A key element of these plans was the identification of potential trails along the Whitewater River and the Coachella Canal.

In 2007, as a next step in planning the trail system in the Coachella Valley, the Desert Recreation District and the Riverside County Regional Parks and Open Space District commissioned studies related to identification of trail alignments along, and trail connections to, the Whitewater River, Coachella Canal, and the Dillon Road corridors.

The Coachella Valley Community Trails Alliance, a nonprofit organization, was formed in 2006 to plan and advocate for a regional trail system in the Coachella Valley. The Community Trails Alliance envisions a regional trail system that will connect the entire Coachella Valley through a broad-based alliance of formal and working partners. Formal partners who have submitted written statements of support are CVWD and CWA. Working partners – who have partnered with the CVCTA on trails advocacy and development – include Riverside County Parks and Open Space District, CVAG, Desert Alliance for Community Empowerment, College of the Desert, and the cities of Cathedral City, Coachella, Desert Hot Springs, Indio, La Quinta, Palm Desert, Palm Springs, and Rancho Mirage.

Future Regional Planning Efforts

The CVRWMG has identified four future water planning efforts that will be coordinated by the partners and will include input from the Planning Partners and stakeholders. These efforts, contingent on grant funding, are described as follows:

- *DAC Water Quality Evaluation* to provide near-term solutions to critical arsenic and other drinking water contaminants in DAC communities and to provide a basis for the development of longer-term solutions;
- *Salt and Nutrient Management Planning Strategy* to establish a framework for how the region's stakeholders can work together on development of Salt and Nutrient Management Plan;
- *Integrated Flood Management Plan* to integrate flood management planning in the Valley, to promote development of integrated flood management solutions Valley-wide, and to develop near-term integrated flood management solutions;
- *Groundwater Elevation Monitoring Strategy* to establish a framework for coordinating groundwater elevation monitoring, analysis, and reporting to DWR in compliance with SBx7-6.

Individual Planning Efforts by Agency

Each of the CVRWMG conducts ongoing planning efforts that are specific to its service area such as distribution system master planning, and project specific feasibility and environmental impact studies. Public review and comment is solicited when appropriate. A list of current studies is shown in **Table 8-1**.

CVWD

CVWD has completed several pilot programs and studies which support the implementation of source substitution programs proposed in the CVWMP to maximize the Coachella Valley Region's water supplies. These studies, which include the Mid-Valley In-Lieu Program Concept Paper, the Brackish Groundwater Treatment Pilot Study, and the Surface Water Treatment Study, are described further below.

The Mid-Valley In-Lieu Program Concept Paper (CVWD 2004), prepared by Bookman-Edmonston, proposed integrating the use of Colorado River water from the Coachella Canal with CVWD's recycled water program via the Mid-Valley Pipeline. The Mid-Valley Pipeline is a distribution system to deliver Colorado River water to the mid-Valley area for use with CVWD's recycled water for golf courses and open space irrigation. This source substitution project will reduce groundwater pumping for these uses. Construction of the first phase of the Mid-Valley Pipeline from the Coachella Canal in Indio to WRP-10 (6.6 miles in length) was completed in 2009. Implementation of later phases will expand the Mid-Valley Pipeline to serve approximately 50 golf courses in the Rancho Mirage-Palm Desert-Indian Wells area that currently use groundwater as their primary source of supply with a mixture of Colorado River water and recycled water.

The Brackish Groundwater Treatment Pilot Study (CVWD 2008c), prepared by Malcolm-Pirnie, demonstrated that reverse osmosis technology can effectively be used to treat agricultural drainage water for reuse as non-potable water. It also demonstrated that bank filtration can effectively be used as a pretreatment method.

Based on the results of the Brackish Groundwater Treatment Pilot Study, Malcolm-Pirnie completed a Surface Water Treatment Study for Canal water in 2008 (CVWD 2008d). This study investigated three alternative treatment approaches for meeting the Surface Water Treatment Rule and reverse osmosis to improve the salinity of Colorado River water delivered for urban use.

DWA

DWA engages in several annual planning efforts, as well as several more specific efforts. Annually, DWA produces and distributes Water Quality Reports according to State regulations. The reports detail DWA's water quality monitoring efforts in accordance with EPA standards. The reports are then distributed to DWA customers. In addition, DWA has an Urban Water Management Plan that was last adopted in 2005, and is currently undergoing an update.

Engineer's Reports for the Mission Creek and Whitewater River subbasins are also completed annually. The reports describe groundwater in the basins, and specifically define the need for artificial recharge for groundwater replenishment.

In 2008, DWA conducted the Desert Water Agency GPS Control Survey April 2008 and Facilities Benchmarks 1962-1994, to study land subsidence. The purpose of this study was to establish a current baseline of horizontal control and vertical control at DWA well sites with existing survey control measurements, and to establish horizontal and vertical control moments at DWA well sites that did not have previous measurements. The study was also used to examine possible ground subsidence within DWA's service area by comparing newly established vertical baseline data with historical data. The study found that no subsidence has occurred.

DWA has also engaged in a variety of security and risk-related assessments, however those planning efforts are confidential to ensure water system security.

IWA

In August 2008, IWA adopted a Water Resources Development Plan that focuses on review of water management alternatives concerning diversification of water resources. This diversification includes recycling "used" resources and conserving available resources. Viable water management alternatives were identified and screened. An integral aspect for many of the water management alternatives involves the development of partnerships and regional cooperation. Water use efficiency strategies and recycled water use is an integral part of the plan. Depending on the timing and quantities of "new" water anticipated from high priority alternatives and the timing of future demands, further studies on the use of treated canal water will be undertaken.

MSWD

MSWD is currently preparing for development of its recycled water capabilities. Included in the design for the next expansion of the Horton Wastewater Treatment Plant is the treatment of influent to tertiary levels. All environmental processes to permit the Horton expansion have been completed. Updates to MSWD Water Master Plan have been developed in conjunction with local developers and city planners for those areas expecting targeted and significant growth. Further, MSWD has developed landscape guidelines to assure growth from both in-fill and specific plans include water–efficient landscaping and irrigation. The guidelines were developed in close consultation with land use agencies and the District provides plan check services needed to implement guidelines.

Table 8-1: Local Water Plans and Studies in Coachella Valley IRWM Region

Plan/Project	Agency	Category
2002 Desert Water Agency Site Risk Assessment	DWA	All
2003 Security Vulnerability Risk Assessment of the Desert Water Agency Using the Vulnerability Self Assessment Software Tool	DWA	Potable Water
2005 Urban Water Management Plans	CVWD, CWA, DWA, IWA, MSWD	Potable Water
2006 CWA Section 303(d) List of Water Quality Limited Segments	RWQCB	All
2006 Water Quality Control Plan for Colorado River Basin - Region 7	RWQCB	All
2007 Final Recirculated Coachella Valley MSHCP		Habitat
2008 Domestic Water System General Plan	DWA	Potable Water
2008 Engineer's Report for Benefit Assessment - Whitewater Watershed	RCFCWCD	Flood/Stormwater
2008 Water Resources Development Plan	IWA	Water Resources
2010 Urban Water Management Plan	IWA	Potable Water
Annual Water Quality Reports	CVWD, CWA, DWA, IWA, MSWD	All
Brackish Groundwater Treatment Pilot Study and Feasibility Study	CVWD	Non-Potable Water
Brackish Groundwater Treatment Pilot Study, 2008	CVWD	Non-Potable
California's Groundwater Bulletin 118: Coachella Valley Groundwater Basin, Indio Subbasin	DWR	Groundwater
City of Coachella 2006 Water Master Plan Update	CWA	Water Resources
Coachella Valley Water Management Plan, 2002	CVWD	Water Resources
Colorado River Basin -- 2005 Watershed Management Initiative	RWQCB	All
Comprehensive Wastewater Facilities Strategic Plan	MSWD	Wastewater
Desert Hot Springs Water Recycling Appraisal Study	MSWD	Recycled Water
Engineer's Report on Water Supply and Replenishment Assessment - Lower Whitewater River Subbasin Area of Benefit	CVWD	Groundwater
Engineer's Report on Water Supply and Replenishment Assessment - Mission Creek Subbasin Area of Benefit	CVWD	Groundwater
Engineer's Report on Water Supply and Replenishment Assessment - Upper Whitewater River Subbasin Area of Benefit	CVWD	Groundwater
Engineer’s Report on Water Supply and Replenishment Assessment – Mission Creek Subbasin Area of Benefit	DWA	Groundwater
Engineer’s Report on Water Supply and Replenishment Assessment—Whitewater Subbasin Area of Benefit	DWA	Groundwater
Groundwater Flow Model of the Mission Creek Subbasin, Desert Hot Springs, California	MSWD	Groundwater

Plan/Project	Agency	Category
Groundwater Input to the Alluvium Basin of the Mission Springs Water District	MSWD	Groundwater
Groundwater Quality Data in the Coachella Valley Study Unit (GAMA), 2007	MSWD	Groundwater
Desert Water Agency GPS Control Survey April 2008 and Facilities Benchmarks 1962-1994	DWA	Groundwater
Mid-Valley In-Lieu Program Concept Paper, 2004	CVWD	Non-Potable
Northeast Quadrant Water Master Plan	MSWD	Groundwater
Northwest Quadrant Water Master Plan Update, 2008	MSWD	Potable Water
Preliminary Water Balance for the Mission Creek Groundwater Subbasin	MSWD	Groundwater
Recycled Water Treatment Facility Conceptual Design, 2010	IWA	Wastewater/Recycled
Salton Community Services District Sewer System Management Plan 2010	SCSD	Wastewater
Sanitation System Master Plan Final Draft, 2009	CVWD	Wastewater/Recycled
Sewer System Management Plan (SSMP), Needs Assessment	CVWD	Wastewater
Surface Water Treatment Study, 2008	CVWD	Potable Water
Surface Water Treatment Facility Conceptual Design, 2010	IWA	Potable Water
Water Master Plan Update	IWA	All
Water Recycling Feasibility Study	MSWD	Recycled Water
Total Maximum Daily Load and Implementation Plan for Bacterial Indicators, Coachella Valley Stormwater Channel	RWQCB	All
Urban Water Conservation and Efficiency Master Plan, 2010	IWA	Water Resources
Water Management Plan for Mission Creek and Garnet Hill Subbasins (under development)	CVWD, DWA, MSWD	Groundwater

8.3 Relation to Local Land Use Planning

*This section complies with the **Relation to Land Use Planning Standard**, which requires an exchange of knowledge and expertise between land use and water resource managers; examines how RWMGs and land use planning agencies currently communicate; and identifies how to improve planning efforts between the RWMGs and land use planning agencies.*

The local land use planning agencies in the Coachella Valley Region consist of nine cities and the County of Riverside. These agencies are responsible for managing growth and development in the Coachella Valley to ensure a healthy and sustainable economy long into the future. They make decisions and seek stakeholder input utilizing the land use planning tools discussed in this section. Public involvement in local land use planning helps define the community's vision of future growth and development. Water agency involvement ensures that the water planning goals of the region are supported by local communities and are harmonious with the future growth plans. For example, MSWD’s Board of Directors meets periodically in joint session with the City of Desert Hot Springs City Council to ensure consistency in planning efforts.

8.3.1 Linkages Between Water Management and Land Use Planning

The following sections describe how local land use planning decisions relate to water management. As applicable, the CVRWMG will use the information shared and collaborated with regional land use planning agencies to help adapt water management systems to potential climate change impacts.

General Plans

General Plans are prepared by the Valley Cities and the County, as required by state law. General Plans represent each community's comprehensive and long-term view of its future. General Plans provide a blueprint for growth and development. The General Plans must address the City's physical development, such as general locations, appropriate land use mixtures, timing and extent of land uses, and supporting infrastructure including water, sewer, and stormwater infrastructure.

General Plans are periodically updated and General Plan Advisory Committees are appointed to serve as the primary means of citizen involvement in the formulation of the draft General Plans. General Plan Advisory Committees provide a means for local water planners to have input on General Plan development.

City Councils and Planning Commissions use the goals and policies of General Plans as a basis from which to make land use decisions. General Plans in this region include goals for water and sewer service such as the following:

- Provision of water, sewer, and utility facilities which safely and adequately meet the needs of the City at build out.
- Conservation of the quality and quantity of the groundwater basin.
- Establishment of a City-wide sewer system.

The five water agencies participate in General Plan development to ensure that water management goals are accurately represented, and to ensure that the water-related needs of future development have been considered in the land use planning process. Water-related needs include supporting long-term programs that ensure adequate quantities of safe drinking water and water for outdoor irrigation; making sure that developed areas are safe from flood hazards; and that water, sewer, and flood control infrastructure are incorporated into future development.

Specific Plans

Specific Plans establish a link between General Plan policies and individual development proposals in a defined area. They are important in water planning because they specify allowable land uses, describe existing infrastructure, and identify future infrastructure needs and costs. They can result in policies specific to infrastructure master planning and financing to ensure that facilities are not undersized or otherwise insufficient. The Coachella Valley Cities follow specific plan processes that provide opportunities for water agencies, the general public, as well as residents located within planning areas, to assist in the planning of their particular communities. Local water agencies provide input and enforce development policies to ensure that the water-related needs of specific plan areas are addressed. By being included in the Specific Plan review process, water agencies are able to help developers quantify their water infrastructure needs and costs, plan their land uses to address flood hazard mitigation requirements, and provide Water Supply Assessments.

Multiple Species Habitat Conservation Plan

The purpose of the Coachella Valley Multiple Species Habitat Conservation Plan (CVMSHCP) is to provide a regional approach to balanced growth that will help conserve the Coachella Valley's natural heritage and allow for economic development by providing comprehensive compliance with federal and state laws to protect endangered species. The CVMSHCP permanently conserves 240,000 acres of open space and 27 threatened plant and animal species across the Coachella Valley. It allows for more timely construction of infrastructure, including water infrastructure, essential to improving the Coachella Valley.

The CVMSHCP was prepared by the Coachella Valley Association of Governments (CVAG) and the Coachella Valley Mountains Conservancy. Current signatories to the CVMSHCP include Riverside County, the cities of Cathedral City, Coachella, Indian Wells, Indio, La Quinta, Palm Desert, Palm Springs, Rancho Mirage, CVWD and Imperial Irrigation District. The Coachella Valley Conservation Commission (CVCC), a joint powers authority of elected representatives from signatory agencies, oversees and manages the CVMSHCP.

The CVMSHCP is currently undergoing a Major Plan Amendment, which would bring the City of Desert Hot Springs and MSWD into the Plan as permittees. The Amendment process will include public review, as well as coordination with federal and State wildlife agencies. The process is expected to be completed in 2011.

Other Development Approval Processes

Additional land use planning tools such as Subdivision maps (dividing land into smaller lots), and Conditional Use Permits, Variances, Building and other Permits for individual development provide water planners with opportunities to work with planning agencies to approve water smart developments. For instance, CVWD participates in Riverside County's monthly Land Development Committee meetings to share comments on projects with the County and developers. This provides an opportunity for CVWD to identify and address local flood hazards and enforce water demand management measures.

8.3.2 Current Relationships Between Water Managers and Land Use Planners

In the Coachella Valley, two of the five water agencies, CWA and IWA, are a branch of City government and report to City Councils. Thus their domestic water planning activities are an integral part of their respective City's land use planning processes. In addition to its role as domestic water service provider, the City of Coachella is also responsible for wastewater collection and local drainage. Likewise, the City of Indio is responsible for local drainage and works closely with its wastewater provider, Valley Sanitary District.

CVWD, DWA, and MSWD, while not associated with city government, work closely with the municipalities in their service areas to ensure quality coordination in land use planning. CVWD provides water service, wastewater management, and recycled water service to 1,000 square miles in central Riverside County (refer to Figure 1-2 in *Chapter 1, Introduction*), including the cities of Cathedral City, Rancho Mirage, Palm Desert, and La Quinta. DWA provides water supply and recycled water to Desert Hot Springs, parts of Cathedral City, outlying county areas, and most of Palm Springs. MSWD provides water and wastewater service to the City of Desert Hot Springs and nearby unincorporated areas.

Planning Partners

The IRWM planning process – particularly through the Planning Partners meetings – provides a forum for the five water purveyors to engage the land use planning agencies in water planning, to hear their water-related needs and perspectives, and to integrate them into a comprehensive water planning document that represents the challenges and the goals of the Region. In Planning Partners meetings, the CVRWMG will promote water management priorities that meet various water supply and water quality objectives while still being compatible with existing and planned future land use designations.

CVWD

CVWD coordinates with land use planners within its service area on topics related to water and sanitation services. Most of the Cities in CVWD's service area have adopted CVWD's Model Landscape Ordinance which sets water budgets for new development to encourage less turf and more drought tolerant landscaping. Also, CVWD partners with cities on programs like "Smart Controller" rebates where citizens can have efficient irrigation clocks installed at reduced cost.

CVWD is currently a participant on the Riverside County General Plan Advisory Committee for the Riverside County General Plan Update. This allows CVWD to have input on flood hazard mitigation planning and water supply planning goals. Also, CVWD participates in Riverside County's monthly Land Development Committee meetings to share comments on projects with the County and developers.

CWA

The Coachella City Council also serves as Board of Directors for CWA. CWA staff attends the Coachella Water Authority/City Council meetings on a regular basis, and participates in the City's land use and planning activities. CWA staff reviews and provides input for all land development projects within CWA's service boundaries.

The Coachella City Council also serves as Board of Directors for Coachella Sanitation District. All master planning for water supplies, wastewater collection and treatment, and stormwater management is done in coordination with the City's Public Works and Planning departments.

DWA

DWA works closely with land use planners in its service area on topics related to water supply and recycled water use. DWA conducts plan checks for new development, and participates in the preparation and approval of water supply assessments.

The City of Palm Springs operates a sewer system within its municipal boundaries, but DWA works with the City to obtain effluent for water recycling. The Palm Springs Office of Sustainability and DWA work together to encourage sustainable water use in the City.

DWA works closely with the cities of Palm Springs and Cathedral City on the Model Landscape Ordinance in order to encourage native landscaping. The City of Cathedral City and DWA also partner on a Smart Irrigation Controller Program to offer devices at no-cost to Cathedral City residents. The City of Palm Springs has also partnered with DWA to offer devices to its residents, but on a more limited basis.

IWA

IWA staff meets regularly with City of Indio land use planners and attends scheduled Planning Commission meetings, as needed, to coordinate water supply and wastewater activities.

MSWD

MSWD's land use planning coordination includes the City of Desert Hot Springs, Riverside County, and the City of Palm Springs, as well as the Desert Edge Community Council. The District's Water Efficient Landscape Guidelines have been incorporated into the landscape ordinance of the City of Desert Hot

Springs and MSWD staff provides landscape plan check services for tract development and in-fill projects.

8.3.3 Future Efforts to Establish Proactive Relationships

The swift pace of development in the Coachella Valley in recent years has made it essential for water planners and land use planners in the Valley to work together through the development approval process. As a result, land use planning agencies have become more informed regarding regional water challenges. *Section 8.2, Relation to Local Water Planning* identifies ways that the water planning agencies have reached out to one another and relevant stakeholders to coordinate on local water planning issues. In addition, coordination related to land use planning is equally important and will be addressed in the following ways:

- The CVRWMG is committed to purposeful, collaborative, and informed coordination with the land use planning agencies within the Valley.
- As General Plans for local cities and the County are updated in the future, it is important that water planners are involved to ensure that the water planning goals of the Region are represented in and supported by land use and development plans.
- In Specific Plans, it is also important that water planners are involved early in the process to ensure that developers have a thorough understanding of available water supplies, flood hazards, and the infrastructure costs and needs of their developments.
- As development approvals are processed, coordination with water planners through development of WSAs are essential for ensuring adequate water supplies to meet future demand.
- This review and approval process by local utilities (water supply, wastewater, storm drainage, and flood control) should also occur during development of project-level CEQA documentation.

As above, the ongoing IRWM program will provide the Region's water and land use planners with an established forum to engage in discussions about water management topics. The quarterly Planning Partners meetings, which include both water managers and land use planners, are designed to discuss regional water issues and concerns. This improved interaction between water managers and land use planners will advance implementation of the IRWM Plan by keeping the group informed about critical issues and needs.



9 Framework for Implementation

*This chapter addresses the following topics related to Plan implementation: the **Impacts and Benefits Standard**, climate change mitigation strategies, the **Data Management Standard**, the **Plan Performance and Monitoring Standard**, and the **Finance Standard**.*

9.1 Impacts and Benefits

This section contains a discussion of potential impacts and benefits of Plan implementation.

The CVRWMG acknowledges that implementation of the Coachella Valley IRWM Plan would potentially result in regional and localized impacts and benefits that must be addressed as part of the IRWM planning process. The sections below give an overview of proposed impacts and benefits, which will be analyzed in detail as part of the Proposition 84 grant application process, and with subsequent environmental review that will be completed prior to construction of any project or program put forth in this Plan.

9.1.1 Overview of Benefits

The proposed Coachella Valley IRWM water management strategies and the priority projects are expected to produce regional benefits that include water quality improvement, enhancement of water supply reliability, ecosystem improvement, flood control enhancement, enhanced scientific and public understanding of water-related issues, improved water management coordination, and greater conservation efforts. The proposed projects will help achieve the designated IRWM Plan goals of:

- Optimizing water supply reliability,
- Protecting or improving water quality,
- Providing stewardship of water-related natural resources,
- Coordinating water resource management, and
- Ensuring cultural, social, and economic sustainability of water in the Coachella Valley.

As described in *Chapter 7, Project Evaluation and Prioritization* the implementation projects included in the project list incorporate a wide range of RMS to achieve the IRWM Plan goals and objectives. The projects would thus result in many long-term regional and inter-regional benefits. **Table 9-1** summarizes the benefits associated with IRWM Plan implementation. **Appendix B** describes the benefits associated with Coachella Valley projects.

Collectively, the proposed projects will result in: water management coordination, water supply reliability, water quality improvement, groundwater improvements, flood control enhancement, ecosystem improvement, enhanced public safety, enhanced recreation and public access, public education and environmental awareness, and economic benefits.

Table 9-1: Summary of Potential Long-Term Benefits for Proposed Projects

Project Type	Project Component	Potential Long-Term Benefit
Groundwater	Groundwater Supply Development	Increased groundwater storage Water supply reliability Water quality improvement (reversal of Salton Sea and perched water intrusion) Reduced land subsidence and/or fissuring Economic benefits
	Conjunctive Use	Increased groundwater storage Water supply reliability Water quality improvement (reversal of Salton Sea and perched water intrusion) Reduced land subsidence and/or fissuring Water management coordination Economic benefits
	Brackish Groundwater Demineralization	Water supply reliability Avoided costs of imported water supply
Potable Water Supply	Conveyance Facilities	Reduced groundwater pumping Water supply reliability
	Storage Facilities or Storage Operations	Reduced groundwater pumping Water supply reliability
	Treatment Facilities	Reduced groundwater pumping Water supply reliability Water quality improvement Economic benefits
	Salinity Management	Water quality improvement Water supply reliability (long-term sustainability of groundwater basin) Economic benefits
Conservation	Outreach and Education	Water supply reliability Public education and environmental awareness
	Economic Incentives	Water supply reliability Avoided costs of imported water supply Avoided costs of water supply infrastructure Economic benefits
Wastewater	Conveyance Facilities	Water supply reliability Source substitution
	Treatment Facilities	Water supply reliability Source substitution Water quality improvement Avoided costs of imported water supply Economic benefits

Table 9-1: Summary of Potential Long-Term Benefits for Proposed Projects

Project Type	Project Component	Potential Long-Term Benefit
	Septic to Sewer Conversion	Water quality improvement (long-term sustainability of groundwater basin) Economic benefits
Recycled Water	Conveyance Facilities	Water supply reliability Source substitution Increased nutrient levels for landscape irrigation
	Treatment Facilities	Water supply reliability Source substitution Water quality improvement Economic benefits
	Salinity Management	Water quality improvement Water supply reliability (long-term sustainability of groundwater basin) Economic benefits
Urban Runoff Management	Stormwater Capture and Recharge	Increased groundwater storage Water supply reliability Reduced land subsidence and/or fissuring Avoided costs of imported water supply Economic benefits
	Diversion to Sewer	Water quality improvement Flood control enhancement Increased recycled water capacity
	Pollution Prevention	Water quality improvement
Flood Management	Storm Drains or Channels	Flood control enhancement Increased groundwater recharge Avoided costs of flood damage Economic benefits
Ecosystem Restoration and Protection	Land Conservation	Water quality improvement Flood control enhancement Habitat protection and restoration Education and stewardship opportunities
	Invasive Species Removal	Water quality improvement Flood control enhancement Habitat protection and restoration
	Restoration/Revegetation	Water quality improvement Erosion and sediment reduction Flood control enhancement Habitat protection and restoration
Water-Based Recreation	Reservoir Recreation	Enhanced recreation and public access
	Parks, Access and Trails	Enhanced recreation and public access

Water Management Coordination

The IRWM process will allow for increased water management coordination among agencies in evaluating and selecting priority projects from the project list. Several of the projects will directly support increased water management coordination through:

- Projects that document and evaluate regional data management and coordination needs,
- Source identification studies that identify specific water quality problems that may require inter-agency or regional resolution, and
- Feasibility studies that identify and assess future water management options.

Several key water management coordination efforts were included in the *Coachella Valley IRWM Planning Grant Proposal*, including the "DAC Water Quality Assessment", the "Salt and Nutrient Management Planning Strategy", and the "Groundwater Elevation Monitoring Strategy". These efforts are all regional collaborative efforts to better manage water resources within the Valley.

Water Supply Reliability

The reliability of the Region's water supply system will be enhanced by projects that: (1) provide for greater water supply diversity and greater local water supply, and (2) increase the flexibility, capacity, and redundancy of the Region's water supply infrastructure. Selected projects will address water supply reliability as it is a top goal for the Region. Projects that improve water supply diversity and increase the contribution of local sources within the Region's water supply portfolio include:

- water conservation projects,
- water supply pipelines and water systems,
- water system tie-ins, interconnections, and diversion structures,
- projects that support water transfers,
- construction of groundwater treatment and extraction facilities,
- increasing water storage, conveyance, or treatment capacity,
- brackish groundwater desalination,
- upgrading wastewater treatment plants to produce recycled water,
- recycled and other non-potable water projects,
- water conservation, landscape water use efficiency, or incentive programs,
- improve agricultural drainage, water reuse, or management, and
- water quality protection projects that improve the usability and treatability of existing water supplies.

The "Eastern Coachella Valley Water Supply Project" lays out planning and designs that will lay out the most cost effective distribution system and may result in plans and specifications for construction. This project will primarily support water supply to many mobile home parks in the Eastern Coachella Valley. "BDCP and DHCCP" is a proposed project that deals with water transfers from the Sacrament Bay Delta. This project intends to provide new conveyance links between existing storage and treatment facilitates in order to better the region's water supply reliability. Another project that works toward water supply reliability is the "IWA Recycled Water Program". This proposed project has potential benefits that will address many regional water supply concerns by promoting groundwater recharge (replenishment) and increasing reliability of the water supply. Last, the "Siting Studies, EIR and Design of Colorado River Water Treatment Facility for Municipal Use Project" will present geographic diversity of water treatment to make reliable sources of domestic water for the East Valley possible.

Water Quality Improvement

Protecting and improving water quality is one of the goals of this IRWM Plan. Different types of projects can contribute to water quality improvements, including:

- pollution prevention and stormwater controls,
- building or upgrading wastewater treatment plants/technologies,
- groundwater quality monitoring and assessment,
- conversion of septic systems to municipal sewers,
- construction of sewer collection and interceptor facilities,
- capture and treatment of stormwater/urban runoff,
- salinity management, and
- other point source identification and control projects.

Implementation of proposed pollution prevention and stormwater management projects would also reduce the volume of urban runoff discharged to surface waters. Water conservation projects and recycled water projects could also reduce the quantity of municipal wastewater discharged to the CVSC.

"The Master Drainage Plan Implementation Project" will provide a permanent solution to reducing the amount of nitrates, bacteria, viruses and Total Dissolved Solids (TDS) migrating towards the Coachella Valley's underground aquifers, which provide the drinking water supply in the region. "Pierce Community Infrastructure - Regional Water Treatment Facility (North)," addresses the concerns of the East Valley, whose well systems are experiencing high levels of arsenic and fluoride. This project will look to construct a treatment mechanism or facility that will provide safe and reliable drinking water to existing mobile home parks in the vicinity. These two different types of projects (one planning and one construction) vary in scope but both aim to improve the region's water quality. Other types of projects such as habitat preservation or land conservation projects will also provide water quality benefits.

Groundwater Improvements

Due to the Region's reliance on groundwater supplies and the current overdraft condition in the CVGB, implementation of groundwater improvements is a priority of this Plan. Groundwater improvement programs may include projects to:

- Enhance conjunctive management and groundwater storage,
- Aquifer storage and recovery,
- Stormwater capture and recharge,
- Installation of groundwater recovery wells,
- Construction of new and/or rehabilitation of spreading grounds,
- Improvements in groundwater monitoring, and
- Hydrogeologic investigations and groundwater modeling.

"The Fargo Canyon Spreading Facility Project" would assist in groundwater replenishment through spreading facilities which will support the Fargo Canyon Sub-Area aquifer. The "Well Pumping Plants 44 and 45 of the Palm Springs Main Well Field" consists of construction of two wells, followed by the construction and operation of associated pumping plants. Both of these projects are important to the provision of adequate water supplies to Valley customers.

Flood Control Enhancement

In the late 1970's, severe flood damage occurred to homes and businesses in several of the Valley's cities. As a result, flood control infrastructure was constructed in the early 1980's with the help of USACE and local funding. There are still several areas of the Valley that lack flood control facilities and are vulnerable to devastating alluvial and riverine flooding. To evade possible economic consequences and human fatalities from extreme flooding events, it is important for the CVRWMG to address flood hazards by carefully considering projects that improve flood control in the Valley. Flood control enhancement may be provided by project components that involve:

- Stormwater collection, diversion, or capture,
- Improve levee systems (i.e. floodwalls, raising levee heights, setback levees, etc.),
- Floodplain protection or management,
- Porous pavement or weather-based irrigation replacement projects, and
- Construction of regional flood control infrastructure.

The project entitled "Implementation of Projects in East Wide Channel, Long Canyon and Tributaries Master Plan" will improve upon current detention dams, levees and reservoirs near the mouths of Long Canyon and West Wide Canyon potentially making stormwater collection/capture more efficient. The project will also include improvements to channels that could create greater porosity in channels or make the flow of flood waters more manageable. Other proposed flood control projects include the "Ramon Road Corridor - Improve Flood Protection, Tahquitz Creek Levee Reconstruction", and "Implementation of Projects for Cathedral City Master Plan."

Ecosystem Improvement

With a decrease in the total acreage of available habitat in Coachella Valley, the range and mobility of species has been adversely affected due to urban development. Proposed projects that deal with conservation and restoration have the ability to enhance the Region's ecosystems and protect endangered and threatened species. The following types of projects are considered:

- Land conservation and preservation projects that would sustain existing habitats and provide important wildlife linkages and corridors,
- Water quality protection projects that result in surface water quality improvement and improved compliance with water quality standards,
- Watershed erosion and sediment management,
- Stormwater management and pollution prevention, including BMPs,
- Debris cleanup and habitat restoration,
- Creation of wetlands, buffers, or other habitat, and
- Invasive species removal and control.

The proposed project, "Construct Wetland, Riparian, and Pupfish Habitat for CVMSHCP and Natural Community Conservation Plan," will provide regional benefits regarding ecosystem improvement.

Enhanced Public Safety

Public safety and property protection will be enhanced by water management projects that:

- Manage flood flows and risks in urbanized areas,
- Address source water control and protection,
- Reduce bacterial pollution, and
- Decrease the potential for recreational-related public safety impacts.

Additionally, fire-fighting and public sanitation will be improved through water supply projects that improve the reliability and flexibility of the Region's water supply infrastructure (including treatment, conveyance, and storage facilities) to reliably deliver water and/or water supply projects that increase supply reliability through source diversity and use of local water sources.

The "Implementation of Total Maximum Daily Load Best Management Practices" project will provide solutions to prevent non-storm urban runoff flows from entering the CVSC, thereby improving public health and safety.

Enhanced Recreation and Public Access

Recreational opportunities that exist in the Coachella Valley region include parks, lakes, and community centers. Continuous population growth and development may result in a greater demand for recreational resources for additional residents. Coachella Valley watercourses that provide recreational opportunities include Lake Cahuilla. The native habitats surrounding the lake provide recreational activities such as hiking trails, bird watching, and fishing. Enhancing recreation and public access will require efforts that:

- Will increase lands available for recreation (through land preservation or conservation),
- Control invasive species, and
- Improve water quality.

The "Construct Wetland, Riparian, and Pupfish Habitat for CVMSHCP and Natural Community Conservation Plan" project will promote enhanced opportunities for recreation through conservation and habitat protection.

Public Education and Environmental Awareness

Many water conservation and water quality protection projects include public education/environmental awareness components. Such programs are directed toward encouraging public support and awareness to:

- Promote and increase water conservation,
- Discourage illegal dumping of trash and litter in watercourses, and
- Encourage appropriate water management practices, including appropriate collection and disposal of hazardous liquid wastes.

Submitted projects which include public education and environmental awareness components include IWA's "Smart Water Conservation Programs Project", "Desert Hot Springs Community Gardens Project," and "DMMs for CVRWMG Partners Project". All three of these projects will utilize a variety of education and outreach methods to increase water conservation throughout the Valley.

Economic Benefits

Implementing the proposed projects will result in economic benefits to the Region, including:

- Avoiding potentially economically significant impacts to the regional economy (business, industry, and agriculture) associated with water supply interruption,
- Tourism economic benefits associated with water quality improvement and enhanced recreational opportunities,
- Economic benefits associated with enhanced public safety and flood protection, erosion and sediment control, and
- Benefits to the regional economy and labor associated with constructing and maintaining proposed IRWM facilities.

Another direct economic benefit of the IRWM Plan is that the planning process allows for implementing agencies and organizations to maximize existing resources by: (1) eliminating duplication or overlap among regional projects, (2) pooling resources to resolve common environmental or regulatory challenges, and (3) coordinating the development of regional data management systems that can be used to improve project evaluation and effectiveness. Additionally, the IRWM Plan process allows regional agencies to more effectively secure outside funding.

While all of the projects within the IRWM Plan will play a role in benefitting the economy by improving water management issues within the Valley, specific projects such as the “Desert Edge Geothermal Water Conservation and Preservation Project” will have direct economic benefits. The Desert Edge project will improve the groundwater quality of hot water springs that currently function as regional tourist attractions, thereby potentially increasing the economic output of tourism in the region.

9.1.2 Overview of Impacts

Negative impacts that may be associated with the proposed IRWM projects are similar to any other water infrastructure project and include (1) short-term, site-specific impacts related to site grading and construction, and (2) long-term impacts associated with project operation. Construction-related impacts associated with implementing physical facilities may include, but are not limited to, traffic, noise, biological resources, public services and utilities, cultural resources, and aesthetics.

Table 9-2 summarizes potential impacts associated with the implementation of key project elements within priority projects. **Appendix B** describes the potential negative impacts associated with Coachella Valley projects. Operation of proposed IRWM projects may result in the following impacts:

- effects of groundwater supply projects on groundwater-dependent vegetation,
- the treatability and quality of water from new supply sources,
- effects of recreation on raw water supplies within surface water reservoirs,
- surface conveyance and surface storage operations and associated impacts on riparian habitat,
- effects of flood control projects on erosion, sedimentation, and water quality,
- waste discharge issues associated with sludge, brine management and brine disposal, and
- increased wastewater residuals (biosolids) generation associated with upgraded water, recycled water and wastewater treatment.

Project-specific and/or programmatic environmental compliance processes per the California Environmental Quality Act (CEQA) and, if applicable, the National Environmental Policy Act (NEPA) will evaluate the significance of the impacts. Impacts concluded as being significant must be mitigated to a level of non-significance (unless the lead agency makes findings of overriding consideration). In addition, project proponents seeking Proposition 84 grant funding shall also notify tribal entities prior to the adoption of CEQA or NEPA documentation, where traditional tribal lands are within the area of the proposed project (PRC §75102).

Table 9-2: Summary of Potential Long-Term Impacts for Proposed Projects

Project Type	Project Component	Potential Long-Term (Non-Construction) Impact
Groundwater	Groundwater Supply Development	Water quality degradation (if poorer quality) Disturbance of groundwater-dependent vegetation Groundwater availability and reliability (if additional pumping)
	Conjunctive Use	Water quality degradation (if poorer quality) Disturbance of groundwater-dependent vegetation Groundwater availability and reliability
	Brackish Groundwater Demineralization	Disturbance of groundwater-dependent vegetation Receiving water quality (brine disposal)
Potable Water Supply	Conveyance Facilities	Land use compatibility (rights-of-way) Disturbance of habitat and endangered species
	Storage Facilities or Storage Operations	Land use compatibility (rights-of-way) Disturbance of habitat and endangered species
	Treatment Facilities	Energy (power consumption) Land use compatibility (rights-of-way) Receiving water quality (if NPDES discharge)
Conservation	Outreach and Education	Reduced discharges to Salton Sea wetlands
	Economic Incentives	Reduced discharges to Salton Sea wetlands
Wastewater	Conveyance Facilities	Land use compatibility (rights-of-way) Disturbance of habitat and endangered species
	Treatment Facilities	Energy (power consumption) Disturbance of habitat and endangered species (if NPDES discharge) Receiving water quality (if NPDES discharge) Receiving water quality (brine disposal)
	Septic to Sewer Conversion	Additional sewer collection and treatment facilities
Recycled Water	Conveyance Facilities	Land use compatibility (rights-of-way) Disturbance of habitat and endangered species Groundwater quality degradation Surface runoff and surface water quality degradation
	Treatment Facilities	Energy (power consumption) Land use compatibility (rights-of-way) Receiving water quality (if NPDES discharge)
	Salinity Management	Receiving water quality

Table 9-2: Summary of Potential Long-Term Impacts for Proposed Projects

Project Type	Project Component	Potential Long-Term (Non-Construction) Impact
Urban Runoff Management	Stormwater Capture and Recharge	Groundwater quality degradation
	Diversion to Sewer	Additional sewer collection and treatment facilities
	Pollution Prevention	None
Flood Management	Storm Drains or Channels	Land use compatibility (rights-of-way) Disturbance of habitat and endangered species Sedimentation and erosion Economic impacts
Ecosystem Restoration and Protection	Land Conservation	Economic impacts
	Invasive Species Removal	Disturbance of habitat and endangered species Sedimentation and erosion
	Restoration/Revegetation	Disturbance of habitat and endangered species Sedimentation and erosion
Water-Based Recreation	Reservoir Recreation	Reservoir water quality degradation Additional potable water treatment facilities
	Parks, Access and Trails	Disturbance of habitat and endangered species Sedimentation and erosion

9.1.3 Benefits and Impacts of Plan Implementation

Regional Impacts and Benefits

Projects proposed as part of this IRWM Plan help implement recommendations presented in the various water supply planning documents from throughout the Coachella Valley. Implementation of proposed water conservation, groundwater, water transfer, desalination, and recycled water projects within the Region are projected to reduce groundwater overdraft within the next 20 years. Implementation of the IRWM Plan will ideally conserve and diversify water supply portfolios in the region. Groundwater and potable water supply projects that provide water supply reliability benefits would benefit DACs and tribal entities by improving access to drinking water supplies, improving groundwater basin management, improving groundwater and surface water quality, and providing economic benefits by reducing the costs in comparison to alternative water supplies (e.g., hauling). Projects related to arsenic treatment within drinking water supplies specifically pertain to DAC water-related issues within the East Valley.

Potential impacts of IRWM Plan implementation could affect neighboring communities through a variety of construction-related impacts, including dust, noise, and traffic generation. Potential impacts to DACs and tribes may include increased costs associated with the provision of water infrastructure, and other construction-related impacts that apply throughout the region. Negative impacts have been described by project sponsors on the online project database and are included in **Appendix B**. Other impacts may be identified further along in the environmental review process. Therefore, as the projects progress, careful consideration will be taken prior to full implementation.

Impacts to disadvantaged and tribal communities will be kept at a minimum. **Appendix B** contains a project-level analysis of the potential impacts and benefits to DACs. In addition, the *Public Outreach and Communication Plan* (see **Appendix C**) seeks to engage DACs to further involve them in the planning process and to avoid any possible impacts.

Inter-Regional Impacts and Benefits

Inter-regional benefits could potentially include increased water supply reliability (through transfers and conjunctive use arrangements with outside entities), groundwater and surface water quality improvement (particularly for discharges to the Salton Sea), flood control enhancement, ecosystem improvement, and economic benefits throughout the larger Coachella-Imperial subregion. However, the construction-related impacts listed within *Section 9.1.2 Overview of Impacts* would likely not be inter-regional impacts, because they are focused within the Coachella Valley.

In addition, the IRWM Plan could result in inter-regional benefits associated with the reduced need for future additional imported water supply from the Sacramento-San Joaquin Delta. The CVRWMG is committed to addressing future water demands by increasing water conservation and water use efficiency, expanding capture and infiltration of stormwater runoff, securing reliable (non-SWP) water supplies, optimizing conjunctive use, expanding recycled water capacity, and desalinating agricultural drain water (refer to *Chapter 4 Objectives*, *Section 4.1.1 Determining Objectives* for more information).

9.2 Climate Change Mitigation/GHG Reduction

This section describes how Plan implementation can help to mitigate climate change by reducing energy consumption and ultimately reducing GHG emissions.

The proposed Coachella Valley IRWM RMS and the priority projects are expected to mitigate climate change by including energy-savings measures, best management practices, and other energy and GHG emissions saving features whenever feasible. *Chapter 6, Resource Management Strategies, Section 6.5, Adapting Resource Management Strategies to Climate Change* discusses further considerations related to climate change, including **Table 6-3**, which contains information regarding various resource management strategies and their potential role in reducing GHG emissions.

Adaption to and mitigation for climate change were both factors included for consideration as part of evaluating projects submitted to the online project database. Project sponsors were asked to provide information about how their project mitigates for associated possible climate change impacts (e.g., GHG reduction strategies), and how their project adapts to future possible changes in climate (e.g., through project design). This information is available to the CVRWMG, Planning Partners, stakeholders, and members of the public through the online project database.

This IRWM Plan is not an appropriate document for analyzing project-level GHG emissions, given that project design, and other project details for priority projects have not yet been vetted. As required by CEQA, all projects will undergo project-level GHG emissions analyses when they are evaluated as part of the environmental review process. Such project-level GHG emissions analysis will estimate GHG emissions from the project; establish significance criteria; identify those project components that may supply carbon sequestration; and, if applicable, explain how the project may help in the adaptation to possible effects of Climate Change.

9.3 Data Management

*This section fulfills the **Data Management Standard** and describes efficient use of available data, stakeholder access to data, and that data generated by IRWM implementation activities can be integrated into existing State databases.*

In preparation of the Coachella Valley IRWM Plan and in continued efforts of regional coordination, the collection and distribution of water management data is essential. The compilation of reports, records, intelligence, statistics and facts between the CVRWMG partners, as well as stakeholders, was vital to compiling the information necessary to create the IRWM Plan.

As the CVRWMG moves forward in regional planning and project implementation, the need for data management will continue to develop. As regional goals and priorities are addressed, the partners will share the responsibility and benefits of continued information gathering and sharing.

As described in earlier chapters of the IRWM Plan, data will be gathered at the project level to assess the performance goals and objectives. This will aid the region in gauging success and progress through regional planning, as well as assist in creating a learning curve for future implementation. Regional monitoring data will also be collected and disseminated to support regional planning updates. The five partners are currently engaged in a variety of monitoring efforts.

The CVRWMG envisions creation of a Data Management System (DMS) to support integrated regional planning within the region. Currently, the IRWM program website (www.cvrwmg.org) has a library of reports, studies, and information used during preparation of the IRWM Plan. In the future, the CVRWMG envisions creation of a more in-depth library allowing public access and dissemination of documents and plans. The www.cvrwmg.org library will contain documents prepared by the CVRWMG, as well as useful planning documents prepared by other agencies. Data will be organized by type and relation then by date of creation. Public access to the data will involve downloading documents in PDF format. A "contact us" feature will allow users to request data that is not online or inform the CVRWMG of data that is available but not accessible.

The process for collecting, organizing and sharing data is described in this chapter. In addition, the CVRWMG has identified data gaps and needs for the region which may be addressed through IRWM planning. Note that for security and legal purposes, not all of the data within the DMS may be publicly available.

9.3.1 Overview of Data Needs

In order to effectively manage water, many varieties of data are needed including information about water quality, quantity, demographics, climate patterns, treatment, habitat locations, costs, infrastructure and legal agreements. The CVRWMG partners have accumulated much of this data individually or in partnerships. Through this regional planning effort, that data is being pooled.

Groundwater Data

Groundwater is currently the largest source of water supply for the Coachella Valley IRWM Region. The five water purveyors, as well as Myoma Dunes Water Company and other private pumpers, share the Coachella Valley Groundwater Basin and pump potable water from wells. Each agency is responsible for data collection from those wells, including groundwater quality information. Each agency also keeps well level information as a method of groundwater monitoring. Results of that monitoring are reported both to customers, through annual Consumer Confidence Reports, and regulatory agencies. Results are also incorporated into other reporting and planning efforts by the agencies.

Collecting groundwater data is vitally important in the Coachella Valley IRWM Region to ensure adequate water quality and supply. In order to efficiently manage the groundwater basin, agencies must closely monitor this data and use it to evaluate future needs.

As the region develops an efficient Data Management System (DMS), each agency will share that data, as appropriate and publicly available, for use in regional planning. Much of this data has already been compiled to create the IRWM Plan; however, future planning will require a more thorough compilation of data management.

Surface Water Data

Surface waters of the Coachella Valley IRWM region consist of the Whitewater River Stormwater Channel (WRSC) and principal tributaries to the WRSC, including the San Gorgonio River, Snow Creek, Falls Creek, Chino Creek, Mission Creek, Morongo Creek, Tahquitz Creek, Andreas Creek, Palm Canyon Wash, Deep Canyon Creek, and the Palm Valley Channel. DWA receives about 5% of its water supply (or 2,500 AFY) through surface water sources, including Chino Creek, Snow Creek, and Falls Creek. These creeks are all tributary to the Whitewater River. DWA monitors this supply and data regarding this surface water is included in annual Water Quality Reports. Surface water data is important to DWA as surface water is part of the domestic supply. Data is used to ensure quality and supply of drinking water within the agency.

As the region develops an efficient DMS, each agency will share that data, as appropriate and publicly available, for use in regional planning. Much of this data has already been shared to create the IRWM Plan; however, future planning will require a more thorough compilation of data management.

Flood Control Data

RCFCWCD and CVWD are the Region's flood control districts. They operate and maintain a series of regional flood control facilities throughout the Valley. These two agencies monitor and report data regarding flood control. Flood control data is used to ensure safety within the community. Flood control is important for development and building within the region. Some areas of the region do not have adequate flood control and collection of this data will allow the CVRWMG to identify gaps that need to be identified and addressed.

As the region develops an efficient DMS, each agency will share that data, as appropriate and publicly available, for use in regional planning. Much of this data has already been shared to create the IRWM Plan; however, future planning will require a more thorough compilation of data management.

Habitat Data

Within the Coachella Valley IRWM Region is the CVMSHCP. The plan, developed by CVAG and approved by both CDFG and USFWS, is used to ensure preservation of protected land while protecting the Valley's ability to grow. The CVRWMG could use data that is available on the CVMSCHCP website (http://www.cvmshcp.org/) in the future planning efforts. Habitat data is important to the region for planning efforts to maintain a balance of urban growth and sustainable environmental practices.

As the region develops an efficient DMS, each agency will share that data, as appropriate and publicly available, for use in regional planning. Much of this data has already been shared to create the IRWM Plan; however, future planning will require a more thorough compilation of data management.

Demographic Data

The CVRMWG has relied heavily on Riverside County and U.S. Census data for demographic information about the region. Statistical data has helped identify regional needs, as well as help target DAC areas. Information such as the *Geographic Areas Reference Manual* from the US Census Bureau is used to understand demographics of the region which help the CVRWMG assess regional needs and priorities.

As the region develops an efficient DMS, each agency will share that data, as appropriate and publicly available, for use in regional planning. Much of this data has already been shared to create the IRWM Plan; however, future planning will require a more thorough compilation of data.

Feasibility Studies and Planning Efforts

Feasibility studies are essential for project implementation. Existing and planned projects will have accompanying feasibility and planning documents that the CVRWMG can use in its own planning efforts. As needs arise, the group will compile those studies, specifically for implementation grant submissions. Project proponents and developers are responsible for developing their own feasibility studies. Often these studies include a water supply assessment. Planning efforts include a vast array of data including agency general and master plans, as well as planning efforts from other agencies within the region. For example, all five water purveyors that constitute the CVRWMG will be completing 2010 updates of their UWMPs, with IWA having already completed and finalized their plan in May 2010.

As planning efforts related to the CVIRWM Plan, studies and plans will be collected in and incorporated into the DMS. The vast amount of planning efforts within the region prevent the DMS from including all but will allow for collection of some as related to water management needs in the region.

As the region develops an efficient DMS, each agency will share that data, as appropriate and publicly available, for use in regional planning. Much of this data has already been shared to create the IRWM Plan; however, future planning will require a more thorough compilation of data.

Historical Agency Information

Each agency has historical data about water quality, quantity, infrastructure, agreements and contracts and climate that could prove useful in future regional planning. The group will continue to compile that data. Local historical societies have additional data that could be incorporated in the region's DMS. Historical information has a variety of uses within the region that could aid the CVIRMG in future planning.

As the region develops an efficient DMS, each agency will share that data, as appropriate and publicly available, for use in regional planning. Much of this data has already been shared to create the IRWM Plan; however, future planning will require a more thorough compilation of data management.

Environmental Impact Reports

The information contained in both program and project-level Environmental Impact Reports (EIRs) for water management infrastructure has potential to be useful to the CVRWMG's planning efforts. As needed, the group will collect those reports to incorporate that data in the data management system. Just as planning and feasibility data is vast in the region, EIRs exist for numerous projects and agencies throughout the region. EIRs will be included in the DMS as needed for the progress of future water management planning.

As the region develops an efficient DMS, each agency will share that data, as appropriate and publicly available, for use in regional planning. Much of this data has already been shared to create the IRWM Plan; however, future planning will require a more thorough compilation of data management.

9.3.2 Data Collection Techniques

Knowledge of existing data has led to collection of much of what the CVRWMG has used during the IRWM planning process; however a great deal of data discovery has and will continue to occur in an effort to compile information about the region's water management systems.

The CVRWMG plans, reports, statistics and information, described above in *Section 8.3.2 Technical Analysis*, were compiled to create a matrix of existing data early in the IRWM planning process. The matrix was shared with the water purveyors and led to the presentation of additional data sources made available. As that data has been shared by the partners, the collection has become reference for the Coachella Valley IRWM Plan.

The CVRWMG partners have shared their data electronically, through hard copy reports, and through other efficient methods such as spreadsheets. Information that was gathered via hard copy has been scanned and is now being store electronically for inclusion in the regional DMS.

9.3.3 Stakeholder Contributions

It has long been recognized by the CVRWMG that the stakeholders in the region possess a great deal of data that the regional planning effort could use. The CVRWMG has been of the mind that stakeholder contributions could prevent duplication of efforts and research and that those contributions would be vital to planning process.

Through extensive stakeholder outreach, the group was able to obtain significant data, as well as discover new reports, materials, and information that the group was unaware of, but that was useful in development of the IRWM Plan. For example, during outreach to the East Valley's DAC representatives, Poder Popular provided a copy of the *Coachella Valley Water Systems Assessment* (Rural Communities Assistance Corporation 2010), which evaluates four drinking water and wastewater systems in local DACs.

Stakeholders in the Coachella Valley IRWM Region have been forthcoming with their data and the region has been able to add a wide variety of information to the online library based on those contributions. All stakeholders have access to program files, as well as regional planning documents and studies, through the library located on the CVRWMG website.

9.3.4 Responsible Entity

The CVRWMG is the responsible entity for the DMS within the region. The region may develop an ad-hoc subcommittee to guide development and management of the DMS, as needs arise. At this time, one point person is assigned to maintain the program library (found at www.cvrwmg.org). All parties are responsible for uploading their data to the existing file sharing program. As the DMS is further refined, the duties of maintenance, data collection, quality control, and dissemination will be further refined based on need.

9.3.5 Quality Assurance/Quality Control (QA/QC) Measures

A great deal of the reporting and monitoring currently conducted within the region is monitored by regulatory bodies and held to standards that meet the policies of those bodies. For instance, Water

Quality Reports are required annually by the U.S. EPA; for data such as these, the CVRWMG will merely serve as a clearinghouse and will not conduct additional quality assurance/quality control (QA/QC).

Data that is collected for regional planning that is unregulated by a State or federal agency will be vetted for accuracy on an as-needed basis.

9.3.6 Regional Data Sharing

Technology has already led to a great deal of efficiency in data collection for the CVRWMG. During the Region Acceptance Process, the CVRWMG used a group website to share files, maps, and data that could be used in completing the application. During IRWM Plan preparation, the CVRWMG relied on both email and a file sharing website to disseminate data to each other for purposes of creating the Plan.

The most useful technology for sharing has been the region's website, www.cvrwmg.org, which houses a library of data that is accessible not only to the management group, but also to stakeholders. Information on the library is publicly available and can be accessed any time. For those stakeholders without internet or email access, information that is available on the CVRWMG website can be provided to stakeholders upon request.

9.3.7 Statewide Data Sharing

The partners in the CVRWMG adhere to regulatory guidelines of data management by providing the necessary data into State databases. Projects implemented under the IRWM Plan will provide necessary data to the following State databases:

- *Water Data Library* – DWR maintains the State's Water Data Library (WDL) which stores data from various monitoring stations, including groundwater level wells, water quality stations, surface water stage and flow sites, rainfall/climate observers, and water well logs. Information regarding the WDL can be found at: http://wdl.water.ca.gov/.
- *Surface Water Ambient Monitoring Program* – The SWRCB created the Surface Water Ambient Monitoring Program (SWAMP). SWAMP has developed standards required for any group collecting or monitoring surface water quality data, using funds from Propositions 13, 40, 50, and 84. More information on the SWAMP is available at: http://www.swrcb.ca.gov/water_issues/programs/swamp.
- *Groundwater Ambient Monitoring and Assessment Program* – Groundwater Ambient Monitoring and Assessment (GAMA) provides a comprehensive assessment of water quality in water wells throughout the State. The California Aquifer Susceptibility Assessment combines age dating of water and sampling for low-level volatile organic compounds to assess the relative susceptibility of public supply wells throughout the State. The Voluntary Domestic Well Assessment provides sampling of water quality in domestic wells, which will assist in assessing the relative susceptibility of California's groundwater to contaminants. Because water quality in individual domestic wells is unregulated, the program is voluntary and focuses, as resources permit, on specific areas of the State. Constituents analyzed include nitrate, total and fecal coliform bacteria, methyl tert-butyl ether, and minerals. Additional information on the GAMA program is available at: http://www.swrcb.ca.gov/gama.
- *California Environmental Information Catalog* – The California Natural Resources Agency maintains the California Environmental Information Catalog (CEIC), which is a Statewide metadata clearinghouse for geospatial data. The online directory is used for reporting and discovery of information resources for California. Participants include cities, counties, utilities,

State and federal agencies, private businesses, and academic institutions that have spatial and other types of data resources. The CEIC is accessible at: http://gis.ca.gov/catalog/.

- *Integrated Water Resources Information System* – DWR maintains the Integrated Water Resources Information System (IWRIS), which is a data management tool for water resources data and not a database. IWRIS is a web based GIS application that allows entities to access, integrate, query, and visualize multiple sets of data simultaneously. Information on IWRIS is available at: http://www.water.ca.gov/iwris/.
- *California Environmental Resources Evaluation System* – California Environmental Resources Evaluation System (CERES) is an information system developed by the California Natural Resources Agency to facilitate access to a variety of electronic data describing California's rich and diverse environments. The goal of CERES is to improve environmental analysis and planning by integrating natural and cultural resource information from multiple contributors and by making it available and useful to a wide variety of users. CERES is available at: http://ceres.ca.gov/.

The CVRWMG partners will continue to follow the regulatory data management requirements, as well as use the State DMS's above as examples in further development of the regional system.

9.4 Plan Performance and Monitoring

*This section complies with the **Plan Performance and Monitoring Standard** by including performance measures and monitoring to document progress toward meeting Plan objectives.*

This Coachella Valley IRWM Plan includes a Plan Performance and Monitoring framework to ensure that the Region (1) meets the IRWM Plan goals and objectives; (2) implements all projects included in this IRWM Plan; and (3) monitors each project to ensure compliance with all applicable rules, laws, and permit requirements. Part of the Plan Performance and Monitoring framework involves the Coachella Valley IRWM Plan undergoing periodic review. This process involves assessing the effectiveness of the IRWM Plan implementation and adjusting the Plan implementation accordingly. This section describes the methods for assessing the Coachella Valley IRWM Plan and project performance and identifies project-specific monitoring plans.

9.4.1 Plan Performance

The Coachella Valley IRWM Plan will be assessed at both the Plan and project levels. The IRWM Plan is framed around regional goals and objectives that contribute to the overall vision of water resources management within the Coachella Valley. Plan and project performance assessments are vital for evaluating how effectively they are achieving the regional goals and objectives. The methods that are to be used in assessing the project and plan performance are described below.

Evaluating Project Performance

Project proponents submitting implementation projects are considered the "Responsible Agency" for each project or program included in the IRWM Plan. The Responsible Agency is responsible for overseeing project implementation, providing ongoing assessment of project performance, and overseeing conformance with grant funding requirements. Each project proponent is responsible for implementing the project, developing the project-specific monitoring strategies, and overseeing monitoring activities. Additionally, the CVRWMG will coordinate reporting on project performance and assuring each project reports its progress toward identified performance measures. Projects that are included in the IRWM Plan, but not grant-funded, are encouraged to follow a similar monitoring and reporting program.

As projects are implemented in the Region as part of this Plan, project outcomes will be monitored and the results from this monitoring will be used to guide future project implementation. If project monitoring reveals that a project is progressing as planned and regional changes do not necessitate revisiting project implementation, then changes to project sequencing are not anticipated. However, if project monitoring reveals that a project is not producing the anticipated result, the CVRWMG will notify the project proponent that it must identify and implement corrective actions. Alternatively, the project proponent may determine that the appropriate action is to stop the project temporarily or permanently to allow another project to proceed in its place.

Based on information provided by project proponents, the CVRWMG will prepare an Annual Report summarizing the progress of each individual project completed via IRWM grant funding and evaluate the projects to determine their progress towards achieving the performance metrics. The Annual Reports will be distributed to the public through the Region's www.cvrwmg.org website, newsletters, and e-mails. Once a grant contract is awarded, project proponents will provide quarterly reports to CVWD (who is authorized to submit and enter into contracts for grant funding on behalf of the region) describing project progress, performance with respect to stated performance metrics, and project deliverables and invoices. These quarterly reports and required project completion reporting will be used to develop the CVRWMG's Annual Reports on the IRWM program.

The performance measures to be used in measuring implementation performance for each identified project are presented in **Appendix D**. These performance measures are intended to serve as measurable benchmarks for establishing success of projects following implementation. As projects become further developed, these metrics may evolve to better capture the performance of projects with respect to meeting project objectives.

Evaluating Plan Performance

The CVRWMG is the Responsible Agency in charge of evaluating the performance of the Plan in regards to achieving goals and objectives. The assessment will be done annually by the CVRWMG. The Annual Reports will include assessment of the overall progress toward achieving the regional priorities identified in *Chapter 7, Project Evaluation and Prioritization Section 7.1 Regional Priorities*. The Annual Reports will be prepared for public distribution through the www.cvrwmg.org website, newsletter, and e-mails. Additionally, the CVRWMG will be responsible for compiling and managing all IRWM Plan data and information in the proposed DMS (see *Section 9.3, Data Management* above) for compliance with State funding requirements.

Table 4-1 in *Chapter 4, Objectives* presents the designated Plan goals, objectives, and targets established for measuring progress in achieving the objectives, and parameters for measuring their success. The CVRWMG will further develop the thresholds of success for the parameters shown in Table 4-1 as part of an adaptive management process.

9.4.2 Project-Specific Monitoring Plans

Project proponents are responsible for implementing project-specific monitoring plans to ensure projects are on track to meeting the individual Plan targets. All projects shall be monitored to comply with applicable regulations, laws, and permit requirements. **Table 9-3** contains a list of required contents for a project-specific monitoring plan. As projects become further developed, monitoring strategies may evolve to better address any problems encountered during monitoring. All project proponents that receive grant funding will generate project progress reports and will be submitted to CVWD with quarterly invoices. **Appendix D** presents preliminary information on each of the projects' monitoring plans. Project proponents will be required to submit monitoring plans before grant funding reimbursements may begin.

Table 9-3: Required Contents of Project-Specific Monitoring Plans

Required Contents of Project-Specific Monitoring Plans
• Clearly and concisely (in a table format) describe what is being monitored for each project
• Measures to remedy or react to problems encountered during monitoring
• Location of monitoring
• Monitoring frequency
• Monitoring protocols/methodologies, including who will perform the monitoring
• DMS or procedures to keep track of what is monitored, including how the data collected will be or can be incorporated into Statewide databases
• Procedures to ensure the monitoring schedule is maintained and that adequate resources (budget) are available to maintain monitoring of the project throughout the scheduled monitoring timeframe

9.5 Finance

This section complies with the ***Finance Standard*** *and ensures that financing of the IRWM Plan has been considered at a programmatic level by the CVRWMG. The potential funding sources for projects and programs that implement the IRWM Plan are also considered.*

Development of the Coachella Valley IRWM Plan included both programmatic and project-level assessment of financing by the CVRWMG. Programmatic financing was considered by the CVRWMG during development of their MOU (see **Appendix E**) and also during formalization of the current governance structure. Project-level financing is presented and accessible to stakeholders, Planning Partners, Issues Groups, and the general public through the online project database used to collect and manage projects submitted as part of this Plan. The project database requires submittal of information regarding current and expected financing of projects.

9.5.1 Sources and Certainty of Funding

The following section discusses financing in the context of multiple potential funding sources, and therefore explains how project proponents will attempt to achieve desired funding for their projects through this IRWM process and through other sources.

IRWM Plan Funding

The five water purveyors that constitute the CVRWMG funded preparation of this IRWM Plan. Each agency contributed an equal share of money to fund a consultant team to assist CVRWMG staff members in Plan preparation. In addition, each member agency allocated staff time and resources to developing the Plan, and to participate in stakeholder outreach efforts. Ongoing IRWM planning efforts will be funded by a combination of the *Coachella Valley IRWM Planning Grant Proposal* and matching funds via the continued CVRWMG investment. The CVRWMG is committed to the long-term continuance of the Coachella Valley IRWM program as a regional water supply planning effort.

Because the IRWM project list is a living list, which will change over time, the potential funding sources in **Table 9-4** are presented generally. Beyond paying for development of the Plan itself, the CVRWMG are committed to ensuring that the Plan is properly implemented. **Table 9-4** below outlines potential funding mechanisms that could be utilized by the CVRWMG and various project proponents to secure funds for on-going project implementation.

Project and Program Funding

As described within *Chapter 7, Project Evaluation and Prioritization*, a description of the potential sources of funding that will be utilized for projects and programs that implement the IRWM Plan was derived from project proponents as part of the project submittal process. Project proponents were required to submit the entire project budget, the amount of funds requested as part of the IRWM process, the estimated local match, and the annual operations and maintenance costs of their project or program. Operation and maintenance costs for projects and programs shall be covered by the project proponents' operating budgets. Operating budgets are generally secured by proponents through their rate structures, as defined by asset management planning.

Appendix B provides a cross-walk of the submitted projects (as of September 30, 2010) and aforementioned funding considerations. **Table 9-4** below outlines potential funding mechanisms that could be utilized by the CVRWMG and various project proponents to secure funds for on-going project implementation.

Certainty of Funding

Chapter 7, Project Evaluation and Prioritization provides information regarding the readiness for projects to proceed with regards to Proposition 84, Proposition 1E, and other factors. In addition, **Appendix B** provides a cross-walk of the submitted projects (as of September 30, 2010) and their security with regards to local cost share. While not all funding has been fully secured for projects submitted as part of this IRWM Plan, the CVRWMG has considered financing of the Plan and implementation projects and programs. As discussed within *Chapter 7, Project Evaluation and Prioritization*, the CVRWMG took into consideration whether or not projects had been identified within an existing planning document as part of the scoring and ranking process. With this criterion, the CVRWMG recognized that accepting a project or program into a formalized planning document is one of the first steps to securing funding. In addition, **Table 9-4** below lists various outside funding mechanisms, and analyzes their certainty/longevity.

Table 9-4: IRWM Plan Potential Funding Mechanisms

Activity Description	Funding Source	Funding: Certainty/Longevity
IRWM Program Management	CVRWMG Member Agencies via MOU	Commitment through IRWM Plan Update in December 2012.
IRWM Plan Update 2012 • Ongoing outreach –Planning Partners, DACs, Tribes, Public Workshops • DAC Water Quality Evaluation • Salt/Nutrient Planning Strategy • Integrated Flood Management • Groundwater Monitoring Strategy	DWR via Prop 84 IRWM Planning Grant	Contingent on success in grant programs.
Implementation of Projects/Programs Through Prop 84 IRWM Implementation Grants	DWR via Prop 84 IRWM Implementation Grant	Contingent on success in grant programs.
Implementation of Stormwater and Flood Management Projects/Programs Through Prop 1E IRWM Implementation Grants	DWR via Prop 1E IRWM Implementation Grant	Contingent on success in grant programs.
Implementation of Projects/Programs Through Capital Improvements Program (CIP) Budgets	Local CIP Budgets	Contingent on CIP budgets adopted by implementing agencies.
Implementation of Projects/Programs Through Assessment Districts	Assessment District Funds	Secure through the lifetime of the relevant Assessment District.
Implementation of Projects/Programs Involving Water Quality Protection for Wastewater Treatment, Nonpoint Source Pollution Control, and Watershed and Estuary Management	Clean Water State Revolving Fund (CWSRF) Loan	Secure through the lifetime of American Recovery and Reinvestment Act (ARRA).
Implementation of Projects/Programs That Improve Drinking Water Systems	Drinking Water State Revolving Fund (DWSRF) Loan	Secure through the lifetime of ARRA.
Implementation of Projects/Programs That are Authorized Under Title XVI	USBR Title XVI	Secure through the lifetime of ARRA.
Implementation of Projects/Programs Addressing Flood Control, Navigation, and Environmental Issues	Water Resources Development Act (WRDA)	Secure through 2012.
Implementation of projects or programs that have flood management components as consistent with Proposition 1E requirements	The Disaster Preparedness and Flood Protection Bond Act of 2006 (Prop1E)	Secure through the lifetime of Proposition 1E.
Operations and Maintenance of Implementation Projects	Operating Budgets/ Enterprise Funds of Project Proponents	Contingent on rate structure adopted by Project Proponents

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La Entrada Water Supply Assessment

Appendix A
Water Supply Planning Documents

Part 5
Coachella Valley Water Management Plan Update Draft Report, December 2010

PREPARED FOR
COACHELLA VALLEY
WATER DISTRICT

Coachella Valley Water Management Plan Update

DRAFT REPORT

December 2010

WATER DISTRICT

MWH
BUILDING A BETTER WORLD

Water Consult
Engineering and Planning Consultants

COACHELLA VALLEY WATER MANAGEMENT PLAN
2010 UPDATE

Draft Report

Prepared by:

Coachella Valley Water District

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General Manager-Chief Engineer

Patti Reyes
Planning and Special Program Manager

December, 2010

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Section 1
Introduction

The Coachella Valley Water District (CVWD, District) initiated a planning process in the early 1990s to meet its responsibilities for securing and protecting Coachella Valley water supplies into the future. The process initially addressed the East Valley, but was expanded to include the entire Coachella Valley in 1995. In September, 2002, the CVWD Board of Directors adopted the "Coachella Valley Final Water Management Plan" (2002 WMP) (Water Consult and MWH, 2002) and certified the final program environmental impact report (PEIR) (MWH, 2002). The Board recognized the need to update the Plan periodically to respond to changing external and internal conditions. This 2010 WMP Update meets that need.

1.1 PURPOSE AND NEED FOR WATER MANAGEMENT PLAN UPDATE

The Coachella Valley groundwater basin has been the principal source of water for the Valley since the early 1900s. As land was developed for agricultural and urban uses, demand on the groundwater basin increased. Groundwater levels in the East Valley began to decline and artesian wells ceased flowing. Recognizing the need for a supplemental water source, CVWD contracted with the federal government for Colorado River water from the All-American and Coachella Canals in 1934. With the completion of the Coachella Canal in 1949, supplemental water deliveries began and the groundwater levels began to recover. Groundwater levels stabilized in the 1970s and early 1980s near historical levels. With increased growth, groundwater levels once again began to decline as demand exceeded the available supply. Groundwater levels have shown a steady decline since the mid 1980s.

In the West Valley, resort and urban development relied solely on groundwater. Recognizing the need for additional water supplies, Desert Water Agency (DWA) and CVWD entered separate agreements with the State of California to purchase water from the State Water Project (SWP) in 1962 and 1963, respectively. To avoid the estimated $150 million cost to construct a pipeline to the Valley at that time, CVWD and DWA signed a water exchange agreement with the Metropolitan Water District of Southern California (Metropolitan) to deliver an equivalent amount of Colorado River water from Metropolitan's aqueduct in exchange for the Valley's SWP water. Deliveries of SWP Exchange water to the Whitewater River Spreading Facility commenced in 1973. Groundwater levels near the recharge facility showed a response to the recharge. However, in the central portions of the Valley, a steady decline continued. CVWD and DWA also signed an advanced delivery agreement with Metropolitan to store excess Colorado River water in the West Valley basin. This stored water represents a pre-delivery of the Valley's SWP supply. In the mid-1980s Metropolitan stored up to 600,000 AF of water in the basin. Even with this additional water, groundwater levels in the West Valley declined.

In 1994, CVWD with DWA commenced preparation of a water management plan to eliminate groundwater overdraft. The goal of the 2002 WMP is to assure adequate quantities of safe, high-quality water at the lowest cost to Coachella Valley water users. To meet this goal, four objectives must be met:

1. Eliminate groundwater overdraft and its associated adverse impacts, including:
   - Groundwater storage reductions,
   - Declining groundwater levels,
   - Land subsidence, and
   - Water quality degradation.
2. Maximize conjunctive use opportunities,
3. Minimize adverse economic impacts to Coachella Valley water users, and
4. Minimize environmental impacts.

Since the adoption of the 2002 WMP, the Coachella Valley has experienced a number of changes affecting water demands in the Valley that are projected to continue for the foreseeable future. These changes include:

- rapid population growth,
- changes in land use from agricultural or vacant to urban and corresponding changes in water demand in terms of both quantity and quality,
- development on tribal lands and related water demands, and
- projected urban development outside the 2002 WMP study area and corresponding increases in water demands.

External factors have also affected or may affect Valley water supplies:

- SWP supplies fluctuate annually due to hydrology and environmental needs in the Sacramento-San Joaquin Delta (Delta).
- Recent environmental rulings have restricted the State's ability to move water through the Delta to the SWP decreasing supply reliability. The degree to which the long term supply of the SWP will be affected is uncertain.
- Efforts are underway to prepare the Bay-Delta Conservation Plan (BDCP), which is intended to restore the Delta's ecosystem and improve water supply reliability.
- The Quantification Settlement Agreement (QSA) has been overturned by the court, creating uncertainty in future Colorado River supplies.
- Climate change could affect the long term reliability of SWP and Colorado River supplies.

These changing conditions reinforce the need for a long term Plan and for updating the Plan in response to changing conditions. Consequently, the goal and objectives for the 2010 WMP Update have been refined to reflect the significant changes in projected water demands and water supplies that have occurred in recent years. The basic goal of the WMP remains essentially the same: "to reliably meet current and future water demands in a cost-effective and sustainable manner." However, the underlying objectives have been refined based on the uncertainties facing water resources managers throughout California. The programs and projects identified in the 2010 WMP Update are based on the following objectives:

1. Meet current and future water demands with a 10 percent supply buffer,
2. Eliminate long-term groundwater overdraft,
3. Manage water quality,
4. Comply with state and federal regulations,
5. Manage future costs, and
6. Minimize adverse environmental impacts.

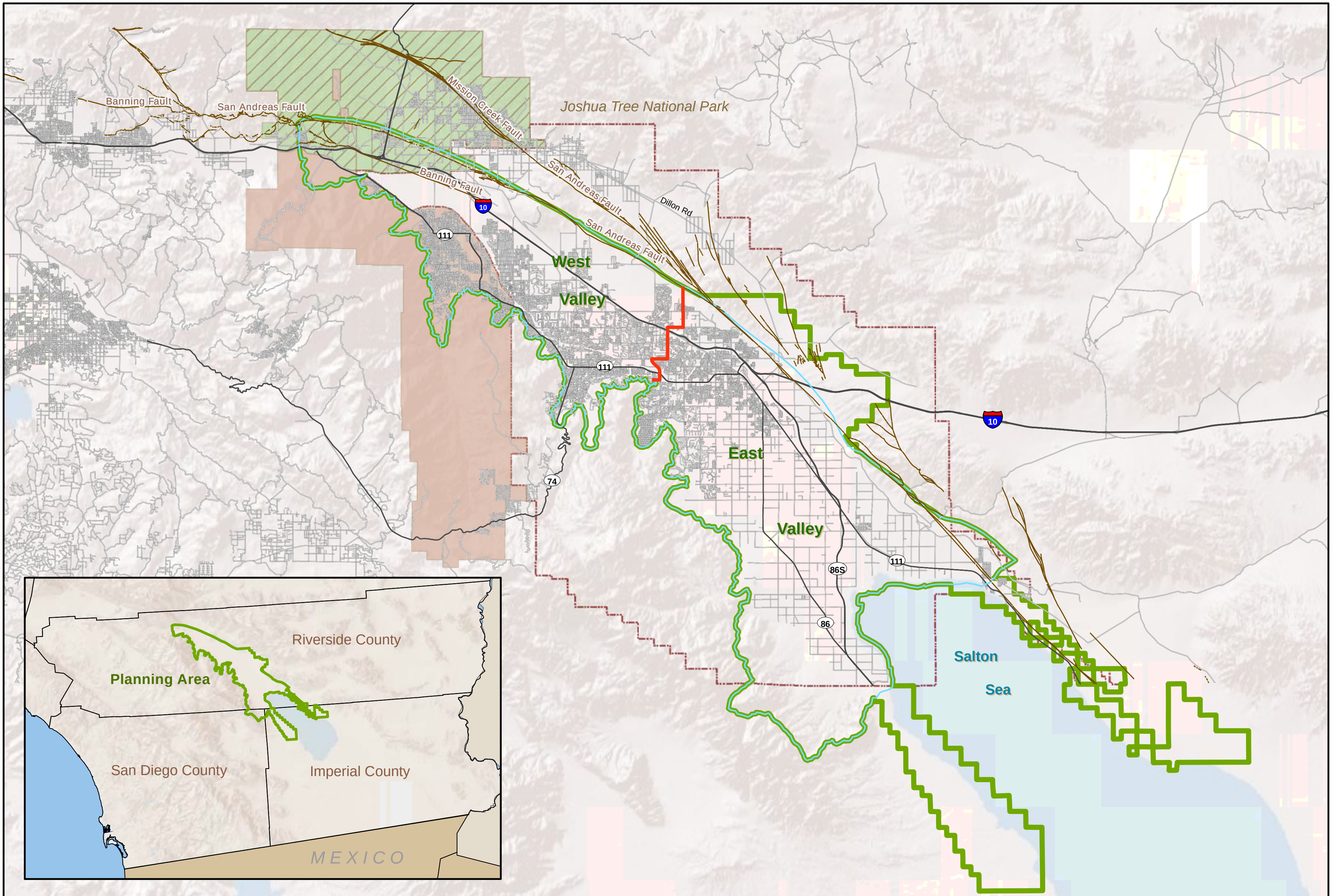
These objectives are described in detail in Section 6.

1.2 STUDY AREA DESCRIPTION

The Coachella Valley lies in the northwestern portion of a great valley, the Salton Trough, which extends from the Gulf of California in Mexico northwesterly to the Cabazon area as shown in **Figure 1-1**. The Colorado River intersects this trough about midway, and its delta has formed a barrier between the Gulf of California and the Coachella and Imperial valleys. The Coachella Valley is ringed with mountains on three sides. On the north and west sides are the San Bernardino Mountains, San Jacinto, and Santa Rosa, which rise more than 10,000 feet above mean sea level (MSL). To the northeast and east are the Little San Bernardino Mountains, which attain elevations of 5,500 feet above MSL.

The Coachella Valley is geographically divided into the West Valley and the East Valley. Generally, the West Valley, which includes the cities of Palm Springs, Cathedral City, Rancho Mirage, Indian Wells and Palm Desert, has a predominately resort/recreation-based economy that relies on groundwater as its principal water source. The East Valley, which includes the cities of Coachella, Indio and La Quinta and the communities of Mecca and Thermal, has an agricultural-based economy utilizing groundwater and Colorado River water imported via the Coachella Canal. The East Valley is southeast of a line extending from Washington Street and Point Happy northeast to the Indio Hills near Jefferson Street, and the West Valley is northwest of this line as shown in **Figure 1-1**. The WMP study area also included CVWD's domestic water service area along the western and eastern shores of the Salton Sea which relies on groundwater pumped from the Whitewater River Subbasin. The 2010 WMP Update includes expanded areas of potential development located east of the San Andreas Fault along Dillon Road. This area falls within the spheres of influence of the cities of Coachella and Indio. Additional discussion of this expanded service area is presented in **Section 3**.

The Coachella Valley Groundwater Basin encompasses much of the Valley floor. Geologic faults and structures divide the basin into five subbasins: San Gorgonio Pass, Whitewater River (Indio), Garnet Hill, Mission Creek, and Desert Hot Springs subbasins. The largest of these is the Whitewater River Subbasin, which lies between the San Andreas Fault on northeast and the surrounding San Jacinto and Santa Rosa Mountains on the southwest. The subbasin extends from Whitewater in the northwest to the Salton Sea in southeast.



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Date: December 2010

2010 Water Management Plan Update Study Area

Figure 1-1

MWH

The California Department of Water Resources (DWR) refers to the Whitewater River subbasin as the Indio Subbasin which is designated Basin No. 7-21.01 in DWR's Bulletin 118 (DWR, 2003). The basin has a storage capacity of approximately 30 million acre-feet[1] (AF) (DWR, 1964). The geology of the basin varies with coarse-grained sediments located in the vicinity of Whitewater and Palm Springs, gradually transitioning to fine-grained sediments near the Salton Sea. Water placed on the ground surface in the West Valley will percolate through the sands and gravels directly into the groundwater aquifer. However, in the East Valley, several impervious clay layers lie between the ground surface and the main groundwater aquifer. Water applied to the surface in the East Valley does not easily reach the East groundwater aquifers due to these impervious clay layers. The only outlet for groundwater in the Whitewater River Subbasin is through natural subsurface outflow to the Salton Sea or through collection in drains and transport to the Salton Sea via the Coachella Valley Stormwater Channel (CVSC).

Although the study area of 2002 WMP and the 2010 WMP Update includes the Garnet Hill Subbasin, this subbasin is evaluated in detail the Mission Creek/Garnet Hill WMP which is under preparation (see **Section 1.4.3**.) The study area also includes the southeast portion of the Desert Hot Springs Subbasin; however, since little to no groundwater is produced from this subbasin.

The water users in the Coachella Valley receive water service from six water agencies: CVWD, DWA, Mission Springs Water District (MSWD), Indio Water Authority (IWA), Coachella Water Authority (CWA) and Myoma Dunes Mutual Water Company. Several isolated communities are supplied by small private water companies. The service area boundaries of Valley water purveyors along with city boundaries are presented in **Figure 1-2**. Wastewater service is provided by CVWD, DWA, the City of Palm Springs, Coachella Sanitary District and Valley Sanitary District (portions of Indio). Portions of the planning area which are not served by one of these agencies rely on individual septic systems for wastewater treatment and disposal.

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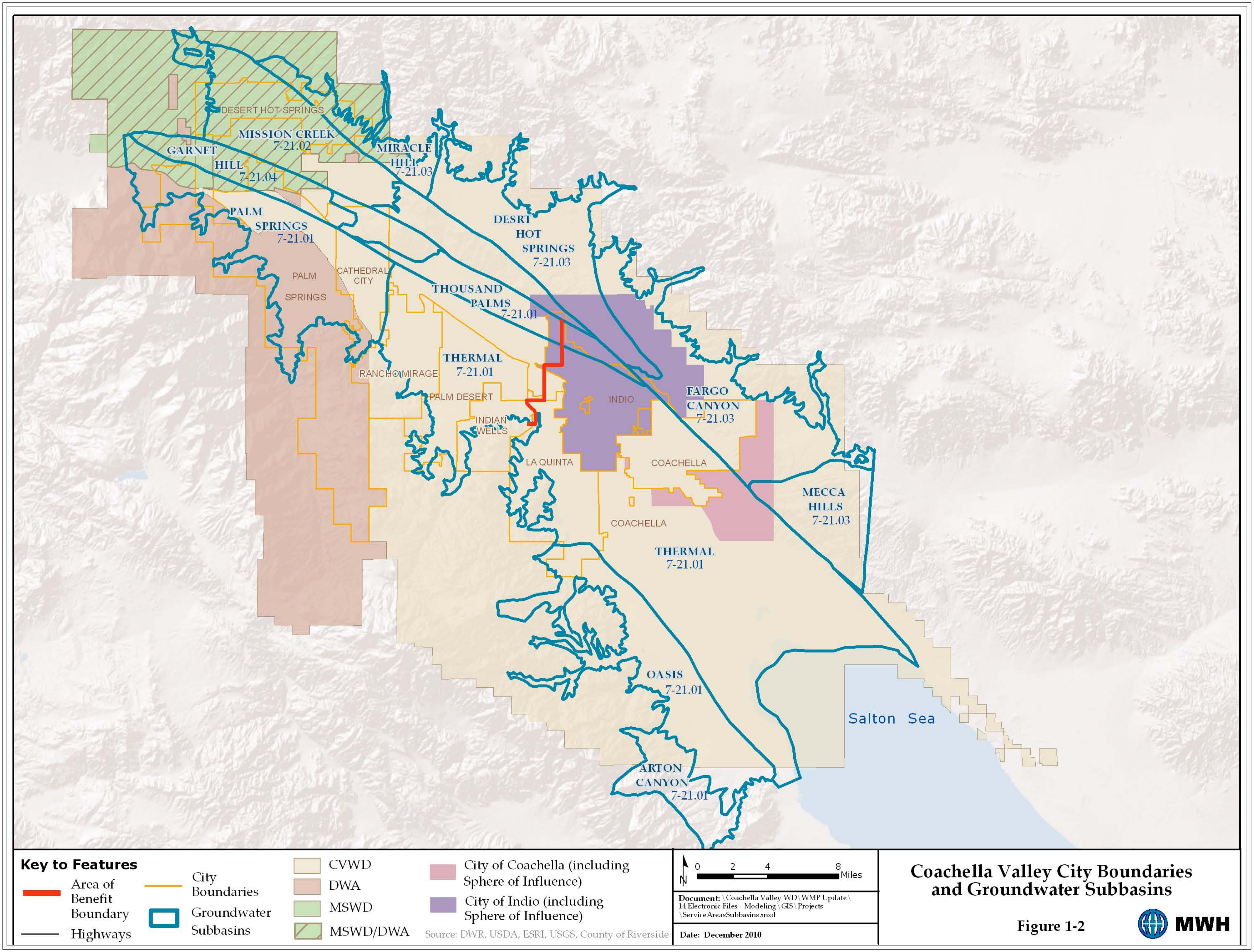
[1] One acre-foot (AF) is the amount of water that would cover one acre of land (approximately the size of a football field), one foot deep, or about 326,000 gallons.


DESERT HOT SPRINGS
MISSION CREEK
7-21.02
GARNET
HILL
7-21.04
MIRACLE
HILL
7-21.03
PALM
SPRINGS
7-21.01
DESRT
HOT
SPRINGS
7-21.03
PALM
SPRINGS
CATHEDRAL
CITY
THOUSAND
PALMS
7-21.01
THERMAL
7-21.01
RANCHO MIRAGE
PALM DESERT
INDIAN
WELLS
INDIO
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CANYON
7-21.03
LA QUINTA
COACHELLA
MECCA
HILLS
7-21.03
COACHELLA
THERMAL
7-21.01
OASIS
7-21.01
Salton Sea
ARTON
CANYON
7-21.01
Key to Features
Area of Benefit Boundary
Highways
City Boundaries
Groundwater Subbasins
CVWD
DWA
MSWD
MSWD/DWA
City of Coachella (including Sphere of Influence)
City of Indio (including Sphere of Influence)
Source: DWR, USDA, ESRI, USGS, County of Riverside
N
0 2 4 8 Miles
Document: \Coachella Valley WD\WMP Update\14 Electronic Files - Modeling\GIS\Projects\ServiceAreasSubbasins.mxd
Date: December 2010
Coachella Valley City Boundaries and Groundwater Subbasins
Figure 1-2
MWH

1.3 APPROACH TO THE PLAN UPDATE

The 2010 WMP Update presents materials needed by an informed public to understand the goal, objectives, purposes and need for the Update. Changed conditions affecting Plan implementation and modifications to the 2002 WMP to meet changing conditions in the future are clearly defined.

Section 2 provides a brief overview of the 2002 WMP to put changes in perspective. Section 3 describes changes in population and land use projections and corresponding changes in water demand projections. Section 4 describes available water supplies. Section 5 identifies issues that have emerged since the 2002 WMP. Section 6 describes the 2010 WMP Update elements needed to meet currently forecast future needs. Section 7 describes the evaluation of plan components and selection of those components for inclusion in the 2010 WMP Update. Section 8 provides a revised implementation plan and programmatic cost estimates for Plan elements.

1.4 RELATIONSHIP TO OTHER PLANNING EFFORTS

Since completion of the 2002 WMP, a number of related, compatible planning efforts have been initiated in the Valley. These are described below.

1.4.1 Integrated Regional Water Management Plan

In 2002, the California legislature enacted the Integrated Regional Water Management (IRWM) Planning Act (Division 6 Part 2.2 of the Water Code §10530 et seq.), amended in 2008. The act encourages local agencies to develop integrated regional strategies for management of water resources and work cooperatively to manage their available local and imported water supplies to improve the quality, quantity and reliability of those supplies. The California Department of Water Resources (DWR) reviews all IRWM plans. DWR provides funding for water management projects through competitive planning and implementation grant programs.

In 2008, CWA, CVWD, DWA, IWA, and MSWD formed the Coachella Valley Regional Water Management Group (CVRWMG) and signed a Memorandum of Understanding (MOU) for development of an Integrated Regional Water Management Plan (IRWMP). In 2009, the CVRWMG established a planning region boundary and submitted an application for region acceptance to DWR, which was approved.

The CVRWMG is developing an IRWMP. The IRWMP will qualify the region for DWR grants under proposition 84, Division 43: *The Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Bond Act of 2006*, and Proposition 1E, *Article 1.699: Disaster Preparedness and Flood Prevention Bond Act of 2006*. The draft Coachella Valley IRWMP was released for public review in November 2010 and is expected to be adopted in December 2010. The 2002 WMP was a significant source of information for the Coachella Valley IRWMP.

1.4.2 Urban Water Management Plan

In 1983, the California Legislature enacted the Urban Water Management Planning (UWMP) Act (Division 6 Part 2.6 of the Water Code §§10610 - 10656). This act requires that every urban water supplier providing water to 3,000 or more customers, or more than 3,000 AF of water annually, should ensure the appropriate level of reliability in its water service sufficient to meet the needs of its various categories of customers during normal, dry, and multiple dry years. The act describes the contents of the UWMP as well as how urban water suppliers should adopt and implement the plans. Every five years (in years ending in five and zero), plans are prepared and adopted that define the supplier's current and future water use, sources of supply, source reliability, and existing conservation measures. DWR reviews plans for compliance and provides a report to the California legislature one year after plans are due to DWR.

In compliance with state requirements, CVWD prepared a 2005 UWMP for its service area. The plan documents CVWD's projected water demands and its plans for delivering water supplies to its CVWD water service area. The plan will be updated every 5 years or as required by DWR. The next deadline for UWMP submission is July 1, 2011. This deadline was extended by Senate Bill (SB) x7-7 (2009) which mandated the development and implementation of plans to decrease per capita urban water usage 20 percent by the year 2020.

The City of Coachella, DWA, and IWA each prepared and submitted a 2005 UWMP. MSWD also prepared a 2005 UWMP. Most of the MSWD service area is outside the 2010 WMP Update planning area but is within the Coachella Valley IRWMP region.

The 2010 WMP Update will be a primary source document for preparation of CVWD's next UWMP.

1.4.3 Mission Creek and Garnet Hill Water Management Plan

The Mission Creek and Garnet Hill subbasins of the Coachella Valley Groundwater Basin lie north of the Banning Fault and outside the area included in the 2010 Water Management Plan Update. CVWD and MSWD have public water systems that rely on groundwater from the Mission Creek and Garnet Hill Subbasins. CVWD and DWA have statutory authority to impose replenishment assessments on water produced from portions of the subbasins within their service areas that benefit from replenishment activities. MSWD was annexed to DWA in 1963. Since that time, land owners within MSWD's and DWA's boundaries have paid a SWP tax assessment for the capital and certain fixed operating costs of the SWP. As early as 1984, MSWD, CVWD and DWA held discussions about recharging the Mission Creek Subbasin and the facilities that would be required. In 2002, DWA completed construction of spreading basins and a turnout from the Metropolitan Colorado River Aqueduct (CRA) and water deliveries began. CVWD and DWA executed the Mission Creek Groundwater Replenishment Agreement in April 2003, which also allowed for storage of advanced deliveries from Metropolitan.

In October 2003, MSWD filed action in the Superior Court of the State of California against DWA seeking a writ of mandate, declaratory relief for prescriptive and appropriative water rights and declaratory and injunctive relief for a physical solution of a groundwater basin. MSWD sought adjudication of the subbasin and questioned the quality of the imported water. In

December 2004, MSWD, DWA and CVWD reached a settlement agreement to work jointly to manage the subbasin. The agreement included provisions regarding payment of Replenishment Assessment Charges (RAC), shared costs for basin studies and development of a Water Management Plan for the Mission Creek and Garnet Hill Subbasins. Development of the Mission Springs and Garnet Hill Water Management Plan was initiated in August 2009 and is expected to be completed in the Spring of 2011.

The development of the Mission Creek/Garnet Hill WMP is being closely coordinated with the 2010 WMP Update to ensure consistent planning assumptions and analyses.

1.4.4 Multiple Species Habitat Conservation Plan

The purpose of the Coachella Valley Multiple Species Habitat Conservation Plan (CVMSHCP) is to provide a regional approach to balanced growth that will help conserve the Coachella Valley's natural heritage and allow for economic development by providing comprehensive compliance with federal and state laws to protect endangered species. The CVMSHCP permanently conserves 240,000 acres of open space and 27 threatened plant and animal species across the Coachella Valley. It allows for more timely construction of infrastructure essential to improving the Coachella Valley. The CVMSHCP was prepared by the Coachella Valley Association of Governments (CVAG) and the Coachella Valley Mountains Conservancy. Current signatories to the CVMSHCP include Riverside County, the cities of Cathedral City, Coachella, Indian Wells, Indio, La Quinta, Palm Desert, Palm Springs, Rancho Mirage, CVWD and Imperial Irrigation District (IID). The Coachella Valley Conservation Commission (CVCC), a joint powers authority of elected representatives, oversees and manages the CVMSHCP. The CVCC has no regulatory powers and no land use authority. Its primary purpose is to buy land from willing sellers in the conservation areas and to manage that land. The Plan will provide 75 years of habitat mitigation for CVWD activities. For participation in the Plan, CVWD will conserve lands in areas designated for conservation, and will also create additional habitat acreage.

Mitigation requirements for the creation of replacement habitat in the 2002 WMP PEIR have been incorporated into the CVMSHCP. The conservation areas defined in the CVMSHCP have been considered in developing the growth forecasts and water demand projections for the planning area of the 2010 WMP Update. In addition, the habitat replacement commitments have been included in the implementation program for the 2010 WMP Update.

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Section 2
The 2002 Water Management Plan

Adoption of the 2002 WMP represented a major change in water management for the Coachella Valley. While past water management practices had been vital for the economic growth of the Valley, the 2002 WMP provided a road map for meeting future water needs. CVWD, DWA and the other Coachella Valley agencies have been successful in implementing many of the recommendations and projects included in the 2002 WMP. The primary successes have been in the areas of urban water conservation, acquisition of additional State Water Project (SWP) supplies, construction of the initial phase of the Mid-Valley Pipeline (MVP) and construction of the Thomas E. Levy Groundwater Replenishment Facility (Levy facility). CVWD has worked cooperatively with Riverside County, the Coachella Valley cities and water agencies and the Coachella Valley Association of Governments (CVAG) to develop a Valley-wide landscape ordinance to conserve water. Many of the local governments in the Valley have adopted the ordinance. CVWD also implemented a replenishment assessment charge (RAC) on pumping for the lower Whitewater River subbasin which generates funds for groundwater replenishment activities. Although much remains to be done to eliminate groundwater overdraft, significant progress has been and continues to be made. This section describes the 2002 WMP and the status of implementation of that Plan.

2.1 ALTERNATIVES

The goal and objectives of the 2002 WMP are stated in Section 1. During preparation of the 2002 WMP, CVWD and its consultants identified a wide range of potential management elements that could potentially be included in a plan. These elements were organized in six categories: pumping restrictions, demand reduction (conservation), local water sources, imported water sources, water management actions, and water quality. Following evaluation for ability to reduce overdraft, technical feasibility, potential environmental impacts, costs, legal and regulatory factors and regional economic impacts, the elements were screened and combined into four management alternatives. A preferred alternative was selected that best met the 2002 WMP goal and objectives.

Alternative 1 – No Project: The No Project Alternative assumed continuation of water management actions at 2002 levels by CVWD including groundwater recharge in the West Valley; supplying Canal water to existing golf courses and agricultural users and to all new agricultural users and new golf courses within ID-1; supplying excess recycled wastewater effluent beyond percolation capacity to area golf courses; and domestic, golf course, and agricultural water conservation.

Alternative 2 – Pumping Restriction by Adjudication: Alternative 2 assumed court-ordered restrictions that allotted water to individual groundwater pumpers. The allocation would require groundwater pumping be drastically reduced throughout the Coachella Valley. West Valley pumping would be reduced by approximately 35 percent, while in the East Valley pumping would be reduced by approximately 75 percent.

Alternative 3 – Management of Demand and Maximization of Local Resources: Alternative 3 maximized the use of available local water resources and managed water demand while maintaining imported water usage at 2002 levels. Demand would be managed, to the extent practical, by maximizing water conservation for both urban and agricultural uses and by the increased use of recycled water.

Alternative 4 – Combination Alternative: Alternative 4 included conservation, groundwater recharge, and source substitution, including many new actions. The most feasible and cost effective management elements were combined to include:

- Urban, golf course, and agricultural conservation measures,
- Additional surface water supplies,
- Groundwater recharge in the West and East Valleys, and
- Numerous source substitution elements to reduce groundwater pumping, including:
  - Canal water to agricultural groundwater users within Improvement District 1 (ID-1),
  - Canal water for golf course irrigation within ID-1,
  - Additional recycled water to West Valley golf courses,
  - Desalted agricultural drain water for agricultural irrigation outside ID-1,
  - Recycled water for agricultural irrigation in East Valley,
  - Treated Canal water for urban uses within ID-1, and
  - Direct delivery of SWP exchange water for West Valley golf course irrigation.

Alternatives 1, 2, and 3 were found to have significant adverse social, economic, and environmental impacts to the Coachella Valley. Alternative 4 best met the 2002 WMP goal and objectives with the least adverse impacts and was selected as the preferred alternative.

2.2 RECOMMENDED PLAN

The 2002 WMP included water conservation, additional supply, source substitution, and groundwater recharge elements. These are described below.

2.2.1 Water Conservation

The primary focus of water conservation was on urban use, agricultural irrigation, and golf course irrigation. As shown in **Table 2-1**, water conservation measures were expected to decrease total water demand by approximately seven percent by 2015. Water conservation activities included in the Plan are described below.

Urban Conservation: Under the preferred alternative, the target was to reduce urban water demand by a minimum of 10 percent by 2010 and maintain this level of reduction through 2035, the 2002 WMP planning period. Existing and potential new water conservation measures to be evaluated included water efficient landscaping, water efficient plumbing, tiered or seasonal water pricing, public information and education programs, and policies to incorporate water conservation measures into future general plan updates and development policies adopted by Valley municipalities.

Table 2-1
Minimum Water Conservation Assumptions for the 2002 Preferred Alternative

Water Use Category	Minimum Conservation Target (Reduction from No Project Demand)
Urban (municipal/residential)	10 percent by 2010
Golf Courses:	
Existing in 1999	5 percent by 2010
Built after 1999 [1]	Case-by-Case
Industrial	Case-by-Case
Crop Irrigation	7 percent by 2015
Fish Farms	Case-by-Case
Duck Clubs	Case-by-Case
Greenhouses	Case-by-Case
Total Demand	7 percent

[1] Future golf courses were assumed to implement water conservation measures under No Project

Agricultural Conservation: Agricultural water conservation included evaluation of existing and new agricultural conservation measures, including efficient irrigation practices and on-farm water audits consisting of field-by-field review of practices with a confidential report to each irrigator on practices and recommendations for improving efficiency.

Golf Course Conservation: Proposed golf course water conservation included improved irrigation practices, golf course turf restrictions and establishing a maximum water allowance.

District Operating Policies: The 2002 WMP included an ongoing process to identify CVWD operating policies resulting in additional water savings or to make the use of Canal water more attractive to groundwater users.

Evaluation of Water Conservation Programs: CVWD's water conservation programs would be evaluated to determine the effectiveness of voluntary programs. Recommendations would be developed for improvement in specific areas, such as public education, ordinances, etc. Based on evaluation results, additional conservation measures would be considered by the CVWD Board.

2.2.2 Additional Water Supplies

The 2002 WMP proposed that CVWD and DWA obtain additional water supplies to help eliminate current and future overdraft. Sources of additional water included the Colorado River, the State Water Project, the Whitewater River, recycled water, water exchanges and transfers, dry year purchases, water development projects, and desalination.

Colorado River Water: CVWD, IID and Metropolitan, along with the State of California and the U. S. Department of the Interior (Interior), agreed on a formal Quantification Settlement Agreement (QSA) regarding their respective shares of Colorado River water. The QSA is described in more detail in **Section 4**.

The QSA was signed in October 2003, giving CVWD a total diversion of 459,000 AFY at Imperial Dam. After deducting conveyance losses, about 428,000 AFY was expected to be available for use in the Valley by 2026.

SWP 100,000 AFY Transfer: Prior to adoption of the 2002 WMP, CVWD and DWA had contracts with the State of California for a combined Table A Amount[1] of 61,200 AFY of SWP water. Under the SWP Transfer Project, CVWD and DWA would acquire 100,000 AFY of Metropolitan's SWP Table A Amount as a permanent transfer. Water obtained through this transfer would be exchanged for Colorado River water.

Additional Water Purchases: During wet years, CVWD and DWA would continue their current practice of purchasing Pool A, Pool B and interruptible water as available from other SWP contractors. In addition, CVWD and DWA would evaluate the purchase of water during dry years from programs like the Governor's Drought Water Bank based on supply availability and costs. The objective of these purchases and acquisitions along with the SWP Transfer was to achieve long-term average deliveries of 140,000 AFY from the SWP.

Recycled Treated Municipal Wastewater Effluent: Municipal effluent recycling would continue and increase by an additional 16,000 AFY by 2035.

Desalinated agricultural drain water: Agricultural drain water from the CVSC would be desalted to a quality equivalent to Canal water for irrigation use with an initial rate of 4,000 AFY by 2013, increasing to 11,000 AFY by 2023.

Recycled fish farm effluent: Recycling would continue at fish farms providing about 5,000 AFY for use by duck clubs and agriculture irrigation.

2.2.3 Source Substitution

Source substitution is the delivery of an alternate source of water to users pumping groundwater. Alternative sources of water in the Coachella Valley include recycled water from municipal wastewater treatment plants, Canal water, desalinated agricultural drain water, and SWP Exchange water delivered through the Coachella Canal.

Source substitution projects included conversion of existing and future golf courses from groundwater to Canal water, recycled water or SWP Exchange water, and conversion of agricultural irrigation and municipal use from groundwater to Canal water. A major project envisioned was the MVP that would convey SWP Exchange water from the Coachella Canal to golf courses in the Rancho Mirage-Palm Desert-Indian Wells area.

Approximately 30 percent of the municipal demand in the East Valley would receive treated Canal water from one or more water treatment plants. Total municipal usage of treated Canal water was projected to be about 32,000 AFY and would be phased in during the late 2020s and early 2030s.

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1 Each SWP contract contains a "Table A" exhibit which defines the maximum annual amount of water each contractor can receive, excluding certain interruptible deliveries. Table A Amounts are used by DWR to allocate available SWP supplies and some of the SWP project costs among the contractors.

2.2.4 Groundwater Recharge

Overall, groundwater recharge under the preferred alternative would increase. CVWD and DWA would initially recharge an average of 140,000 AFY SWP Exchange water the Whitewater River Recharge Facility. This volume would gradually be reduced to 103,000 AFY of SWP water as a portion of the SWP Exchange water is delivered to golf courses in the West Valley through the MVP for source substitution.

Approximately 80,000 AFY of Canal water would be recharged on average in the East Valley. This amount will be phased in over time at recharge facilities anticipated to be located near Dike No. 4 and in the Martinez Canyon area.

An ongoing groundwater monitoring program would continue to play an integral role in CVWD's understanding of the basin's response to different plan elements. CVWD/ U. S. Geological Survey (USGS) land subsidence studies would continue and include the construction of additional monitoring wells. CVWD would use groundwater data to assess individual plan elements and effectiveness in meeting the goal of the 2002 WMP.

2.3 ENVIRONMENTAL COMPLIANCE

Adoption of the 2002 WMP by the Board of Directors was an action subject to compliance with the California Environmental Quality Act (CEQA). CEQA compliance was achieved by preparing a Program Environmental Impact Report (PEIR). The PEIR presented the results of the technical and environmental analyses of the preferred alternative (Proposed Project) and other alternatives, and on-going input from stakeholders during development of the PEIR.

A programmatic approach was taken because the Proposed Project resulted in implementation of a set of policies and actions in a large geographic area over a 35-year period. The PEIR identified the environmental setting, environmental impacts of the Proposed Project (described at a program level), and mitigation measures included in the Proposed Project to reduce adverse effects.

The PEIR identified project impacts on the physical environment, surface water resources, groundwater resources, human or built environment, biological resources, including federal and state listed threatened and endangered species, and growth inducing impacts (MWH, 2002).

As a result of the review, impacts were classified as follows:

- Beneficial,
- Potentially significant,
- Less than significant with mitigation incorporated (identified in PEIR),
- Less than significant, and
- no impact

Almost all of the 2002 WMP impacts were determined to be less than significant with mitigation. Some impacts were considered beneficial, such as impacts on groundwater and surface water resources, land subsidence, and local water supply. The following potentially significant impacts also were identified in the PEIR:

- A potential increase in selenium in agricultural drains exceeding aquatic life criteria (to be monitored and mitigated, if required, in the future by creating replacement habitat with low selenium water)
- Groundwater quality impacts from recharge with Colorado River water were identified as significant and not mitigable; primarily (health-based) drinking water quality impacts on individual wells near recharge areas, including Indian Trust assets, would be addressed by providing alternative water supplies.
- Increase in the rate of Salton Sea salinization and the timing of fisheries impacts (to be mitigated by others as part of the Salton Sea Restoration Project).

The PEIR also identified cumulative impacts, i.e., impacts that result from implementation of the WMP and other ongoing planned projects, to surface waters, groundwater, the Salton Sea, and biological resources. Most cumulative impacts were determined to be less than significant, less than significant with mitigation, or beneficial.

It was recognized in the PEIR that implementation of certain WMP elements would be subject to additional CEQA compliance as those activities proceeded. This would include site-specific impacts of construction and operation of pipelines, pumping stations, recharge basins, wastewater treatment facilities, etc.

In September 2002, the CVWD Board of Directors certified the PEIR and adopted findings of fact that included a statement of overriding considerations and a Mitigation Monitoring and Reporting Plan (MMRP). Mitigation measures contained therein still stand.

2.4 WATER MANAGEMENT PLAN IMPLEMENTATION PROGRAM

In early 2004, CVWD initiated development of the Water Management Plan Implementation Program (CVWD, 2006). The Implementation Program was developed by CVWD staff, consultants, and a Stakeholder Task Force. The objective was to identify and prioritize projects, both ongoing and new, that were needed to achieve the goal and objectives of the 2002 WMP.

Stakeholders were involved in all aspects of development of the Program. The Stakeholder Task Force was made up of representatives from a broad cross-section of interests in the Coachella Valley including agriculture, golf courses, municipalities, homeowners associations, tribes, Riverside County, California Regional Water Quality Control Board – Colorado River Basin Region (Regional Board) CVAG, building industry, Salton Sea Authority, and League of Women Voters. The Task Force developed recommendations and priorities for implementation of urban, agriculture, and golf course conservation and special projects. Project summaries and detailed project descriptions were reviewed by the stakeholders, including staffing and cost estimates.

Stakeholder recommendations formed the basis of the Implementation Program. A summary of the stakeholder recommendations is provided below:

1. The stakeholders recommended initiation, continuation, or expansion of 53 short-term projects to achieve the goals of the 2002 WMP.
2. In the event that the Program cannot be fully implemented in the near-term, the CVWD Board should implement the Program in accordance with priorities recommended by the Task Force.
3. The CVWD Board should consult with the four stakeholder teams and the Task Force as a whole as it evaluates the recommendations of the Task Force.

The CVWD Board accepted the stakeholder's recommendations in January 2006. Priorities recommended by the stakeholders for these projects are considered in developing annual and long range budgets. CVWD conducts ongoing reviews of the staffing and costs of the various projects recommended by the stakeholders. Schedule and budgets for projects are adjusted by CVWD management and the Board each year based on available funds.

2.5 STATUS OF 2002 WMP IMPLEMENTATION

The 2002 WMP incorporated many ongoing activities, expanded those activities, and added a number of new activities to insure achievement of the 2002 WMP goal and objectives. The 2002 WMP set forth time frames for achievement of the goal, objectives, and activities. Major accomplishments are summarized below. A detailed listing of activities and accomplishments is provided in **Table 2-2** below.

Water Conservation: Urban water use in 2009 was 14 percent less per customer than in 2003 and has shown a steady downward trend since 2003. Based on a review of available water usage data, Coachella Valley urban water users appear to have exceeded the 10 percent objective established in the 2002 WMP. CVWD's implementation of tiered water rates in conjunction with a valley-wide landscape ordinance in 2009 will likely contribute to exceeding this target in the future.

The 2002 WMP established a target of 7 percent agricultural water use reduction through conservation. In order to comply with the QSA and the U. S. Bureau of Reclamation's (Reclamation) Inadvertent Overrun and Payback Policy (IOPP), Coachella Valley farmers implemented a number of extraordinary water conservation measures. Based on a comparison with 2000-2002 average water use per acre, agricultural water usage has varied from 2003 to 2008, but has generally declined about 9.9 percent. While this estimate may be high due to weather variations, crop water needs, accuracy of reported groundwater production, and variation in cropping patterns, it does indicate a significant decrease in agricultural water use over the period. Implementation of these measures allowed CVWD to complete its IOPP 72,000 AF payback requirement two years early.

Actual golf course water use per irrigated acre in the West Valley appears to have declined about 14 percent compared to the 2000-2002 average. Available data for East Valley courses is not adequate to determine the conservation level achieved.

CVWD has appointed an urban/golf course water conservation coordinator and centralized its conservation staff. Nine staff members are assigned to this substantial effort.

Additional Water Supplies: The QSA was signed in 2003 and provides substantial guarantees regarding existing water sources and substantial additional supplies to CVWD. A number of agreements to implement the QSA have been completed, resulting in transfer of substantial qualities of water to CVWD (see **Table 2-2**). CVWD and DWA continue to develop additional supplies through purchase of SWP water from other contractors. Since 2002, those purchases have provided an additional 32,900 AFY for a total Table A Amount of 194,100 AFY. Other purchases are implemented on a short term basis as opportunities arise. Municipal wastewater treatment plant recycling is currently 14,000 AFY and is expected to increase substantially in the future. A pilot study for use of desalinated agricultural drain water for agricultural purposes was completed in 2008.

Source Substitution: Canal water use on East Valley golf courses increased from 6,100 AFY in 1999 to 14,900 AFY in 2009. Phase 1 of the MVP has been completed and plans are underway for completion of additional phases to deliver 37,000 AFY of Canal water and 15,000 AFY of recycled water to West Valley golf courses in lieu of groundwater pumping. A treatability study for municipal use of Canal water was completed in 2007. Agreements were reached with several developers regarding installation of non-potable water systems for landscape irrigation. Plans are being developed for conversion of additional East Valley agriculture to Canal water where feasible.

Groundwater Recharge: Recharge continues with available SWP Exchange water deliveries at the Whitewater River Recharge Facility in the West Valley. In the East Valley, the Thomas E. Levy Groundwater Replenishment (Levy) Facility at the Dike 4 site was completed in 2009 with 18,500 AFY of recharge accomplished. The facility can currently recharge about 32,500 AFY and will have a capacity of 40,000 AFY with construction of additional water conveyance facilities. A pilot project was completed for the Martinez Canyon Recharge Facility in 2008 and about 3,000 AFY of recharge is underway at that facility.

Groundwater/Subsidence Monitoring Program: Monitoring of stream flow, groundwater production, groundwater levels, and water quality continues. The USGS completed subsidence reports in 2001 and 2007. Monitoring for subsidence is ongoing.

Numerous activities are being conducted to assure achievement of the 2002 WMP goal and objectives and many of these activities have made substantial progress since 2002. Details of these activities are provided in **Table 2-2.**

Table 2-2
Status of the 2002 Water Management Plan Implementation

1. WATER CONSERVATION	
A. Municipal Conservation	
Large Landscape Customers	**Has This Program or Project Been Implemented?**
Low-Interest Loans to Implement Water Conservation Programs	No – A CVWD Board resolution was adopted but no applications received
Initiate Professional Landscaper Certification Program	Yes – Quarterly seminars
Water Audits for Large Water Users	Yes
Adoption of Water Efficient Landscape Ordinance by Valley Cities	Yes - Most cities adopted 2007 CVWD ordinance or something more stringent. Revised ordinance adopted by CVWD Board in 2009. All cities and the County are expected to adopt 2009 ordinance.
Large Landscape Weather-Based Irrigation Controller Rebate Program	Yes – 97 customers. This represents about 10% of CVWD customers.
Large Site Curbside Sprinkler Retrofit Rebate Program	Yes – Two pilot projects. New development complies with 2009 Landscape Ordinance.
Plan Check Compliance Inspections of All Approved Landscape Irrigation Plans	Yes
Residential Customers	**Has This Program or Project Been Implemented?**
Generate Residential ETo Zone Map	Yes – Used for tiered rates and maximum applied water allowance in Landscape Ordinance
Residential Weather-Based Irrigation Controller Rebate Program	Yes – Existing customers. Required for all new development via Landscape Ordinance
Residential Curbside Sprinkler Retrofit Rebate Program	Yes - A pilot project consisting of 10 houses on a cul-de-sac. Reduced street runoff by a total of 55 gpm when sprinklers were running.
Generic Landscape Irrigation Schedule Sticker Program	Yes
Website Turf Grass Irrigation Scheduling Program	Yes
Turf buyout partnership with cities of La Quinta and Palm Desert	Yes – new program not included in 2002 WMP.
Water Efficient Plumbing	**Has This Program or Project Been Implemented?**
Water efficient plumbing is installed in all new homes.	Yes – Implemented via building codes.
Retrofit of existing fixtures with water efficient fixtures	No – Emphasis has focused on reducing outdoor water use.
Tiered or Seasonal Water Pricing	**Has This Program or Project Been Implemented?**
Tiered water pricing will be reviewed as part of the 2008 Water Management Plan update.	Yes– Implemented in 2009

Table 2-2 (continued)
Status of the 2002 Water Management Plan Implementation

1. WATER CONSERVATION (continued)	
Municipal Development Policies	**Has This Program or Project Been Implemented?**
Adoption of Water Efficient Landscape Ordinance by Valley Cities	Yes - Most cities and Riverside County adopted 2007 ordinance or something more stringent. Revised ordinance adopted by CVWD Board in 2009. All cities and the County are expected to adopt 2009 ordinance.
Maximum Water Allowance	**Has This Program or Project Been Implemented?**
Establish new and enforce existing annual maximum applied water allowances for parks, playgrounds, sports fields, school yards, and other recreational areas.	Yes - Program is implemented through adoption of the Water Efficient Landscape Ordinance by local municipalities. It is enforced/monitored via the tiered rate program which establishes customized water budgets for customers
Conservation Coordinator	**Has This Program or Project Been Implemented?**
Hire a full-time water conservation coordinator and support staff to develop and coordinate water conservation plans.	Yes - A full time coordinator has been hired with nine full time staff. Staff has been reorganized to centralize urban and golf course water conservation activities.
Public Information and Education Program	**Has This Program or Project Been Implemented?**
Lush and Efficient: Guide to Coachella Valley Landscape Gardening	Yes – available on CVWD website.
Demonstration Garden	Yes – 2 at CVWD, 1 at City of Palm Desert,
Landscape Workshops	Yes – 2 per year for home gardeners and landscape professionals
Educate staff and public regarding Water Management Plan	Yes. Via WMP Update process
Expanded Water Education Program for Residential Users	Yes – Landscape workshops and self audit form on website, publications: “Water Wise at Home”,
Add Water Conservation Page(s) to District Website	Yes - www.cvwd.org/conservation/conservation.php
School Education Program	Yes – The Water Wheel has been published 2-3 times per year since 2005, providing educators with water science information. Water Fun 4 Kids Website: http://www.waterfun4kids.org/
B. Agricultural Conservation	
Activity	**Has This Program or Project Been Implemented?**
Scientific Irrigation Scheduling	Yes
Scientific Salinity Management	Yes
Farm Uniformity Evaluations	Yes
On-Farm Audits – Confidential field by fields reviews	No. Not needed to achieve targets.

Table 2-2 (continued)
Status of the 2002 Water Management Plan Implementation

1. WATER CONSERVATION (continued)	
C. Golf Course Conservation	
Activity	**Has This Program or Project Been Implemented?**
Apply 2009 Landscape Ordinance to new golf courses. Reduce demand at new courses by 25%.	Yes - 2007 and 2009 Landscape Ordinances apply turf limits to new golf courses.
Soil Moisture Monitoring Services	No
Plan Checking: Adjust Recreational Turf Grass Plant Factor/Develop Turf Grass Prescriptive Criteria	Yes
Inspect New Golf Courses for Plan Check Compliance following construction	No
Monitoring of Maximum Water Allowance Compliance	Yes – CVWD staff is evaluating monthly water use and developing monthly water budgets based on reported groundwater pumping.
Annual Golf Symposium to promote golf course water conservation	Yes – 2008 and 2009
D. District Operating Policies	
Activity	**Has This Program or Project Been Implemented?**
Review and identify policies that 1) result in additional water savings, and 2) make the use of Canal water more attractive to groundwater users	Replenishment assessment charge (RAC) established in the East Valley to recover replenishment costs. The RAC provides an economic incentive to use Canal water.
E. Evaluation of Water Conservation Programs	
Activity	**Has This Program or Project Been Implemented?**
Evaluate Water Conservation Programs	Yes - In 2006-2007, CVWD staff and stakeholders representing cities, tribes, water agencies, resource agencies, agriculture, golf, homeowners, and other interest groups reviewed and prioritized all water conservation programs and prepared a recommended Implementation Program (I. P.) to guide project development. The Board adopted the I. P. as a guideline in March, 2006. The I. P. is used to help formulate annual budgets. Most of the programs are either underway or complete, as indicated in this report.
2. ADDITIONAL WATER SUPPLIES	
A. Colorado River Water	
Activity	**Has This Program or Project Been Implemented?**
Maintain 330,000 AFY base allotment	Yes
1988 Metropolitan/IID Approval Agreement for 20,000 AFY	Yes
IID Transfer of 50,000 AFY to CVWD	Agreement completed in 2003. 12,000 AFY to be transferred in 2010.

Status of the 2002 Water Management Plan Implementation

2. ADDITIONAL WATER SUPPLIES (continued)	
IID Transfer of additional 53,000 AFY to CVWD	Agreement completed in 2003.
Metropolitan SWP Transfer: 35,000 AFY to CVWD	Agreement Completed in 2003. Water is available for use anywhere in the Valley.
B. SWP Exchange Water	
Activity	**Has This Program or Project Been Implemented?**
Utilize existing SWP Table A Amount of 61,200 AFY (average supply of about 50,000 AFY)	Yes – Ongoing but current SWP reliability has declined to 60% (average supply = 36,700 AFY).
Use spot purchases of Pool A, B, and Interruptible water as available	Yes -Implemented as opportunities arise. Purchased more than 6,100 AF since 2002.
Maintain level of SWP Exchange water at 140,000 AFY (excluding the 35,000 AFY SWP transfer under the QSA)	No. Total deliveries averaged 80,600 AFY since 2002 due to California drought.
C. SWP Transfer Project	
Activity	**Has This Program or Project Been Implemented?**
Acquire 100,000 AFY of Metropolitan's SWP Table A Amount as a permanent transfer and exchange for Colorado River water	Yes. Transfer completed in 2003.
D. Future Water Acquisitions	
Activity	**Has This Program or Project Been Implemented?**
Develop additional supplies that could include other SWP water acquisitions, other water transfers, or participation in out-of basin water development projects	Implemented as opportunities arise. Completed: • Tulare Lake (2004): 9,900 AFY • Berrenda Mesa WD (2007): 16,000 AFY • Tulare Lake (2007): 7,000 AFY • Rosedale Rio Bravo: 10,000 AF (one time)
Purchase water during dry years from programs like the Governor's Drought Water Bank	Implemented as opportunities arise • Yuba Accord Dry Year Water Purchase Program – 1,836 AF in 2008, 3,482 AF in 2009
E. Recycled and Desalinated Drain Water	
Activity	**Has This Program or Project Been Implemented?**
Treated Municipal Effluent	Yes – Municipal recycling for non-potable use is currently 13,100 AFY from four plants: Palm Springs WRP, WRP 10, WRP 9, and WRP 7. About 9,000 AFY is percolated.
Desalinated Agricultural Drain Water	Yes – Pilot treatment study completed in 2008
3. SOURCE SUBSTITUTION	
Activity	**Has This Program or Project Been Implemented?**
Conversion of East Valley golf courses to Canal water use to serve additional golf courses in ID-I	Yes - Ongoing - Use has increased from 6,100 AFY in 1999 to 14,900 AFY in 2009.

Table 2-2 (continued)
Status of the 2002 Water Management Plan Implementation

3. SOURCE SUBSTITUTION (continued)	
West Valley golf course conversion to recycled water and Canal water	Phase 1 of MVP completed in 2008. Additional phases planned to deliver 37,000 AFY of Canal water and 15,000 AFY of recycled water to up to 50 golf courses. Delivered 9,000 AFY in 2009.
Conversion of existing East Valley agriculture to Canal water	Developing two irrigation system expansion projects which will be funded by assessment districts; will deliver 5,300 AFY of Canal water when complete.
Conversion of municipal use to Canal water	Pilot treatability study completed in 2008.
4. GROUNDWATER RECHARGE	
Activity	**Has This Program or Project Been Implemented?**
Whitewater River Recharge Facility: The recharge objective is 140,000 AFY in the West Valley, reducing to 103,000 AFY with implementation of the MVP.	Yes - The ability to meet the recharge objective has improved by additional purchases of Table A water but is limited by current SWP supply reliability. Recharge operations ongoing.
East Valley Recharge Facilities: Thomas E. Levy Groundwater Replenishment Facility (formerly Dike 4)	Yes - Project completed in 2009 and recharged 18,600 AFY. Currently recharging 32,000 AFY on average. May need additional pumping station and pipeline to achieve full capacity of 40,000 AFY capacity.
East Valley Recharge Facilities: Martinez Canyon Recharge	Pilot project completed in 2005. Recharging 2,500 AFY on average since 2005.
5. GROUNDWATER/SUBSIDENCE MONITORING PROGRAM	
Activity	**Has This Program or Project Been Implemented?**
Monitoring of groundwater production, levels and water quality in the valley	On-going
Monitoring of potential salt water intrusion from the Salton Sea, including construction of additional multi-level wells	On-going
CVWD/USGS land subsidence monitoring program in the valley	On-going - Initial USGS subsidence report in 2001; follow up report in 2007; monitoring ongoing
Periodic review of monitoring data to determine impacts of Water Management Plan; status of basin levels and quality	On-going - Too early to see significant regional change. Local changes observed in vicinity of La Quinta due to Levy facility operations.
Incorporation of new information into the groundwater model to enhance the model in predicting trends and impacts of management actions	No – Changes in water level data did not justify recalibration of model. Future activity.

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Section 3
Water Demand Projections

Water resources planning requires reasonably accurate estimates of future water needs. Many factors can affect the amount of water required in the future including climate, existing water use patterns, population growth, employment, economic trends, environmental needs and water conservation efforts, to name a few. To provide an adequate long-range view of future water needs, the 2010 WMP Update uses a 35-year planning period from 2010 through 2045. This section also describes the changes in the study area for this 2010 WMP Update since the adoption of the 2002 WMP and presents the projected water demands through 2045 for the Coachella Valley.

3.1 FACTORS AFFECTING FUTURE WATER DEMANDS

Since the adoption of the 2002 WMP, the Coachella Valley has experienced a number of changes that will affect future water demands. These changes include:

- Rapid population growth,
- Changes in land use,
- Development on Tribal land,
- Potential development outside the 2002 WMP Study Area, and
- Effects of the economic recession.

These changes are discussed below.

3.1.1 Revised Growth Forecasts

In 2005, Riverside County was experiencing rapid growth. Recognizing the need for more accurate growth forecasts, the Riverside County Center for Demographic Research (RCCDR) was established under the joint efforts of the County of Riverside, the Western Riverside Council of Governments (WRCOG), the Coachella Valley Association of Governments (CVAG), and the University of California Riverside for the development of demographic data and related support products to serve all of Riverside County. The RCCDR was tasked with developing the Riverside County Projections 2006 (RCP-06) growth forecasts.

The RCP-06 was developed to provide County agencies and departments, the councils of governments, the universities and other entities with a consistent and standard set of population, housing and employment forecasts. In addition, a major objective for developing RCP-06 was to provide the Southern California Association of Governments (SCAG) with a set of projections for inclusion in their regional growth forecasts. The RCP-06 was approved by the Executive Committee of WRCOG on December 4, 2006, the Executive Committee of CVAG on January 29, 2007, and by the Riverside County Board of Supervisors on March 14, 2007.

The forecast was prepared in five-year increments for the period of 2005 through 2035. Because the RCP-06 is the primary source of growth forecasts for the Valley, the 2010 WMP Update uses these forecasts for estimating future water demands as discussed in **Section 3.2**.

3.1.2 Land Use Changes

Although the revised growth forecasts indicated significant future growth for the Coachella Valley, these forecasts were based on potential development that had not yet been approved by the cities and the County. The Riverside County Integrated Plan (RCIP), the County's General Plan, was adopted in 2003. The original intent of the RCIP was to conduct a formal review and update every five years. The Riverside County Planning Department is updating the General Plan (Riverside County, 2010). The General Plan Update includes an examination of land use policies for the Vista Santa Rosa (located in City of Indio, west of Highway. 86 around 58th Avenue) and South Valley Regions (area between Salton Sea and City of Coachella) of the Eastern Coachella Valley. These areas are subjected to substantial development pressure, transitioning from agricultural to urban land uses.

As agricultural land converts to urban uses, the characteristics of its water demands and infrastructure will change. The 2010 WMP Update therefore reflects these changes in its water demand projections and the ways that water is used in this area. As urban development occurs, land that currently is irrigated with untreated Coachella Canal water could begin using groundwater, increasing future overdraft, or could use treated Canal water for indoor use and untreated Canal water for outdoor use, reducing future overdraft.

3.1.3 Development on Tribal Land

There are over 56,000 acres of Tribal land in the Coachella Valley. While much Tribal land in the West Valley has been developed to varying degrees, a substantial amount of Tribal land in the East Valley is largely undeveloped. Total tribal land ownership in the East Valley is approximately 26,400 acres. An understanding of the timing and degree of development on Tribal lands is important. All of the Coachella Valley tribes have developed one or more casinos, which have provided them important economic opportunities. As development continues in the Valley, it is expected that additional growth will occur on the remaining Tribal lands. For example, the Torres-Martinez Tribe has prepared a land use plan that projects residential, commercial, industrial, agricultural, aquacultural, recreational, and wetlands land uses (Torres-Martinez Planning Department website, 2010). This development in the Torres-Martinez plan is not currently included in the Riverside County growth forecasts. The Torres-Martinez tribe conducted a water and wastewater feasibility study in 2007, which indicated an existing potable water demand of 740 AFY and a projected potable water demand of 2,500 AFY in 2027 (Infrastructure Engineering Corporation, 2007).

In the incorporated portions of the Valley, development of Tribal land is closely coordinated with the cities in which those lands are located. Consequently, Riverside County growth forecasts are assumed to include development of these lands as part of the growth forecasts for the cities. It is assumed that development occurring on Tribal land lying outside of city boundaries will be at the same rate as for the Valley as a whole and land uses will be proportional to the land uses that occurs on non-Tribal land in the East Valley.

3.1.4 Development outside the 2002 WMP Study Area

The original study area for the 2002 WMP was the land area on the valley floor that overlies the Whitewater River and Garnet Hill subbasins and lands that receive water supply from this area. The San Andreas fault was the northeasterly boundary of the study area. The water demands of CVWD service areas in Riverside and Imperial Counties on either side of the Salton Sea (Area 23 and Improvement District 11) were included in the original study area since these areas were already being served by groundwater from the Whitewater River Subbasin. These areas are similarly included in the 2010 WMP Update study area.

In 2002, there were no plans for significant development northeast of the San Andreas fault prior to 2035, except in the Desert Hot Springs area that overlies the Mission Creek Subbasin and is the subject of a separate water management plan. Consequently, the 2002 WMP assumed that any development outside the study area would provide additional water supplies needed to meet the additional demands and would not add to the overdraft of the Whitewater River Subbasin.

In recent years, the cities of Indio and Coachella have both annexed land and expanded their spheres of influence (SOI) to include land northeast of the San Andreas fault. Several large developments have been proposed for this area including Citrus Ranch, Dillon Trails, Inner Beauty (Indio Hills) and Stonewater within the Indio SOI and Desert Lakes and Lomas del Sol within the City of Coachella. Planning efforts are underway to define appropriate land uses in these areas.

Agreements have been developed among CVWD, Indio and Coachella regarding water service within these areas. Citrus Ranch is a 1,200 acre development located west of Dillon Road located within the City of Indio's SOI but outside of the Whitewater River Subbasin. The development includes several residential neighborhoods with up to 3,100 dwelling units, a hotel, golf course and community center. In October 2008, CVWD and the City of Indio agreed to settlement terms of a lawsuit regarding the potential impact that the proposed Citrus Ranch development would have on groundwater supplies in the Coachella Valley. The settlement agreement provides for the developer to pay $5.6 million to mitigate the impact of the development on groundwater supplies (CVWD, 2008). In August 2009, CVWD and the City of Coachella signed a Memorandum of Understanding (MOU) regarding developments within that city's SOI that are located outside the Whitewater River Subbasin. Under the terms of the MOU, the City of Coachella will participate in funding CVWD's acquisition of supplemental supplies to offset the demands associated with the newly approved development within the City's SOI. Under the August 2009 settlement agreement (Replenishment Assessment Charge litigation), CVWD and the City of Indio agreed to work cooperatively to mitigate impacts on water supplies associated with new developments within the Indio Water Authority (IWA) service area.

Based on these settlement agreements and MOUs, the 2010 WMP Update study area has been expanded to include those portions of the SOIs and corporate boundaries of Indio and Coachella that lie northeast of the San Andreas fault. In addition, any land within this area that is not within the current SOIs of Indio and Coachella, but outside of the designated CVMSHCP conservation areas, will be included in the study area for demand projections. However, the areas currently within the service areas of CVWD and Mission Springs Water District (MSWD) that are northeast of the San Andreas/Banning fault are not included in the 2010 WMP Update study area. These areas are included in the Mission Creek and Garnet Hill Water Management Plan that is under development.

3.1.5 Effects of Recession on Growth Forecasts

As described earlier, the 2010 WMP Update uses population estimates developed by the RCCDR (RCP-06) for long term planning. There was a rapid population increase in the Coachella Valley in the early 2000s; the population in the Valley has increased by 35 percent since 2000. The RCP-06 estimates that the annual growth rate for Riverside County as a whole will be four percent per year between 2005 and 2035.

Since late 2007, Riverside County has been negatively affected by the current economic recession and has experienced some of the highest rates of foreclosures and unemployment in the country. Due to this economic downturn, growth in the County has significantly moderated over the last two years. The RCP-06 growth forecasts were developed and adopted in late 2006 and early 2007, before the onset of the widespread recession. Therefore, the slowdown in the housing market, which was one of the primary components of the recession, is not accounted for in the RCP-06 forecasts.

Some economists and real estate professionals who have been studying the effects of the recession on Riverside County predict that economic recovery in the County will be slow paced over the next five years (Beacon-UCR, 2010). This could result in lower than projected growth rate for the Valley in the near term. The timing and extent of this reduced growth rate cannot be accurately predicted. Because the planning period for the 2010 WMP Update is 35 years (through 2045), it is expected that the effect of the recession on growth in the Valley will attenuate over the long term. Changes in the growth forecast will be reflected in future plan updates. For the purpose of this Update, it is assumed that the RCP-06 growth forecasts are applicable. However, implementation of some plan elements may be deferred until growth resumes.

3.2 POPULATION AND LAND USE FORECASTS

The RCP-06 population forecast forms the basis for urban land use and water demand projections used in the 2010 WMP Update. A detailed description of the population projection used for the 2010 WMP Update is presented below.

3.2.1 Population Forecasts

The 2002 WMP was based on growth forecasts developed by SCAG for the Coachella Valley in 1998. From 2000 through 2007, the Coachella Valley experienced rapid growth and corresponding conversion of agricultural land and vacant desert land to residential and urban development. Growth has occurred predominantly in the cities of La Quinta, Palm Desert, Indio and Coachella with additional development in unincorporated portions of the Valley. The following observations are made regarding growth in Valley cities from 2000 to 2010 based on the 2010 California Department of Finance (DOF) population estimates:

- The lowest growth rate of about 14 percent was observed in the City of Palm Springs.
- The highest growth of approximately 88 percent from 2000 to 2010 was observed in the cities of La Quinta and Coachella.
- The City of Indio experienced a 73 percent growth from 2000 to 2010.

According to RCP-06 estimates, there were approximately 366,500 permanent residents living in over 175,500 households in the Valley in 2005 (Riverside County, 2006). Approximately 49 percent of the population was located within the East Valley (from Indio to the Salton Sea) and 51 percent was located in the West Valley (Palm Springs to Indio). About 91 percent of Valley residents lived in one of the nine incorporated cities, while the other nine percent lived in unincorporated portions of the Valley. Cathedral City and Indio were the two largest cities, each with a population exceeding 50,000 residents.

The RCP-06 population projections for the Coachella Valley extend to 2035. These projections were extrapolated to 2045 for the 2010 WMP Update based on the growth rate presented in the RCP-06 projection. The resulting projection is presented in **Table 3-1**. **Figure 3-1** presents a comparison of population projections by source. As shown on the figure, the extrapolated RCP-06 population projection for 2045 is about 80 percent higher than the projection used in the 2002 WMP as extrapolated to 2045.

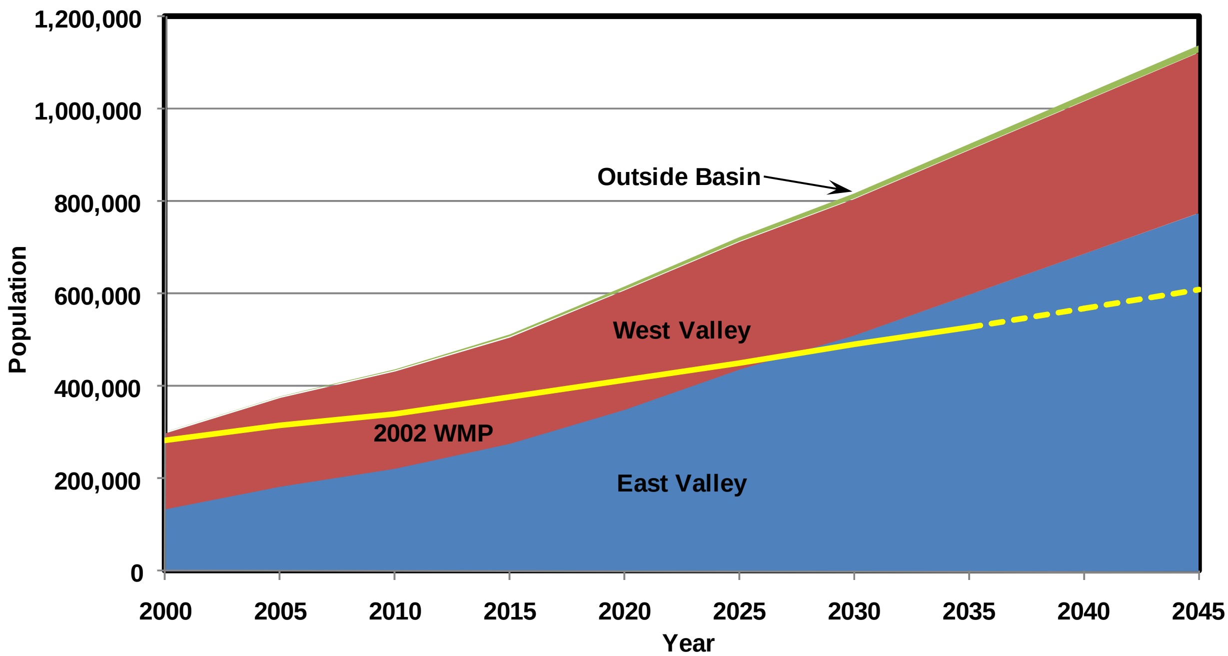
The RCP-06 population estimates for the area outside the Whitewater River Subbasin boundary are shown in **Table 3-1**. As seen in the table, the RCP-06 does not identify significant growth in this area. A section-by-section analysis was performed to estimate the amount of potentially developable land outside the Whitewater River Subbasin boundary (MWH, 2009). Based on this analysis, about 20,000 acres of land outside the Whitewater River Subbasin boundary was identified as potentially developable. Water demand projections based on this estimate are presented in **Section 3.3**. The estimated area of developable land and the RCP-06 population estimate for this area outside the Whitewater River Subbasin boundary are not in agreement. Consequently, water demand projections presented in **Table 3-2** would be much lower if they were based solely on the RCP-06 population. For planning purposes, the water demands for this area are calculated on the basis of potentially developable land, which results in a conservatively higher demand. CVWD, Indio and Coachella will monitor growth in this area and make necessary adjustments to the projections in future WMP updates as needed.

Table 3-1
Population Projections for the Coachella Valley

City	2000	2005	2010	2015	2020	2025	2030	2035	2040 [1]	2045 [1]
East Valley										
Bermuda Dunes	3,474	4,167	5,590	6,302	8,138	8,292	9,153	10,021	10,890	11,759
Coachella	22,781	33,267	45,448	57,708	70,864	83,663	96,571	110,195	123,818	137,442
Indio	49,116	69,479	77,967	86,887	93,115	99,477	105,873	112,019	118,166	124,313
La Quinta	23,929	37,564	45,272	50,049	52,923	54,788	56,439	57,937	59,435	60,933
Mecca	5,402	6,107	7,341	8,855	18,490	44,674	63,367	77,243	91,119	104,995
Unincorporated	22,475	24,107	29,538	52,381	91,512	130,275	163,111	215,140	267,169	319,197
Imperial County Area [2]	8,986	9,977	12,311	15,003	15,685	16,137	16,373	16,411	16,581	16,718
Sub-Total	**136,163**	**184,668**	**223,467**	**277,184**	**350,726**	**437,306**	**510,886**	**598,966**	**687,178**	**775,357**
West Valley										
Bermuda Dunes	2,630	3,138	4,125	4,761	5,997	6,071	6,606	7,304	8,003	8,701
Cathedral City	42,647	51,302	55,746	60,293	65,221	69,431	74,052	76,837	79,622	82,407
Indian Wells	3,992	4,864	5,309	5,708	6,026	6,311	6,524	6,712	6,900	7,088
Palm Desert	44,265	49,842	54,437	59,588	64,860	67,204	70,303	73,131	75,959	78,787
Palm Springs	42,807	46,416	49,182	52,349	56,228	60,440	65,343	70,796	76,250	81,763
Rancho Mirage	13,249	16,686	18,984	22,585	26,764	32,096	32,541	32,846	33,150	33,455
Thousand Palms	5,103	5,722	6,695	7,028	11,753	13,202	16,224	18,518	20,812	23,107
Unincorporated	9,323	13,824	15,552	17,300	20,983	21,089	23,201	25,737	28,272	30,808
Sub-Total	**164,016**	**191,793**	**210,030**	**229,611**	**257,834**	**275,844**	**294,794**	**311,881**	**328,968**	**346,115**
Area Outside Whitewater River Subbasin Boundary [3]	491	636	2,201	4,172	6,379	8,476	10,585	12,146	13,706	15,267
TOTAL	**300,670**	**377,097**	**435,698**	**510,967**	**614,938**	**721,626**	**816,266**	**922,994**	**1,029,912**	**1,136,739**

1. Growth forecasts for 2040 and 2045 are extrapolated based on growth rate trends through 2035.
2. Imperial County population from SCAG 2008 Regional Transportation Plan projections for Imperial County by census tract.
3. Population for the area outside the Whitewater River Subbasin is based on an evaluation of population growth by census tract using the RCP-06 projection.

Figure 3-1
Comparison of Population Projections
for the Coachella Valley



2002 WMP – Coachella Valley Water Management Plan completed in 2002 – projections based on 1998 SCAG data. Data beyond 2020 are extrapolated.
2006 RCCDR – Riverside County Center for Demographic Research population projections adopted by CVAG in 2006. Data beyond 2035 are extrapolated.

3.2.2 Land Use Forecasts

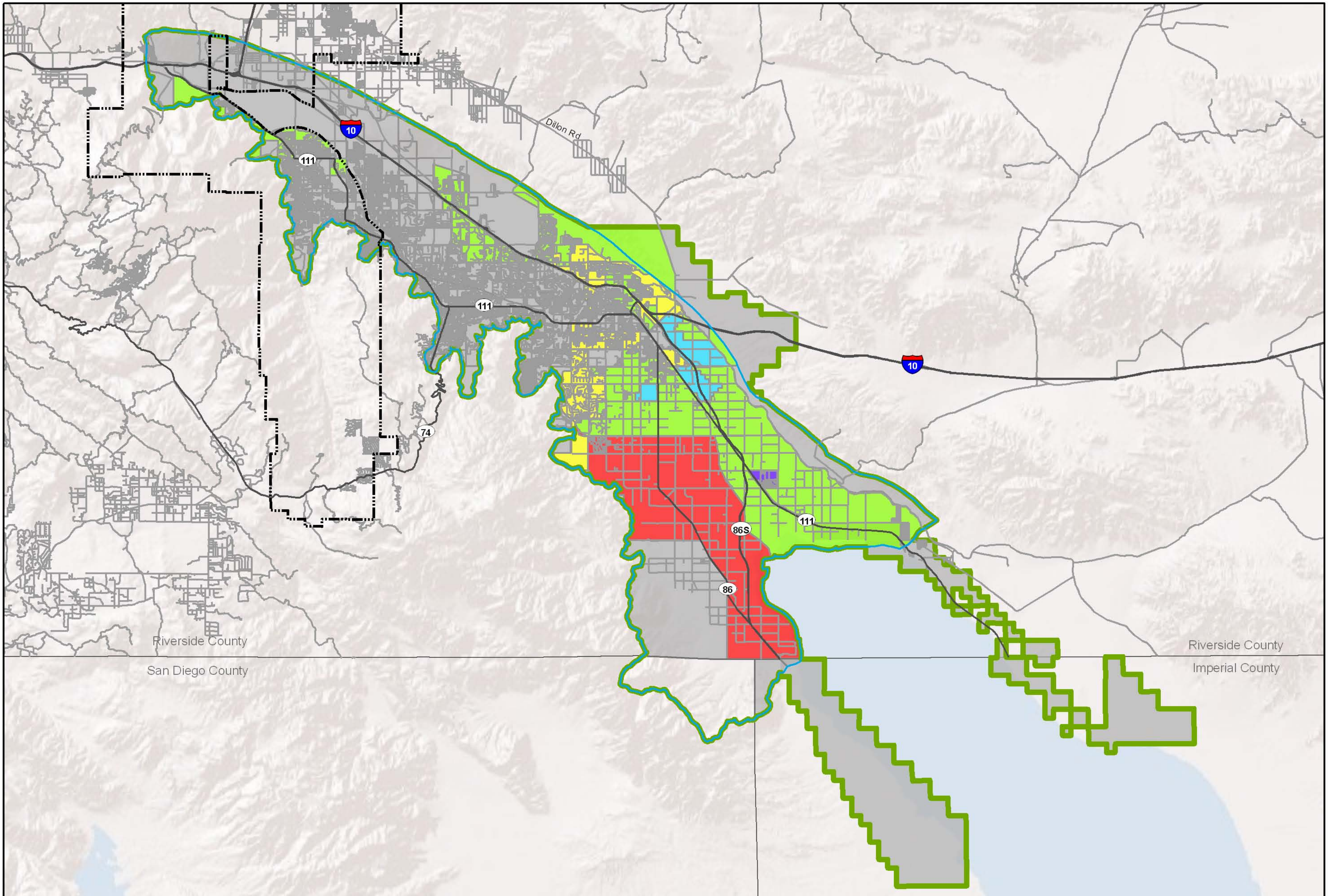
As described earlier, Riverside County is currently preparing a major update to the General Plan, designated General Plan Amendment 960 (GPA 960). GPA 960 will update planning policies for the Vista Santa Rosa and South Valley Policy Areas in the Eastern Coachella Valley Area Plan and land use inventories in the Thousand Palms area in the Western Coachella Valley Area Plan (Riverside County Planning Commission, 2008). The 2010 WMP Update growth assumptions may need to be revisited in light of the updated County General Plan and EIR and adjustments made as needed. Any adjustments will be reflected in projected water demands in future WMP updates.

Lacking an updated county land use plan, the 2010 WMP Update incorporates the following assumptions to apply growth forecasts to projected land use changes:

1. Urban growth in the East Valley will occur equally (50 percent each) on agricultural and vacant parcels.
2. A total of 75 new golf courses (based on **Section 3.3.1.4**) are projected to be constructed by 2045. If fewer courses are constructed, it is expected that the land area will be developed for urban uses.

3. The Riverside County growth forecast (RCP-06) includes growth on Tribal lands. Land development on Tribal lands will occur at the same rate and in the same patterns as growth on non-Tribal lands.
4. The RCP-06 population growth forecast is used (with the water demand factors) to project future municipal water demands.

The geographical distribution of population growth within the Valley projected by RCP-06 is presented in **Figure 3-2**.



Key to Features

County Boundary

DWA Boundary

Whitewater Sub-basin

Study Area

Population Growth Through 2045 (by tract)

0 - 5,000

5,001 - 10,000

10,001 - 20,000

20,001 - 40,000

40,001 - 100,000

100,001 - 300,000

N

0 4 8 Miles

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Date: December 2010

Location of Population Growth within Coachella Valley

Figure 3-2

MWH.

3.3 WATER DEMAND PROJECTIONS

Water demand projections form the basis for water supply planning in the Coachella Valley. This section describes the principal assumptions and the resulting water demand projections that are used for the 2010 WMP Update. These baseline water demands serve as a starting point for water supply and demand management planning in the Update.

3.3.1 Assumptions

A number of assumptions have been made in the development of the future baseline water demands, as described below.

3.3.1.1. Water Conservation

Water conservation is a major component of future water management. A significant focus of urban water conservation activities is on landscape irrigation water use. Adoption of the Coachella Valley Landscape Ordinance[1] along with water budget-based rates is expected to have a significant impact on water use by both existing and future development. Consequently, the baseline urban water demands resulting from growth incorporate the reduced water use associated with the landscape ordinance. Similarly, water demands associated with future golf courses assume the turf restrictions contained in the landscape ordinance. Baseline agricultural water demands do not include additional water conservation. Instead, agricultural conservation is evaluated as part of the water management elements considered in the 2010 WMP Update.

3.3.1.2. Urban Water Demand Assumptions

The average urban water use in the Coachella Valley by CVWD customers was 1,173 gallons per day per connection (gpd/conn) for all customer categories during the period 1995-2004. Water usage for all Valley urban customers for the same period was estimated to be about 1,400 gpd/conn, based on reported production data and CVAG population estimates.

The 2003 CVWD Landscape Ordinance required 25 percent reduction in outdoor water use for new development. Future urban water use is further reduced with the implementation of 2007 and 2009 Landscape Ordinances to an average of 800 gpd/conn. Consequently, the water demand factor used to calculate urban demands within the Whitewater River Subbasin boundary associated with growth is estimated to be 800 gpd/conn. The RCP-06 population projections and assumptions regarding the population densities per connection are used with the water demand factor to project future urban demands.

The following assumptions are made for demands outside the Whitewater River Subbasin boundary:

[1] CVWD adopted a valley-wide model ordinance for water efficient landscaping in 2003. This ordinance established a maximum applied water allowance (MAWA) equal to 60 percent of the reference evapotranspiration (ETo). The ordinance was revised in 2007 to reduce the MAWA to 50 percent of ETo and established limits on the amount of turf at new gold courses. CVWD and CVAG revised the ordinance again in 2009 to meet new State requirements and provide a model ordinance for all Valley cities to adopt.

1. An average residential density of 4 dwelling units per acre is assumed, except for three sections (about 1,920 acres) previously subdivided as 5 acre lots where a density of 1 dwelling unit per 2 acres may be allowed.
2. Urban water use is based on an average of 5 water connections per acre (less golf acreage) and an average water use of 800 gpd/conn. This demand is an overall average of residential, commercial, institutional and irrigation use (excluding golf courses).
3. Build-out of vacant parcels is assumed to take place by 2050 with initial development beginning in 2020.

3.3.1.3. Agricultural Water Demand Assumptions

The 2002 WMP assumed that agricultural land use would be displaced as growth occurs, but that vacant land would be developed for agricultural purposes, keeping agricultural demands more or less constant. The 2010 WMP Update assumes that agricultural demand will reduce in proportion to the increase in urban demands. The agricultural demands are based on the assumption that urban growth in the East Valley will occur equally (50 percent each) on agricultural and vacant parcels. A water usage factor of 6.27 AFY/acre of agricultural land is used for calculating agricultural demands through 2045 based on the 2005 demands adjusted for conservation and evapotranspiration (ET). This number accounts for increased water use on land which is double- or triple-cropped but excludes additional conservation.

3.3.1.4. Golf Course Water Demand Assumptions

The golf industry represents a significant water demand sector in the Coachella Valley and is expected to remain so in the future. Estimates developed for the 2010 WMP Update indicate that up to 75 new golf courses could potentially be constructed within the Whitewater River Subbasin boundary area by 2045. Since most of the future growth is anticipated to occur in the East Valley, this estimate is based on a ratio of the total number of existing golf courses in the East Valley to the total East Valley population. This ratio is then applied to future population growth in the Valley. This method assumes that the existing pattern of development (golf course acres per acre of urban development) within the Valley will continue into the future.

Implementation of the Landscape Ordinance and improved irrigation efficiency (proposed as part of the 2002 WMP) will result in reduced demands at new golf courses. For the purpose of this Update, it is expected that water demand for new golf courses or for any rehabilitation of existing golf courses will be 700 AFY per 18 holes (reduced from 900 AFY in 2002 WMP) based on the ordinance.

Water demand for new golf courses located outside the Whitewater River Subbasin is also assumed to be 700 AFY per course based on a typical 125-acre course. The ratio of golf courses per developed acre is similar to that of the six major identified developments. Based on this ratio, up to 14 golf courses are assumed for area outside the Whitewater River Subbasin.

3.3.1.5. Fish Farm and Duck Club Water Demand Assumptions

For the 2010 WMP Update, it is assumed that the fish farm and duck club water use will be much lower than projected in the 2002 WMP. Some of the large fish farm owners have moved away from the traditional fish farming business. The replacement use at these farms is expected to have significantly lower water demands. Based on information available at this time, future fish farm demand of 8,500 AFY and duck club demand of 2,000 AFY are assumed. A more detailed discussion on this subject is presented in **Section 3.4** Demand Uncertainty.

3.3.1.6. Tribal Demand Assumptions

There is very little specific information available about future growth on Tribal lands in the East Valley. It is assumed that the growth that occurs on Tribal land located within the cities is accounted for in the RCP-06 projection. It is assumed that growth on Tribal lands outside the cities will be at the same rate as for the Valley as a whole and will be proportional to the growth that occurs on non-Tribal land in the East Valley. Corresponding water demands are calculated based on these assumptions.

3.3.2 Water Demand Projections

Table 3-2 presents the updated water demand projections. The total demand projected for the year 2045 using the assumptions described above is 883,915 AFY. Projected water demand in the Update for the year 2035 is about 73,600 AFY lower than that projected in the 2002 WMP. A comparison of historical (pre-Landscape Ordinance) and projected future water use (2010 WMP Update) on a per acre basis is presented in **Figure 3-3** for different user types. The reduction in projected per acre water use is mainly due to:

1. Lower net demand (per acre of land) resulting from conversion of agricultural farm land to urban development and
2. Increased golf course and municipal conservation with implementation of the Landscape Ordinance.

Without the inclusion of demands outside the Whitewater River Subbasin boundary (i.e. using the same study area considered in 2002 WMP), the projected demands in the Update for 2035 are about 108,000 AFY lower than that projected in the 2002 WMP.

As previously discussed, the CVAG projection shows rapid population growth within the Valley. This growth translates directly into increased urban water demand. As shown in **Table 3-2**, the total projected urban demand more than doubles between 2010 and 2045.

Agricultural demand is projected to decrease in proportion to the increase in population. As agricultural land is converted to urban development, there is a shift in water demand from agricultural to urban uses. The result is a projected 48 percent decline in agricultural demand between 2010 and 2045.

Figure 3-3
Pre-Landscape Ordinance and Future (2010 WMP Update) Water Usage per Acre by User Type

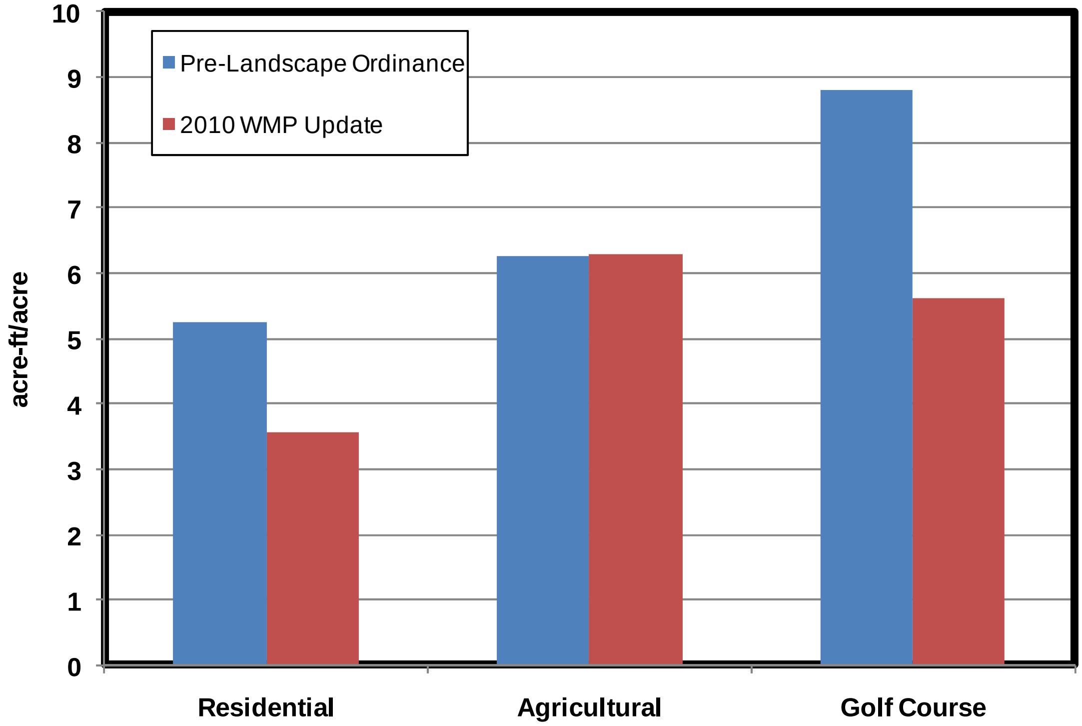


Table 3-2
Water Demand Projections for the Coachella Valley

Component	2005 [1]	2010	2015	2020	2025	2030	2035	2040	2045
Agricultural									
Crop Irrigation	283,100	317,400	302,900	282,300	258,500	238,100	213,900	189,700	166,100
Total Agricultural Demand	**283,100**	**317,400**	**302,900**	**282,300**	**258,500**	**238,100**	**213,900**	**189,700**	**166,100**
Urban									
Municipal	205,400	234,600	260,900	298,100	346,600	390,000	438,500	487,300	537,000
Industrial	1,700	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300
Total Urban Demand	**207,100**	**236,900**	**263,200**	**300,400**	**348,900**	**392,300**	**440,800**	**489,600**	**539,300**
Golf Course Demand	**109,800**	**113,800**	**118,800**	**125,900**	**134,600**	**142,400**	**151,900**	**160,700**	**169,500**
Fish Farms and Duck Clubs									
Fish Farms	23,500	8,500	8,500	8,500	8,500	8,500	8,500	8,500	8,500
Duck Clubs	4,600	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Total Fish Farms and Duck Clubs	**28,100**	**10,500**	**10,500**	**10,500**	**10,500**	**10,500**	**10,500**	**10,500**	**10,500**
TOTAL DEMAND	**628,100**	**678,600**	**695,400**	**719,100**	**752,500**	**783,300**	**817,100**	**850,500**	**885,400**

1. Demands shown are actual demands for 2005 excluding the extra-ordinary agricultural conservation of 18,491 AFY. For demand projection purposes, the 2005 actual demands were adjusted upwards for wet weather effect by a factor of 8.7%.

3.4 DEMAND UNCERTAINTY

This section summarizes the uncertainties associated with water demands within the Valley. A sensitivity analysis of water demands associated with these uncertainty factors is also presented to indicate a possible range of demands. There are several factors that could affect future Valley water demands.

Growth forecasts are too high: If the actual growth in the Valley is less than forecasted, the resulting water demands will be lower than anticipated. This lower demand in turn would reduce or delay the need to implement certain elements incorporated in the Update**.**

Growth forecasts are too low: If the actual growth in the Valley exceeds the forecasted growth, it will result in higher than anticipated water demands. This would increase or advance the need to implement certain Plan elements.

Economic recession: Although there is no way to accurately predict the impact of the recent economic downturn on growth in the Valley, the current recession is expected to slow projected growth. Given the 35-year planning horizon of this Update, this deferral is not expected to have a significant long-term impact on the Plan beyond the next three to five years. Consequently, the recession would result in delay the need to implement certain elements of the Update.

Reduction in fish farm operations: Fish farm operations in the East Valley are declining. Owners of these fish farms are either shutting down their facilities or replacing their use. One of the largest fish farm owners in the East Valley is moving away from their traditional fish farming business and venturing into the business of growing algae in their ponds for use as a biofuel. This shift in operations has reduced their water demands. This has led to a significant decrease in groundwater pumping near the Salton Sea, which in turn has reduced the groundwater overdraft in this area. Future plans of other large fish farms in the East Valley are not known at this time. The amount of groundwater pumping required in the future, and the resulting overdraft in this area of the East Valley will be affected by the replacement use at these fish farms. If fish farm demands are further reduced, the need for some management elements would be delayed or reduced.

Higher rate of Tribal land development: Data available on projected or planned Tribal land development is limited, so it is assumed that growth on Tribal lands will be similar in mix to the growth in other parts of the Valley. If actual growth on Tribal lands exceeds forecasted growth, it would result in higher water demands than projected. This would result in higher groundwater pumping or would require more imported water supplies to meet the higher demands.

Rate of agricultural/vacant land conversion: For the purpose of demand projections, it is assumed that urban growth within the Valley will occur equally on agricultural and vacant parcels. Vacant parcels are assumed to have little or no current water demand. Thus, development occurring on vacant land results in a higher net change in demand as compared to development occurring on agricultural land. If more growth occurs on vacant land, this would also result in higher than projected agricultural demands. Higher agricultural demand would make less Colorado River water available for urban and recharge uses in the East Valley.

Future water demand factors: The water demand factors used for demand projections in this Update might be affected by the effectiveness of water conservation within the Valley. If conservation measures are less effective than expected, demands would be higher and more supplies would be needed. If conservation effectiveness is better, then lower demands and a decreased need for supplies would result.

Growth outside the Whitewater River Subbasin: As described above, there are plans for future growth in areas which lie in the SOI of the cities of Coachella and Indio. This growth will result in increased water demand that has been included in this Plan Update. Development of these areas will be affected by economic factors and might lag behind the rest of the Valley. In addition, development restrictions based on flood control and seismic safety could limit potential growth. Additional supplies will be required to meet the demand arising from this growth.

Sensitivity Analysis: A sensitivity analysis was performed on the water demand projections to determine the effects of the uncertainties described above. Results of this analysis are presented on **Figure 3-4**.

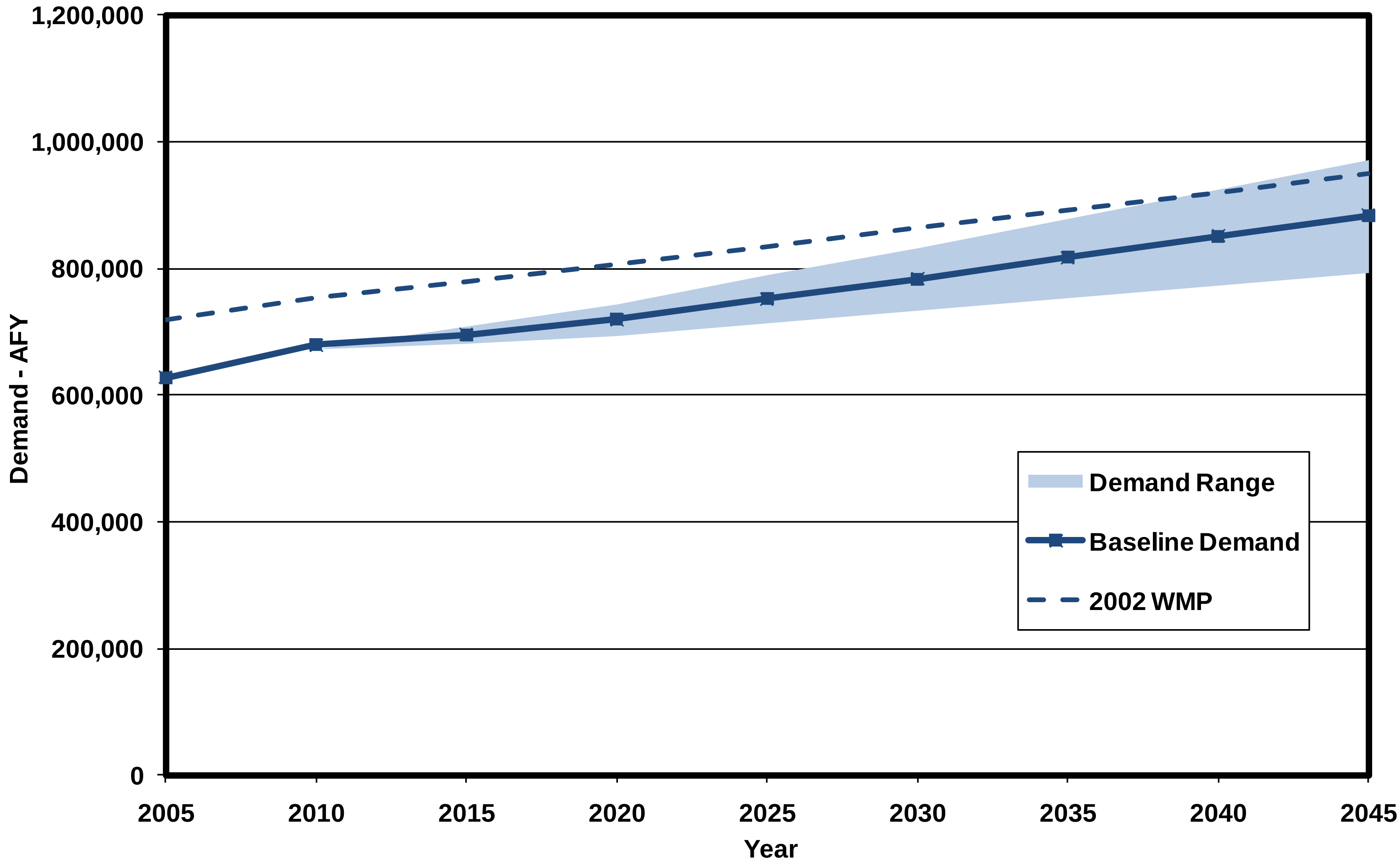
The 2002 WMP water demands are linearly extrapolated beyond 2035 for comparison with the 2045 demand projections developed as part of the 2010 WMP Update. Projections are tested by changing variables such as number of projected golf courses, and agricultural/vacant land conversion. The two extreme conditions tested in this analysis are:

1. **High Demands** - Increase in water demands associated with projected population growth with existing water use and 25 percent (instead of 50 percent) of East Valley growth on agricultural land (with 75 percent on vacant land), and
2. **Low Demands** - 75 percent (instead of 50 percent) of the growth in the East Valley occurs on agricultural land (with 25 percent on vacant land) and only 24 golf courses that are currently proposed in the East Valley get developed in the future.

The resulting high and low ends of demands with the above two conditions are approximately 971,500 AFY to 793,600 AFY respectively. Along with these, other conditions are also tested, the results of which fall within the demand band shown on **Figure 3-4**. Depending on how, where, and when the actual growth occurs in the Valley in the future, the actual resulting water demands for 2045 are estimated to fall within this band.

To account for the above described uncertainty and variability in demands, the 2010 WMP Update utilizes a more flexible approach by assigning book-end targets (ranges) for each of the major program element as described in **Section 6**. The book-ends represent reasonable ranges of minimum and maximum amounts for potential project development. Depending on the actual demands that are encountered in the future, implementation the 2010 WMP Update elements can be adapted to meet these changed demands. The 2010 WMP Update also introduces the concept of a water supply buffer where supplies and conservation are planned to meet slightly more than the baseline demand and are sufficient to encompass the potential range of expected demands. The development of a water supply buffer is discussed further in **Sections 6** and **7**.

Figure 3-4
2010 WMP Update Demand Projections – Sensitivity Analysis



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Section 4
Existing Water Supplies

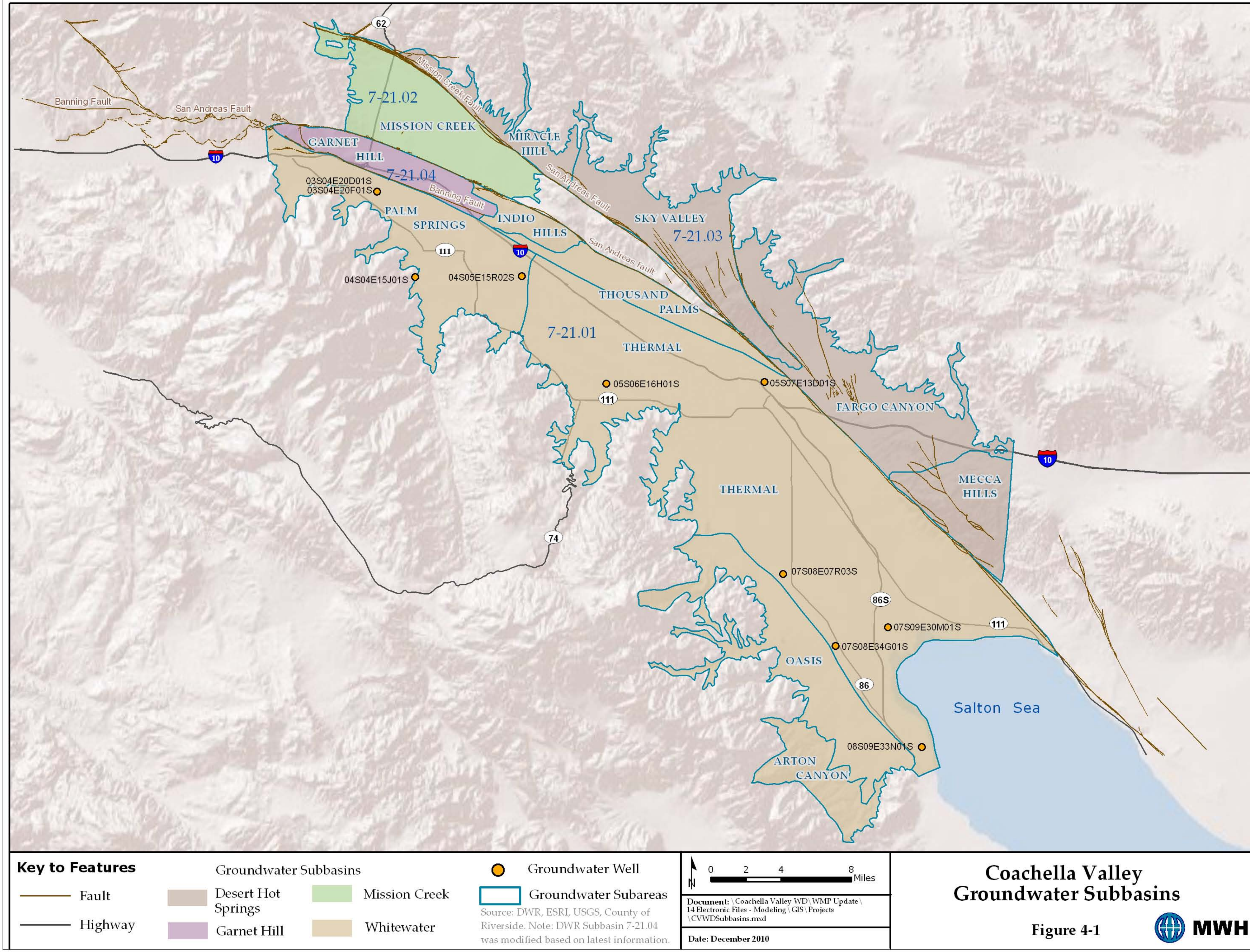
The Coachella Valley relies on a combination of local groundwater, Colorado River water, State Water Project (SWP) water, surface water and recycled water to meet water demands. This section describes the existing water supplies available to the Coachella Valley. A detailed discussion of amounts, risks and reliability associated with each supply source is also presented in the section. The section concludes with a discussion of the “No-Project” condition, which essentially evaluates what would happen if the 2002 Water Management Plan (WMP) was not updated to reflect new demands and changing supplies.

4.1 LOCAL GROUNDWATER

Groundwater has been the principal source of urban water supply in the Coachella Valley since the early part of the 20th century. Groundwater also supplies water for crop irrigation, fish farms, duck clubs, golf courses, greenhouses and industrial uses in the Valley. The Coachella Valley Groundwater Basin (DWR Basin No. 7-21) encompasses the entire floor of the Coachella Valley and consists of five subbasins as shown on **Figure 4-1**. These subbasins are the San Gorgonio Pass, Whitewater (Indio), Garnet Hill, Mission Creek and Desert Hot Springs subbasins. The 2010 WMP Update study area as described in **Section 1** consists of the Whitewater River (Indio) Subbasin, Garnet Hill and portions of Desert Hot Springs subbasins, which are described below. The Mission Creek Subbasin is described briefly because it relies on imported SWP supplies for replenishment.

4.1.1 Whitewater River Subbasin

The Whitewater River Subbasin, designated the Indio Subbasin (Basin No. 7-21.01) in DWR Bulletin No. 118 (2003), underlies the major portion of the Valley floor and encompasses approximately 400 square miles. Beginning approximately one mile west of the junction of State Highway 111 and Interstate Highway 10, the Whitewater River Subbasin extends southeast approximately 70 miles to the Salton Sea. The Subbasin is bordered on the southwest by the Santa Rosa and San Jacinto Mountains and is separated from Garnet Hill, Mission Creek and Desert Hot Springs Subbasins to the north and east by the Garnet Hill and San Andreas faults (CVWD, 2010a, DWR, 1964). The Garnet Hill fault, which extends southeastward from the north side of San Gorgonio Pass to the Indio Hills, is a relatively effective barrier to groundwater movement from the Garnet Hill Subbasin into the Whitewater River Subbasin, with some portions in the shallower zones more permeable. The San Andreas fault, extending southeastward from the junction of the Mission Creek and Banning faults in the Indio Hills and continuing out of the basin on the east flank of the Salton Sea, is also an effective barrier to groundwater movement from the northeast.



Coachella Valley Groundwater Subbasins

Figure 4-1

The subbasin underlies the cities of Palm Springs, Cathedral City, Rancho Mirage, Palm Desert, Indian Wells, La Quinta, Indio and Coachella, and the unincorporated communities of Thousand Palms, Thermal, Bermuda Dunes, Oasis and Mecca. From about Indio southeasterly to the Salton Sea, the subbasin contains increasingly thick layers of silt and clay, especially in the shallower portions of the subbasin. These silt and clay layers, which are remnants of ancient lake beds, impede the percolation of water applied for irrigation and limit groundwater recharge opportunities to the westerly fringe of the subbasin.

In 1964, the DWR estimated that the five subbasins that make up the Coachella Valley groundwater basin contained a total of approximately 39.2 million acre-feet (AF) of water in the first 1,000 feet below the ground surface; much of this water originated as runoff from the adjacent mountains. Of this amount, approximately 28.8 million AF of water was stored in the Whitewater River Subbasin. However, the amount of water in the Whitewater River Subbasin has decreased over the years due to pumping to serve urban, rural and agricultural development in the Coachella Valley has withdrawn water at a rate faster than its rate of recharge.

The Whitewater River Subbasin is not adjudicated. From a management perspective, the subbasin is divided into two management areas designated the Upper Whitewater River Subbasin Area of Benefit (AOB) and the Lower Whitewater River Subbasin AOB. The dividing line between these two areas is an irregular trending northeast to southwest between the Indio Hills north of the City of Indio and Point Happy in La Quinta. The Upper Whitewater River Subbaisn AOB is jointly managed by CVWD and DWA under the terms of the 1976 Water Management Agreement. The Lower Whitewater River Subbasin AOB is managed by CVWD. DWA and CVWD jointly operate a groundwater replenishment program whereby groundwater pumpers (other than minimal pumpers[1]) within designated areas of benefit pay a per acre-foot charge that is used to pay the cost of importing water and recharging the aquifer.

The Whitewater River Subbasin is divided into four subareas: Palm Springs, Thermal, Thousand Palms and Oasis. The Palm Springs Subarea is the forebay or main area of recharge to the Subbasin and the Thermal Subarea comprises the pressure or confined area within the basin. The other two subareas are peripheral areas having unconfined groundwater conditions (CVWD, 2009b).

4.1.1.1 Palm Springs Subarea

The triangular area between the Garnet Hill Fault and the east slope of the San Jacinto Mountains southeast to Cathedral City is designated the Palm Springs Subarea, and is an area in which groundwater is unconfined. The Valley fill materials within the Palm Springs Subarea are essentially heterogeneous alluvial fan deposits with little sorting and little fine grained material content. The thickness of these water bearing materials is not known; however, it exceeds 1,000 feet (CVWD, 2010a). Although no lithologic distinction is apparent from well drillers' logs, the probable thickness of Recent deposits suggests that Ocotillo conglomerate underlies Recent fanglomerate in the Subarea at depths ranging from 300 to 400 feet.

[1] CVWD's enabling legislation defines a minimal pumper as any producer who produces 25 or fewer AF in any year. DWA's legislation defines a minimal pumper as any producer who produces 10 or fewer AF in any year.

Natural recharge to the aquifers in the Whitewater River and Garnet Hill subbasins occurs primarily in the Palm Springs Subarea. The major natural sources include infiltration of stream runoff from the San Jacinto Mountains and the Whitewater River, and subsurface inflow from the San Gorgonio Pass and Mission Creek Subbasins. Deep percolation of direct precipitation on the Palm Springs Subarea is considered negligible as it is consumed by evapotranspiration.

4.1.1.2 Thermal Subarea

Groundwater of the Palm Springs Subarea moves southeastward into the interbedded sands, silts and clays underlying the central portion of the Valley. The division between the Palm Springs Subarea and the Thermal Subarea is near Cathedral City. The permeabilities parallel to the bedding of the deposits in the Thermal Subarea are several times the permeabilities normal to the bedding and, therefore, movement of groundwater parallel to the bedding predominates. Confined or semi-confined groundwater conditions are present in the major portion of the Thermal Subarea. Movement of groundwater under these conditions is present in the major portion of the Thermal Subarea and is caused by differences in piezometric (pressure) level or head. Unconfined or free water conditions are present in the alluvial fans at the base of the Santa Rosa Mountains, as in the fans at the mouth of Deep Canyon and in the La Quinta area.

Sand and gravel lenses underlying this Subarea are discontinuous and clay beds are not extensive. However, two aquifer zones separated by a zone of finer-grained materials were identified from well logs. The fine grained materials within the intervening horizontal plane are not tight enough or persistent enough to restrict completely the vertical interflow of water, or to assign the term “aquiclude” to it. Therefore, the term “aquitard” is used for this zone of less permeable material that separates the Upper and Lower aquifer zones in the southeastern part of the Valley. Capping the Upper aquifer at the surface are tight clays and silts with minor amounts of sands. Semiperched groundwater occurs in this capping zone, which is up to 100 feet thick.

The Lower aquifer zone, composed of part of the Ocotillo conglomerate, consists of silty sands and gravels with interbeds of silt and clay. It is the most important source of groundwater in the Valley Groundwater Basin, but serves only that portion of the Valley east of Washington Street. The top of the Lower aquifer zone is present at depths ranging from 300 to 600 feet below the surface. The thickness of the zone is undetermined, as the deepest wells present in the Valley have not penetrated it in its entirety. The available data indicate that the zone is at least 500 feet thick and may be in excess of 1,000 feet thick.

The aquitard overlying the Lower aquifer zone is generally 100 to 200 feet thick, although in small areas on the periphery of the Salton Sea it is in excess of 500 feet in thickness. North and west of Indio, in an curving zone approximately one mile wide, the aquitard is apparently lacking and no distinction is made between the Upper and Lower aquifer zones.

Capping the Upper aquifer zone in the Thermal Subarea is a shallow fine-grained zone in which semi-perched groundwater is present. This zone consists of Recent silts, clays, and fine sands and is relatively persistent southeast of Indio. It ranges from zero to 100 feet thick and is generally an effective barrier to deep percolation. However, north and west of Indio, the zone is composed mainly of clayey sands and silts and its effect in retarding deep percolation is limited. The low permeability of the materials southeast of Indio has contributed to the irrigation drainage problems of the area. Semiperched groundwater has been maintained by irrigation water applied to agricultural lands south of Point Happy. This condition causes waterlogged soils and the accumulation of salts in the root zone in agricultural areas. Surface drains were constructed in the 1930s to alleviate this condition. Subsurface tile drainage systems were installed in the 1950s to control the high water table conditions and to intercept poor quality return flows. The District operates and maintains a collector system of 166 miles of pipe, ranging in diameter from 18 inches to 72 inches, along with 21 miles of open ditches, to serve as a drainage network for irrigated lands. All agricultural drains empty into the Coachella Valley Stormwater Channel (CVSC) except those at the southern end of the Valley, which flow directly to the Salton Sea. This system serves nearly 38,000 acres and receives water from more than 2,293 miles of on-farm drain lines (CVWMP, 2002).

The Thermal Subarea contains the division between the upper and lower portions of the Whitewater River Subbasin and their respective groundwater tables. Primarily due to the application of imported water from the Coachella Canal, and an attendant reduction in groundwater pumpage, the water table in the area southerly from Point Happy (in La Quinta) rose until the early 1970s, while the water table in the area northerly of Point Happy was dropping. This division forms the lower (southern) boundary of the management area of the Management Agreement between CVWD and DWA. Water table measurements have shown no distinction between the Palm Springs Subarea and the Thermal Subarea. The only distinction is that in the Thermal Subarea at Point Happy the groundwater levels until recently were stabilized, neither rising nor falling significantly. As discussed elsewhere, this is changing, as increased pumpage is again lowering the groundwater levels in the lower portion of the Whitewater River Subbasin. CVWD recently completed a study to evaluate the entire groundwater basin. This led to the development and adoption of the Valley-wide Coachella Valley WMP in 2002.

4.1.1.3 Thousand Palms Subarea

The small area along the southwest flank of the Indio Hills is designated the Thousand Palms Subarea. The southwest boundary of the Subarea was determined by tracing the limit of distinctive groundwater chemical characteristics (CVWD, 2009b). Whereas calcium bicarbonate water is characteristic of the major aquifers of the Whitewater River Subbasin, water in the Thousand Palms Subarea is sodium sulfate in character.

These quality differences suggest that recharge to the Thousand Palms Subarea comes primarily from the Indio Hills and is limited in supply. The relatively sharp boundary between chemical characteristics of water derived from the Indio Hills and groundwater in the Thermal Subarea suggests there is little intermixing of the two waters.

The configuration of the water table north of the community of Thousand Palms is such that the generally uniform, southeast gradient in the Palm Springs Subarea diverges and steepens to the east along the base of Edom Hill. This steepened gradient suggests a barrier to the movement of groundwater, or a reduction in permeability of the water bearing materials. A southeast extension of the Garnet Hill Fault would also coincide with this anomaly. However, there is no surface expression of such a fault, and the gravity measurements taken during the 1964 DWR investigation do not suggest a subsurface fault. The residual gravity profile across this area supports these observations. The sharp increase in gradient is therefore attributed to lower permeability of the materials to the east. Most of the Thousand Palms Subarea is located within the upper portion of the Whitewater River Subbasin. Groundwater levels in this area show similar patterns to those of the adjacent Thermal Subarea, suggesting a hydraulic connectivity.

4.1.1.4 Oasis Subarea

Another peripheral zone of unconfined groundwater that differs in chemical characteristics from water in the major aquifers of the Whitewater River Subbasin is found underlying the Oasis Piedmont slope. This zone, named the Oasis Subarea, extends along the base of the Santa Rosa Mountains. Water bearing materials underlying the Subarea consist of highly permeable alluvial fan deposits. Although groundwater data suggest that the boundary between the Oasis and Thermal Subareas may be a buried fault extending from Travertine Rock to the community of Oasis, the remainder of the boundary is a change from the coarse fan deposits of the Oasis Subarea to the interbedded sands, gravel and silts of the Thermal Subarea. Little information is available as to the thickness of water bearing materials, but it is estimated to be in excess of 1,000 feet. Groundwater levels in the Oasis Subarea have exhibited similar declines as elsewhere in the Subbasin due to increased groundwater pumping to meet agricultural demands on the Oasis slope.

4.1.2 Mission Creek Subbasin

Water-bearing materials underlying the Mission Creek upland comprise the Mission Creek Subbasin. This subbasin is designated number 7-21.02 in DWR's Bulletin 118 (2003). The subbasin is bounded on the south by the Banning fault and on the north and east by the Mission Creek fault. The subbasin is bordered on the west by non-waterbearing rocks of the San Bernardino Mountains. To the southeast of the subbasin are the Indio Hills, which consist of the semiwater-bearing Palm Springs Formation. The area within this boundary reflects the estimated geographic limit of effective storage within the subbasin. This subbasin is outside of the study area of the 2010 WMP Update; however, it relies on the same imported SWP Exchange water source for replenishment as does the Whitewater River Subbasin.

CVWD, DWA and MSWD jointly manage this subbasin under the terms of the Mission Creek Settlement Agreement (CVWD-DWA-MSWD, 2004). This agreement and the 2003 Mission Creek Groundwater Replenishment Agreement between CVWD and DWA specify that the available SWP will be allocated between the Mission Creek and Whitewater River Subbasins in proportion to the amount of water produced or diverted from each subbasin during the preceding year (CVWD-DWA, 2003). In 2009, production from the Mission Creek Subbasin was about 7 percent of the combined production from these two subbasins.

More information on water supply within this subbasin can be found in "Engineer's Report on Water Supply and Replenishment Assessment for the Mission Creek Subbasin Area of Benefit" (CVWD, 2008). CVWD, MSWD and DWA are jointly developing a water management plan for this subbasin.

4.1.3 Garnet Hill Subbasin

The area between the Garnet Hill fault and the Banning fault, named the Garnet Hill Subarea by DWR (DWR, 1964), was considered a distinct subbasin by the USGS (Tyley, 1974) because of the effectiveness of the Banning and Garnet Hill faults as barriers to groundwater movement. This is illustrated by a difference of 170 feet in groundwater level elevation in a horizontal distance of 3,200 feet across the Garnet Hill fault, as measured in the spring of 1961. The fault does not reach the surface and is probably effective as a barrier to groundwater movement only below a depth of about 100 feet. Although some recharge to this subbasin may come from Mission Creek and other streams that pass through during periods of high flood flows, the chemical character of the groundwater plus its direction of movement indicate that the main source of recharge to the subbasin comes from the Whitewater River through the permeable deposits which underlie Whitewater Hill. Based on groundwater level measurements, this area is partially influenced by artificial recharge activities at the Whitewater Spreading Facilities at Windy Point. This subbasin is considered part of the Whitewater River (Indio) in DWR's Bulletin 118 (2003).

4.1.4 Desert Hot Springs Subbasin

The Desert Hot Springs subbasin is bounded on the north by the Little San Bernardino Mountains and to the southeast by the Mission Creek and San Andreas faults. The San Andreas fault separates the Desert Hot Springs subbasin from the Whitewater River subbasin and serves as an effective barrier to groundwater flow. The subbasin has been divided into three subareas: Miracle Hill, Sky Valley and Fargo Canyon. This subbasin is designated number 7-21.03 in DWR's Bulletin 118 (2003).

The Desert Hot Springs subbasin is not extensively developed except in the area of Desert Hot Springs. Relatively poor groundwater quality has limited the use of this subbasin for groundwater supply. The Miracle Hill subarea underlies portions of the City of Desert Hot Springs and is characterized by hot mineralized groundwater, which supplies a number of spas in that area. The Fargo Canyon subarea underlies a portion of the planning area along Dillon Road north of Interstate 10. This area is characterized by coarse alluvial fans and stream channels flowing out of Joshua Tree National Park. Based on limited groundwater data for this area, flow is generally to the southeast. Water quality is relatively poor with salinities in the range of 700 to over 1,000 mg/L (CVWD, 2009c).

4.1.5 Historical Groundwater Use

CVWD and other public water suppliers, including DWA, MSWD, the City of Coachella, the City of Indio and the Myoma Dunes Mutual Water Company, share a common groundwater source – the Whitewater River Subbasin. Other groundwater users of this source include tribes, individual residents, farmers, golf courses, businesses and commercial facilities.

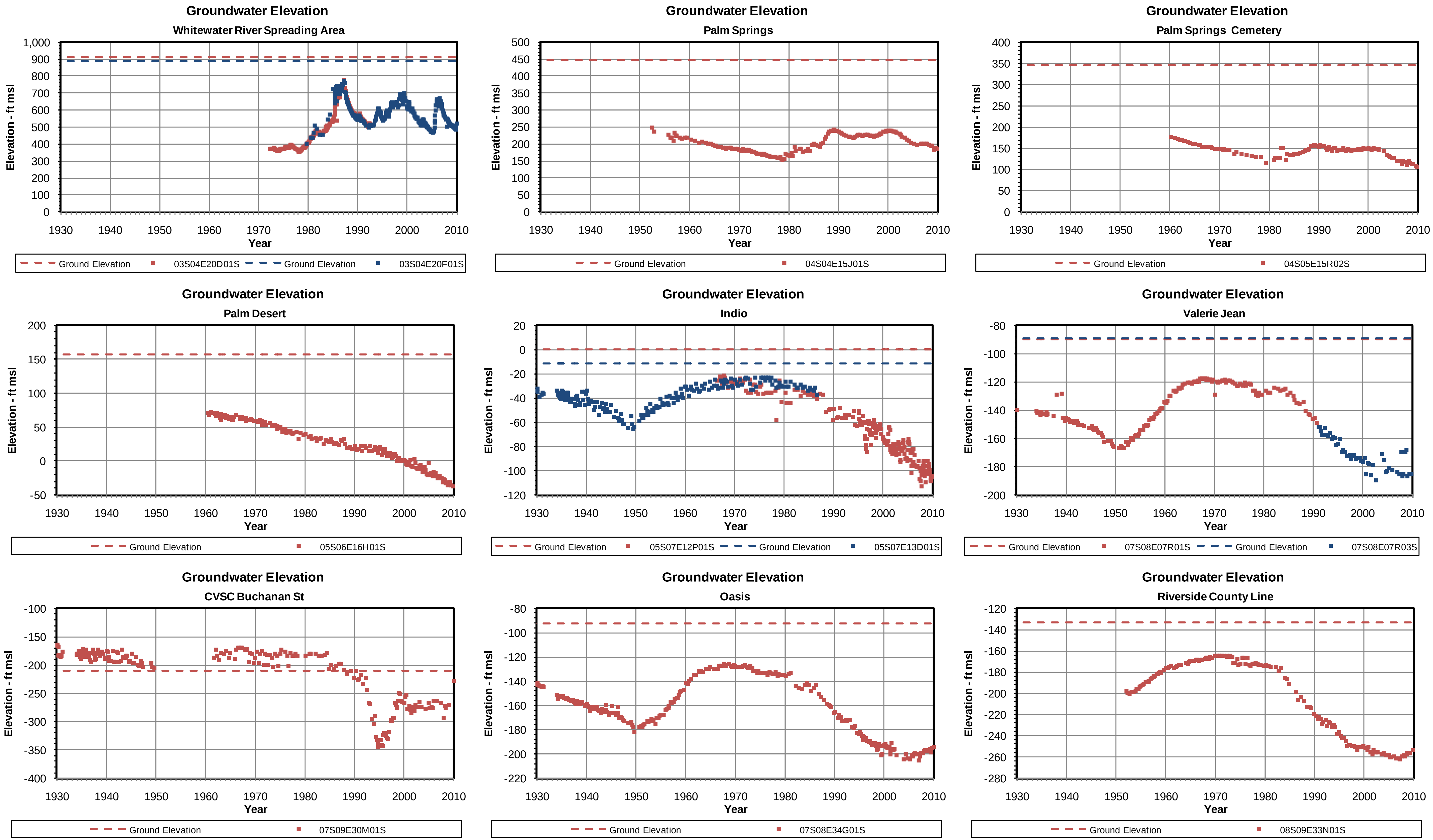
The 2002 WMP and CVWD's and DWA's annual Engineer's Report on Water Supply and Replenishment Assessment for each of the groundwater basins review the historical use of groundwater in the Coachella Valley. In 1936, groundwater use was estimated to be 92,400 acre-ft/yr (AFY) and it increased steadily to about 376,000 AFY in 1999 (Water Consult and

MWH, 2002). The groundwater use in 2009 dropped to about 358,700 AFY due to a combination of water conservation efforts, source substitution projects and the effects of the on-going economic recession.

Total production within the Upper Whitewater River Subbasin was 198,713 AFY in 2009. The production within CVWD's Upper Whitewater River AOB for 2009 was 155,793 AF, of which CVWD pumped 96,576 AFY (CVWD, 2010a). Total production within the Lower Whitewater River Subbasin was estimated to be 160,000 AFY in 2009, of which CVWD pumped 24,283 AFY (CVWD, 2010b).

The historical fluctuations of groundwater levels within the Whitewater River Subbasin indicate a steady decline in the levels throughout the Subbasin prior to 1949. With the use of Colorado River water from the Coachella Canal after 1949, groundwater demand on the groundwater basin declined in the East Valley (generally east and south of Washington Street) below Point Happy and the groundwater levels rose sharply. Water levels in the deeper aquifers rose from 1950 to 1980. However, since the early 1980s, water levels in this area have again declined, at least partly due to increasing urbanization and groundwater usage. Groundwater levels in wells across the Valley floor are presented in **Figure 4-2**. The location of these wells is shown on **Figure 4-1**.

Figure 4-2
Representative Groundwater Levels



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4.1.6 Overdraft Status

The groundwater supply of the Whitewater River Subbasin consists of a combination of natural runoff and returns from groundwater and imported water use. The supply is supplemented with artificial recharge with imported SWP and Colorado River water. The long-term average of natural inflow is about 57,000 AFY and varies from about 8,000 AFY in very dry years to over 200,000 AFY in extremely wet years. From 2000 to 2009, natural inflows were below normal averaging about 40,000 AFY. Returns from use vary with water demands. From 2000 to 2009, returns from use are estimated to average about 240,000 AFY. During this same period, about 51,000 AFY of imported water was recharged in the basin. Total inflows are estimated to be about 331,000 AFY.

Outflows from the basin consist of pumping, flows to the agricultural drainage system, evapotranspiration by native vegetation and subsurface outflow to the Salton Sea. For the 2000-2009 period, groundwater pumping averaged about 389,000 AFY. Drain flows are estimated be about 48,000 AFY while evapotranspiration and subsurface outflow averaged about 4,000 AFY. Total basin outflows for this period averaged 441,000 AFY.

Bulletin 108 (1964) and Bulletin 118 (2003) are the most DWR recent bulletins that characterize the condition of the Coachella Valley aquifer as a whole. In Bulletin 108, DWR noted that the amount of usable supply in the overdrafted aquifer was decreasing. CVWD estimates the annual overdraft annually in its Engineer's Reports on Water Supply and Replenishment Assessment. The annual loss in storage (overdraft) for the Coachella Valley continued; in 2009, it was estimated to be 72,051 AFY. The 2009 loss in storage was lower than historical loss due to increased SWP Exchange water deliveries at Whitewater River Recharge Facility and increased Canal water recharge at the Thomas E. Levy Groundwater Replenishment Facility (Levy facility) in the East Valley beginning in 2009.

The overdraft condition of the Coachella Valley has caused groundwater levels to decline in many portions of the East Valley from La Quinta to the Salton Sea, and has raised concerns about water quality degradation and land subsidence. As indicated on **Figure 4-2**, groundwater levels in the West Valley from Palm Springs to La Quinta have also decreased substantially, except in areas adjacent to and down gradient of the Whitewater River Recharge Facility, where artificial recharge has successfully raised water levels. In 2009, the annual loss in storage in the Lower Whitewater River Subbasin was 23,912 AF (CVWD, 2010b). The annual loss in storage in the Upper Whitewater River Subbasin was 48,139 AF in 2009 (CVWD, 2010a). For the ten-year period of 2000 to 2009, an average of 110,000 AFY was removed from storage.

4.2 COLORADO RIVER

Colorado River water has been a major source of supply for the Coachella Valley since 1949 with the completion of the Coachella Canal. The Colorado River is managed and operated in accordance with the *Law of the River*, the collection of interstate compacts, federal and state legislation, various agreements and contracts, an international treaty, a U.S. Supreme Court decree, and federal administrative actions that govern the rights to use of Colorado River water within the seven Colorado River Basin states. The *Colorado River Compact*, signed in 1922, apportioned the waters of the Colorado River Basin between the Upper Colorado River Basin

(Colorado, Wyoming, Utah, and New Mexico) and the Lower Basin (Nevada, Arizona, and California). The Colorado River Compact allocates 15 million AFY of Colorado River water: 7.5 million AFY to the Upper Basin and 7.5 million AFY to the Lower Basin, plus up to 1 million AFY of surplus supplies. The Lower Basin's water was further apportioned among the three Lower Basin states by the *Boulder Canyon Project Act* in 1928 and the 1964 U.S. Supreme Court decree in *Arizona v. California*. Arizona's basic annual apportionment is 2.8 million AFY, California's is 4.4 million AFY, and Nevada's is 0.3 million AFY. California has been diverting up to 5.3 million AFY in recent years, using the unused portions of the Arizona and Nevada entitlements. Mexico is entitled to 1.5 million AFY of the Colorado River under the *1944 United States-Mexico Treaty for Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande*. However, this treaty did not specify a required quality for water entering Mexico. In 1973, the United States and Mexico signed Minute No. 242 of the International Boundary and Water Commission requiring certain water quality standards for water entering Mexico.

California's apportionment of Colorado River water is allocated by the 1931 *Seven Party Agreement* among Palo Verde Irrigation District (PVID), Imperial Irrigation District (IID), CVWD and Metropolitan. The three remaining parties - the City and the County of San Diego and the City of Los Angeles - are now part of Metropolitan. The allocations defined in the *Seven Party Agreement* are shown in **Table 4-1**. In its 1979 supplemental decree in the *Arizona v. California* case, the United States Supreme Court also assigned "present perfected rights" to the use of river water to a number of individuals, water districts, towns and Indian tribes along the river. These rights, which total approximately 2,875,000 AFY, are charged against California's 4.4 million AFY allocation and must be satisfied first in times of shortage. Under the 1970 *Criteria for Coordinated Long-Range Operation of the Colorado River Reservoirs* (Operating Criteria), the Secretary of the Interior determines how much water is to be allocated for use in Arizona, California and Nevada and whether a surplus, normal or shortage condition exists. The Secretary may allocate additional water if surplus conditions exist on the River (see **Section 4.7.1.2**).

Table 4-1
Priorities and Water Delivery Contracts
California Seven-Party Agreement of 1931

Priority	Description	AFY
1	Palo Verde Irrigation District gross area of 104,500 acres of valley lands	3,850,000
2	Yuma Project (Reservation Division) not exceeding a gross area of 25,000 acres within California	
3(a)	Imperial Irrigation District, Coachella Valley Water District, and lands in Imperial and Coachella Valleys to be served by the All American Canal	
3(b)	Palo Verde Irrigation District - 16,000 acres of mesa lands	
4	Metropolitan Water District of Southern California for use on coastal plain	550,000
	Subtotal – California's Basic Apportionment	**4,400,000**
5(a)	Metropolitan Water District of Southern California for use on coastal plain	550,000
5(b)	Metropolitan Water District of Southern California for use on coastal plain	112,000
6(a)	Imperial Irrigation District and lands in the Imperial and Coachella Valleys to be served by the All American Canal	300,000
6(b)	Palo Verde Irrigation District - 16,000 acres of mesa lands	
	Total	**5,362,000**[1]

1 – Priorities 5-6 would only receive water if there is water available in excess of the 7.5 MAFY available to the Lower Basin States or unused water within the Lower Basin.

California's Colorado River supply is protected by the 1968 Colorado River Basin Project Act, which provides that in years of insufficient supply on the main stream of the Colorado River, supplies to the Central Arizona Project shall be reduced to zero before California will be reduced below 4.4 million AF in any year. This assures full supplies to the Coachella Valley except in periods of extreme drought. As described further in **Section 4.7.1.2**, delivery analyses performed for the Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lakes Powell and Mead indicated that that California would only experience shortages if the total shortage in the Lower Basin exceeds 1.7 million AFY.

The Coachella Canal (Canal) is a branch of the All-American Canal that brings Colorado River water into the Imperial and Coachella Valleys. Historically, CVWD received approximately 330,000 AFY of Priority 3A Colorado River water delivered via the Coachella Canal. The Canal originates at Drop 1 on the All-American Canal and extends approximately 122 miles, terminating in CVWD's Lake Cahuilla. The service area for Colorado River water delivery under CVWD's contract with Reclamation is defined as Improvement District No. 1 (ID-1) which encompasses most of the East Valley and a portion of the West Valley north of Interstate

10. Under the 1931 California Seven Party Agreement, CVWD has water rights to Colorado River water as part of the first 3.85 million AFY allocated to California. CVWD is in the third priority position along with IID.

4.2.1 Quantification Settlement Agreement

In 2003, CVWD, IID and Metropolitan successfully completed negotiation of the Quantification Settlement Agreement (QSA). The QSA quantifies the Colorado River water allocations of California's agricultural water contractors for the next 75 years and provides for the transfer of water between agencies. Under the QSA, CVWD has a base allotment of 330,000 AFY. In accordance with the QSA, CVWD has entered into water transfer agreements with Metropolitan and IID that increase CVWD supplies by an additional 129,000 AFY as shown in **Table 4-2** and **Figure 4-3**.

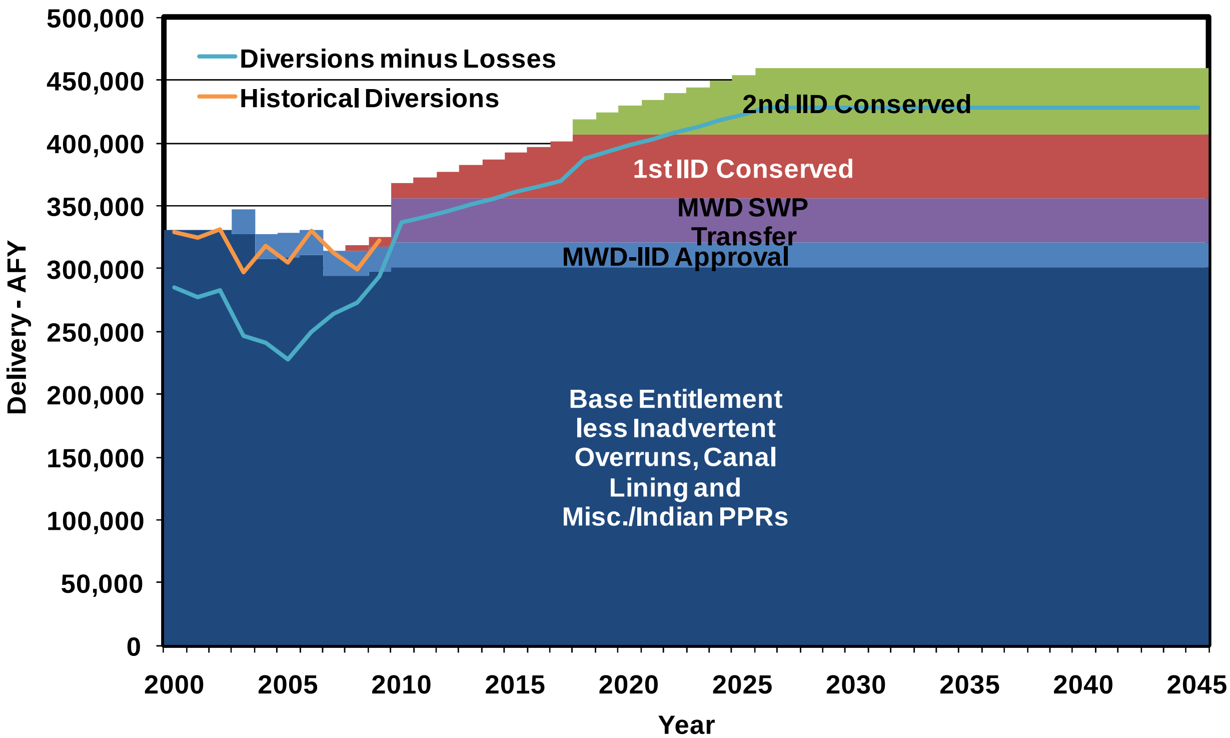
Table 4-2
CVWD Deliveries under the Quantification Settlement Agreement

Component	2010 Amount (AFY)	2045 Amount (AFY)
Base Entitlement	330,000	330,000
1988 Metropolitan/IID Approval Agreement	20,000	20,000
Coachella Canal Lining (to SDCWA)	-26,000	-26,000
To Miscellaneous/Indian PPRs	-3,000	-3,000
IID/CVWD First Transfer	12,000	50,000
IID/CVWD Second Transfer	0	53,000
Metropolitan/SWP Transfer	35,000	35,000
Total Diversion at Imperial Dam	**368,000**	**459,000**
Less Conveyance Losses [1]	-31,000	-31,000
Total Deliveries to CVWD	**337,000**	**428,000**

1 – Assumed total losses after completion of canal lining projects.

As of 2010, CVWD receives 368,000 AFY of Colorado River water deliveries under the QSA (**Table 4-2**). This includes the base entitlement of 330,000 AFY, Metropolitan/IID Approval of 20,000 AFY, 12,000 AFY of IID/CVWD First transfer, and 35,000 AFY of Metropolitan/SWP transfer. It also includes the 26,000 AFY transferred to San Diego County Water Authority (SDCWA) as part of the Coachella Canal lining project and the 3,000 AFY transfer to Indian Present Perfected Rights (PPRs). CVWD's allocation will increase to 459,000 ac-ft/yr of Colorado River water by 2026 and remain at that level for the 75 year term of the QSA. After deducting conveyance and distribution losses, approximately 428,000 AFY will be available for CVWD use.

Figure 4-3
CVWD Colorado River Water Allocation Chart



The Valley's Colorado River supply faces problems that could impact long-term reliability. Issues affecting Colorado River supply are the extended Colorado River Basin drought, Colorado River shortage sharing agreement, endangered species and habitat protection, climate change and lawsuits challenging the validity of the QSA. Due to both California's and CVWD's high priority position regarding Colorado River allocations, this supply is expected to be relatively reliable. However, in January 2010, the QSA was rendered invalid in a state court decision along with eleven related agreements (Superior Court of California, 2010). CVWD and the other parties have appealed the judgment. On March 9, 2010, the California Court of Appeal, Third Appellate District, issued a temporary stay of the judgment pending further briefing and order of the court regarding appellants' request for a stay during the pendency of the appeal. An appellate decision is expected in early 2011. A detailed discussion of these issues is presented in **Section 4.7.1**.

4.3 STATE WATER PROJECT (SWP)

The SWP is managed by DWR and includes 660 miles of aqueduct and conveyance facilities extending from Lake Oroville in northern California to Lake Perris in the south. The SWP has contracts to deliver 4.172 million AFY to 29 contracting agencies. DWA and CVWD initially contracted for water from the SWP in 1962 and 1963, respectively. CVWD's original SWP water allocation (Table A Amount) was 23,100 AFY and DWA's original SWP Table A

Amount[2] was 38,100 AFY for a combined Table A Amount of 61,200 AFY. Each year, DWR determines the amount of water available for delivery to SWP contractors based on hydrology, reservoir storage, the requirements of water rights licenses and permits, water quality and environmental requirements for protected species in the Sacramento-San Joaquin Delta. The available supply is then allocated according to each SWP contractor's Table A Amount.

There are no physical facilities to deliver SWP water to the Valley. CVWD's and DWA's Table A water is exchanged with Metropolitan for a like amount of Colorado River water from Metropolitan's Colorado River Aqueduct (CRA), that extends from Lake Havasu, through the Coachella Valley to Metropolitan's Lake Mathews. SWP Exchange water has been used to recharge the Whitewater River Subbasin at the Whitewater River Recharge Facility since 1973. Metropolitan, DWA and CVWD executed an advanced delivery agreement in 1985 that allowed Metropolitan to pre-deliver up to 600,000 AF of SWP water into the Coachella Valley. Metropolitan then has the option to deliver CVWD's and DWA's SWP allocation either from the CRA or from water previously stored in the basin. This agreement was subsequently amended to increase the pre-delivery amount to a maximum of 800,000 AF. The 2002 WMP established a goal of maintaining an average amount of SWP exchange water recharge at 140,000 AFY in the Whitewater River Subbasin.

4.3.1 Metropolitan 100,000 AFY Transfer

Metropolitan historically has not made full use of its SWP Table A Amounts in normal and wet years. Under the 2003 Exchange Agreement, CVWD and DWA acquired 100,000 AFY of Metropolitan's SWP Table A water as a permanent transfer (CVWD-DWA, 2003). The water would be exchanged for Colorado River water and either recharged at the existing Whitewater Spreading Facility or delivered via the Coachella Canal for golf course irrigation purposes in the Palm Desert-Rancho Mirage area of the West Valley. The transferred water may also be delivered from Metropolitan's Advance Storage account. CVWD and DWA would assume all SWP costs associated with this water except as described below.

The terms of the agreement provide that CVWD receives 88,100 AFY and DWA receives 11,900 AFY of Metropolitan's SWP Table A water. CVWD and DWA assume all capital costs associated with capacity in the California Aqueduct to transport this water and variable costs to deliver the water to Lake Perris. Metropolitan retains other rights associated with the transferred water including interruptible water service, carryover storage in San Luis Reservoir and flexible storage at Castaic and Perris Reservoirs. Amendments to CVWD's and DWA's SWP contracts were executed in 2003 (DWR, 2003b and 2003c).

Metropolitan has the option to call back the water in years when needed. This option must be exercised no later than April 30 of each year. Metropolitan's callback options are to be exercised in two 50,000 AF blocks. To estimate the average supply from this transfer conservatively, the 2010 WMP Update assumes that Metropolitan would exercise its option to callback the 100,000 AFY in 4 wet years out of every 10 years. The actual frequency of callback would depend on the

[2] Each SWP contract contains a "Table A" exhibit which defines the maximum annual amount of water each contractor can receive excluding certain interruptible deliveries. Table A Amounts are used by DWR to allocate available SWP supplies and some of the SWP project costs among the contractors.

availability of Metropolitan's water supplies to meet its demands. Since 2003, Metropolitan has called back the water only in 2005.

The environmental impacts of this transfer were evaluated in the PEIR for the WMP and SWP Transfer that was certified by the CVWD Board in October 2002. The Metropolitan Board certified the CVWMP PEIR as a responsible agency on October 14, 2003. Metropolitan's SWP contract was amended on October 24, 2003 (DWR, 2003d). CVWD's and DWA's SWP contracts were amended on October 10, 2003 and November 3, 2003, respectively (DWA, 2003b and 2003c). The transfer became effective on January 1, 2005.

4.3.2 Other SWP Transfers

In 2004, CVWD purchased an additional 9,900 AFY of SWP Table A water from the Tulare Lake Basin Water Storage District (Tulare Lake Basin) in Kings County (DWR, 2004). In 2007, CVWD and DWA made a second purchase of Table A SWP water from Tulare Lake Basin totaling 7,000 AFY (DWR, 2007a and 2007b). Also in 2007, CVWD and DWA completed the transfer of 16,000 AFY of Table A Amounts from the Berrenda Mesa Water District in Kern County (DWR, 2007c and 2007d). These latter two transfers became effective in January 2010. With these additional transfers, the total SWP Table A Amount for CVWD and DWA is 194,100 AFY, with CVWD's portion equal to 138,350 AFY. **Table 4-3** summarizes CVWD and DWA total allocations of Table A SWP water.

Table 4-3
State Water Project Sources

Agency	Original SWP Table A	Tulare Lake Basin Transfer #1	Tulare Lake Basin Transfer #2	Metropolitan Transfer	Berrenda Mesa Transfer	Total
CVWD	23,100	9,900	5,250	88,100	12,000	138,350
DWA	38,100	--	1,750	11,900	4,000	55,750
Total	61,200	9,900	7,000	100,000	16,000	194,100

All values expressed in AFY.

4.3.3 SWP Delivery Availability

SWP water contractors submit annual requests to the DWR for water allocations and DWR makes an initial SWP Table A allocation for planning purposes, typically in December of each year. Throughout the year, as additional information regarding water availability becomes available to DWR, its allocation/delivery estimates are updated. **Table 4-4** presents the historic reliability of SWP deliveries, including their initial and final allocations for the past 23 years (1988 through 2010).

DWR issues the SWP Delivery Reliability Report (DRR) every two years, with the 2009 final version currently available (DWR, 2010),. This report accounts for impacts to water delivery reliability associated with climate change and recent federal litigation. Based on information from the final 2009 DRR, the average reliability of SWP Table A deliveries through 2029 is projected to be 60 percent of Table A Amounts after taking into consideration the effects of climate change. This allocation percentage is based on computer modeling of the state's watersheds, an expected range of Delta export controls to protect the Delta smelt, the current condition of the river and reservoir systems, and a climate change scenario. It should be noted that the published reliability of the SWP water has decreased over time. The 2003 DRR estimated a reliability of 75-76 percent in 2021; the 2005 DRR estimated a reliability of 77 percent in 2025, whereas the 2007 DRR had estimated reliability at 66-69 percent in 2027.

Table 4-4
Historical SWP Table A Allocations (1988-2009)

Year	Water Year Type[1]	Initial Allocation	Final Allocation
1988	Critical	100%	100%
1989	Dry	100%	100%
1990	Critical	100%	100%
1991	Critical	85%	30%
1992	Critical	20%	45%
1993	Above Normal	10%	100%
1994	Critical	50%	50%
1995	Wet	40%	100%
1996	Wet	40%	100%
1997	Wet	70%	100%
1998	Wet	40%	100%
1999	Wet	55%	100%
2000	Above Normal	50%	90%
2001	Dry	40%	39%
2002	Dry	20%	70%
2003	Above Normal	20%	90%
2004	Below Normal	35%	65%
2005	Above Normal	40%	90%
2006	Wet	55%	100%
2007	Dry	60%	60%
2008	Critical	25%	35%
2009	Dry	15%	40%
2010	Below Normal	5%	50%
Average:		**47%**	**76%**

Source: DWR, Water Contract Branch within the State Water Project Analysis Office, Notices to State Water Contractors, 1988 – 2010.

1 Water year designation based on Sacramento Valley Water Year Hydrologic Classification, which is based on the sum of the unimpaired runoff in the water year as published in the DWR Bulletin 120 for the Sacramento River at Bed Bridge, Feather River inflow to Oroville, Yuba River at Smartville and American River inflow to Folsom reservoir (DWR, 2010).

To account for additional uncertainties related with SWP reliability in the future, the 2010 WMP Update further reduces the reliability factor for the future conditions. The factors that could further reduce the SWP reliability considered in the 2010 WMP Update are:

- Uncertainty in modeling restrictions associated with biological opinions,
- Risk of levee failure in the Delta,
- Additional pumping restrictions resulting from biological opinions on new species or revisions to existing biological opinions,
- Impacts associated with litigations such as the California ESA lawsuit, and
- Climate change impacts

These factors are discussed in detail in **Section 4.7.2.** After taking the above factors into consideration, and in order to plan for higher contingency, the 2010 WMP Update assumes a long-term future average SWP reliability of 50 percent in the absence of successful completion of the Bay-Delta Conservation Plan (BDCP) and delta conveyance facilities.

CVWD's and DWA's SWP Table A Amounts are used to replenish both the Upper Whitewater River and the Mission Creek subbasins (CVWD-DWA, 2003). Water for recharge is allocated between the subbasins in proportion to pumping in the two subbasins. The estimated availability of SWP Table A Amounts for the Coachella Valley is presented in **Table 4-5**.

Table 4-5
SWP Availability for the Coachella Valley

SWP Components	Existing (2010) (AFY)	Future (2030) (AFY)
Table A Amount (Existing)	194,100	194,100
Assumed SWP Reliability [1]	60%	50%
Average SWP Delivery	116,460	97,050
Less Metropolitan Call-back [2]	(32,856)	(24,847)
Average Net SWP Supply [3]	83,604	72,203
Upper Whitewater Share		
Percent of Total Production[4]	93%	85%
Allocated to Upper Whitewater	77,752	61,372
Mission Creek Share		
Percent of Total Production[4]	7%	15%
Allocated to Mission Creek	5,852	10,830

1 – Based on California DWR's 2009 SWP Reliability Report and adjusted based on the combined CVWD-DWA Table A Amounts and assumed future reliability amounts.
2 – Average callback in 4 wet years during a 10 year period.
3 – Net supply is calculated by deducting the Metropolitan callback from the Table A Amount with SWP Reliability.
4 - Estimated percent of total production is the percent of production in each subbasin to the combined total production.

CVWD and DWA have made significant progress toward meeting the 2002 WMP goal of 140,000 AFY average SWP delivery for the Whitewater River Subbasin. However, increased demand, Delta environmental issues, recent court decisions and other risks including climate change threaten to reduce SWP deliveries in the future. The potential reduction equates to reduced reliability of SWP supplies for all SWP contractors, including CVWD. The reduced reliability is factored into the 2010 WMP Update as reduced availability of SWP supplies to meet water demands, and a corresponding need to provide alternative supplies. The impacts of these issues on the Valley's SWP supplies are discussed below.

4.4 SURFACE WATER

Surface water supplies come from several local rivers and streams including the Whitewater River, Snow Creek, Falls Creek and Chino Creek, as well as a number of smaller creeks and washes. Some of this water is diverted for direct delivery to customers while the remainder becomes part of the groundwater supply through percolation of runoff. In 2009, surface water supplied less than one percent of the total water supply to the West Valley to meet urban and golf course demands and none to the East Valley. Because surface water supplies are affected by variations in annual precipitation, the annual supply is highly variable. Since 1936, the historical surface water deliveries have ranged from approximately 1,400 to 9,000 AFY, averaging about 5,800 AFY.

The majority of local surface water is derived from runoff from the San Bernardino and San Jacinto Mountains with lesser amounts from the Santa Rosa Mountains. This runoff either percolates in the streambeds or is captured in mountain-front debris basins where it recharges the groundwater basin. According to the estimates developed for the 2010 WMP Update, since 1993, an average of approximately 60,000 AFY of surface water recharged the Whitewater River Subbasin.

4.5 RECYCLED WATER

Recycled water is a significant potential local resource that can be used to help reduce overdraft. Wastewater that has been highly treated and disinfected can be reused for landscape irrigation and other purposes; however, treated wastewater is not suitable for direct potable use. Recycled wastewater has historically been used for irrigation of golf courses and municipal landscaping in the Coachella Valley. In addition, fish farm effluent is available in localized areas of the East Valley and a portion is recycled. Based on data from CVWD and DWA, recycled water usage in the West Valley is approximately 12,400 AFY (8,200 AFY CVWD usage, 4,200 AFY DWA usage). Recycled water usage in the East Valley is approximately 700 AFY and is mainly for agricultural irrigation.

CVWD operates six water reclamation plants (WRPs), three of which (WRP-7, WRP-9 and WRP-10) generate recycled water for irrigation of golf courses and large landscaped areas. WRP-4 became operational in 1986 and serves communities from La Quinta to Mecca. WRP-4 effluent is not currently recycled; however, it will be recycled in the future when the demand for recycled water develops and tertiary treatment is constructed. The City of Palm Springs operates the Palm Springs Wastewater Treatment Plant (WWTP). DWA provides tertiary treatment to effluent from this plant and delivers recycled water to golf courses and parks in the Palm Springs area. There is also potential for obtaining recycled water from the reclamation plants operated by the City of Coachella and Valley Sanitary District (VSD), but water from these sources is not currently recycled. The existing and projected baseline amounts of recycled water (without additional indoor residential water conservation) available from these plants are presented in **Table 4-6.** Brief descriptions of Valley wastewater facilities are presented below.

4.5.1 WRP-4

CVWD's WRP-4 is a 9.9 million gallons per day (mgd**)** capacity treatment facility located in Thermal. WRP-4 provides secondary treatment consisting of pre-aeration ponds, aeration lagoons, polishing ponds, and disinfection. The treated effluent is discharged to the CVSC pursuant to a National Pollution Discharge Elimination System (NPDES) permit. The annual average flow to the facility is approximately 4.75 mgd (5,300 AFY).

4.5.2 WRP-7

WRP-7 is located in north Indio. The plant is a 5.0 mgd secondary treatment facility with a current tertiary treatment capacity of 2.5 mgd. The tertiary treated wastewater is used for irrigation of golf courses in the Sun City area. The average annual flow is currently 2.11 mgd (2,400 AFY). The plant consists of aeration basins, circular clarifiers and polishing ponds. Recycled water not used for irrigation is percolated at on-site and off-site ponds. A plant expansion is currently under design that will increase the plant capacity to 7.5 mgd.

4.5.3 WRP-9

WRP-9 is located in Palm Desert. WRP-9 treats approximately 0.33 mgd (370 AFY) of wastewater from the residential development surrounding the Palm Desert Country Club. The WRP consists of the following treatment units: a grit chamber, aeration tanks, secondary clarifiers, chlorine contact chamber, aerobic digester and two infiltration basins. One basin is lined for storage of treated wastewater. Raw wastewater in excess of the design capacity is pumped to WRP-10. Secondary effluent from WRP-9 is used to irrigate a portion of the Palm Desert Country Club golf course.

4.5.4 WRP-10

WRP-10 is located in Palm Desert. WRP-10 consists of an activated sludge treatment plant, a tertiary wastewater treatment plant, a lined holding basin, 6 storage basins and 21 infiltration basins.

The combined secondary wastewater treatment design capacity of the WRP is 18 mgd. WRP-10 treats an annual average daily flow of 10.8 mgd from the activated sludge plant. Approximately 60 percent of this plant's effluent receives tertiary treatment for reuse and is delivered to customers through an existing recycled water distribution system. The remaining secondary effluent is piped to a holding basin and/or the 6 storage basins, and then to the 21 infiltration basins for final disposal.

Most secondary effluent receives tertiary treatment and is used for irrigation of local golf courses. Since 2009, CVWD blends tertiary effluent with Canal water provided by the Mid-Valley Pipeline (MVP) for distribution to golf courses. CVWD plans to expand the non-potable water delivery system in the future, as discussed in **Section 6**.

4.5.5 Palm Springs Water Reclamation Facility

The City of Palm Springs provides wastewater collection and treatment service within its city limits. The City of Palm Springs operates the Palm Springs WWTP, which has a capacity of 10.9 mgd and produces secondary-treated effluent. DWA provides tertiary treatment to effluent from this plant and delivers recycled water to golf courses and parks in the Palm Springs area. Recycled water that is not delivered to customers is disposed of in percolation ponds located near the plant site.

4.5.6 Valley Sanitary District WWTP

The VSD owns and operates an 11 mgd capacity wastewater treatment facility that serves most of the City of Indio. The wastewater treatment system consists of preliminary, primary and secondary treatment processes. Secondary treatment is provided by three process trains – activated sludge (7.5 mgd), oxidation ponds (2.5 mgd) and wetlands treatment (1 mgd). Effluent from the oxidation ponds and the wetlands is either routed to pasture irrigation or blended with activated sludge effluent, disinfected, dechlorinated and discharged to the CVSC. VSD plans to increase the capacity of the activated sludge process to 10 mgd through the addition of aeration basins and secondary clarifiers by 2011. This will increase the total plant capacity to 13.5 mgd (CRRWQCB, 2010c).

Growth within the VSD service is projected to increase the flow to the plant to about 11,300 AFY by 2045. The City of Indio's Water Resources Development Plan indicates that the City intends to use as much recycled water as is practical from VSD to meet future demands in its service area (Indio, 2008).

4.5.7 Coachella Sanitary District WWTP

The City of Coachella through its Coachella Sanitary District owns and operates a 4.5 mgd secondary treatment wastewater facility utilizing activated sludge and oxidation ditch processes. Treated wastewater is discharge to the CVSC (CRRWQCB, 2010b). The City is currently analyzing the cost-benefit of upgrading the wastewater treatment facility to tertiary treatment to determine its feasibility (Coachella, 2008). The City does not have infrastructure in place to recycle water. If the treatment system upgrade feasibility study produces a favorable result and tertiary treatment is added to the facility, potential uses include large landscape irrigation, groundwater recharge, water exchange, agricultural irrigation, industrial reuse and habitat revitalization. Separate, non-potable water systems were required with approval of many of the larger recent developments. These non-potable water systems were constructed using "purple pipe" to facilitate connections to a future City-wide recycled water system without significant system modification costs (Coachella, 2008).

Table 4-6
Existing and Projected Total Wastewater Flows in the Coachella Valley

Wastewater Treatment Plant	Flow - AFY								
	2005 [1]	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**
Palm Springs WWTP	7,272	8,060	8,580	9,218	9,910	10,717	11,615	12,513	13,410
Coachella SD WWTP	2,412	3,509	4,614	5,800	6,955	8,118	9,350	10,583	11,815
VSD WWTP	6,172	6,969	7,825	8,398	8,898	9,519	10,103	10,687	11,271
CVWD WRP-10	12,290	13,106	14,049	15,043	15,912	16,461	16,870	17,279	17,688
CVWD WRP-4	5,055	6,162	8,148	11,783	16,783	20,597	25,237	29,877	34,517
CVWD WRP-7	2,411	3,264	3,946	5,403	5,882	6,758	7,569	8,379	9,189
CVWD WRP-9	335	335	335	335	335	335	335	335	335
Total	**35,947**	**36,322**	**41,406**	**47,499**	**55,981**	**64,675**	**72,506**	**81,079**	**89,652**

1 – Actual plant flows for the year 2005.

Source: Average Dry Weather Flows developed by MWH.

4.5.8 Aquaculture Water Reuse

CVWD has worked with a local aquaculture firm to develop water efficiency programs that include water treatment and reuse. Historically, the amount of fish farm effluent recycled in the East Valley was approximately 2,000 AFY. However, one of the largest fish farms in the East Valley recently terminated operations and is now using their ponds to grow algae that will be used for the production of biofuel. This shift in operations has significantly reduced groundwater pumping as well as essentially eliminated a source of reusable aquaculture effluent. Water users that have used this recycled water will need to convert to Canal water as a supply. Several areas have been approved for Canal water service pending design and construction of facilities. The 2010 WMP Update assumes that no aquaculture water is available for future reuse.

4.6 OTHER SUPPLIES

CVWD along with other Valley agencies have investigated other water transfer opportunities described below. Since these water transfers are highly uncertain, they are not accounted for as firm existing supply capacity available to CVWD.

Yuba River Accord Dry Year Water Purchase Program: In March 2008, CVWD and DWA entered into separate agreements with the DWR for the purchase and conveyance of supplemental SWP water under the Yuba River Accord Dry Year Water Purchase Program. This program provides dry year supplies through a water purchase agreement between DWR and Yuba County Water Agency (YCWA) as part of the Lower Yuba River Accord (Yuba Accord) which settled long-standing operational and environmental issues over instream flow requirements for the lower Yuba River. Yuba Accord water transfers will include both surface water and groundwater substitution transfers for an estimated total of up to 140,000 AFY. The available water is allocated among participating SWP contractors based on their Table A Amounts. It is estimated that CVWD and DWA may be able to purchase up to 4 percent or 5,600 AFY, and 1.3 percent or 1,820 AFY, respectively for a total of 7,420 AFY. The amount of water available for purchase in a given year varies and will be based on DWR's determination of the Water Year Classification. These agreements provide for the exchange of these supplies with Metropolitan for Colorado River water in accordance with existing exchange agreements. CVWD and DWA obtained 1,836 AF in 2008 and 3,482 AF in 2009 from this program.

Rosedale-Rio Bravo Transfer: In 2008, CVWD executed an agreement with Rosedale-Rio Bravo Water Storage District (Rosedale) in Kern County for a one-time transfer of 10,000 AF of banked Kern River flood water that is exportable to CVWD. Per the Rosedale agreement, deliveries to CVWD began in 2008 and be completed by December 31, 2010 (CVWD, 2010a). Similar transfers could be executed in future years based on water availability.

4.7 SUPPLY RISKS AND UNCERTAINTIES

The existing water supplies face risks and uncertainties that could affect long-term supply reliability. These risks and uncertainties include the extended drought in the southwestern

United States and legal/regulatory decisions affecting vital contracts and water deliveries. In addition, climate change could impact both supplies and demands in the Valley. Climate change is discussed in **Section 5**.

4.7.1 Colorado River

Although CVWD's Colorado River supply has historically been fully reliable, the extended Colorado River drought and the recent invalidation of the QSA may impact the availability of this supply.

4.7.1.1 Extended Colorado River Drought

CVWD receives approximately 40 percent of its overall water supply from the Colorado River. The period from 2000 through 2007 was the driest eight-year period in the 100-year historical record of the Colorado River. This drought in the Colorado River Basin reduced Colorado River system storage, while demands for Colorado River water supplies continued to increase. From October 1, 1999 through September 30, 2007, storage in Colorado River reservoirs decreased from 55.8 million AF (approximately 94 percent of capacity) to 32.1 million AF (approximately 54 percent of capacity), and was as low as 29.7 million AF (approximately 52 percent of capacity) in 2004. In November 2010, Lake Powell and Lake Mead were at 62 percent and 38 percent of their storage capacities, respectively (Reclamation, 2010b). Although slightly above-normal snowpack conditions existed in the Colorado River basin in 2008, the years 2009 and 2010 saw a return of below normal runoff conditions. Consequently, the potential for continued drought conditions exists.

Extended droughts in the southwestern United States are believed to have occurred a number of times in the past 1,200 years. A study published in 2007 reconstructed Upper Colorado River flows at Lee Ferry (below Lake Powell) using tree-ring data for the period A.D. 762 to 2005 (NOAA/NCDC, 2007). This study indicated that the Colorado River basin may have experienced two droughts extending for 60 to 80 years during the Medieval period (A.D. 800 to 1200), including a drought in the mid-1100s where the average flow over a 25-year period decreased by 15 percent. One of these droughts is believed to have caused the decline of the Anasazi culture in the Southwest. Several droughts having durations of 20 to 30 years are also inferred from the tree-ring data. Although basin-wide inflows have exceeded water use over the past 100 years, the reconstructed hydrology suggests that the average flow at Lee Ferry might be 14.65 million AFY, which is significantly lower than the 16.5 million AFY allocated to Colorado River users.

CVWD will continue to monitor the supply conditions on the Colorado River, make appropriate adjustments to its operations and actively participate in efforts to augment the water supplies of Colorado River.

4.7.1.2 Colorado River Interim Guidelines

Each year, the Secretary of the Interior is required to declare the Colorado River water supply availability conditions for the Lower Basin States in terms of normal, surplus or shortage. Although operational criteria have been developed for normal and surplus, Reclamation did not have specific operational guidelines in place to address the operations of Lake Powell and Lake Mead during drought and low reservoir conditions. In 2007, Reclamation adopted specific interim guidelines for Lower Basin shortages and coordinated operations for Lake Powell and Lake Mead. These interim guidelines will remain in effect for determinations to be made through 2025 regarding water supply and reservoir operating decisions through 2026 and will provide guidance for development of the Annual Operating Plan (AOP) for Colorado River Reservoirs (Reclamation, 2007).

The purposes of the interim guidelines are to: 1) improve Reclamation's management of the Colorado River by considering trade-offs between the frequency and magnitude of reductions of water deliveries, and considering the effects on water storage in Lake Powell and Lake Mead. Reclamation will also consider the effects on water supply, power production, recreation, and other environmental resources; 2) provide mainstream United States users of Colorado River water, particularly those in the Lower Division states, a greater degree of predictability with respect to the amount of annual water deliveries in future years, particularly under drought and low reservoir conditions; and 3) provide additional mechanisms for the storage and delivery of water supplies in Lake Mead to increase the flexibility of meeting water use needs from Lake Mead, particularly under drought and low reservoir conditions.

As a result of the interim guidelines, recipients of Colorado River water, including CVWD, will receive deliveries with a higher degree of reliability. Information presented in the Final Environmental Impact Statement (EIS) for the Interim Guidelines indicates that California would only experience shortages if the total shortage in the Lower Basin exceeds 1.7 million AF. Due to California's Colorado River priority system, all delivery shortages would be borne by Metropolitan, which has a lower priority than CVWD (Reclamation, 2007). Consequently, no reduction in CVWD's Colorado River supplies is projected at this time.

4.7.1.3 QSA Litigation

In November 2003, IID filed a validation action to confirm the validity of the QSA and twelve of the thirty-four QSA related agreements. The case was coordinated for trial with other lawsuits challenging QSA environmental and regulatory approvals in the Sacramento County Superior Court.

On February 11, 2010, the trial court entered judgment declaring the QSA and eleven of the related agreements void and invalid based on a determination that the unconditional state obligation in the QSA-JPA Agreement to pay for excess environmental mitigation costs violated the appropriation requirement of California Constitution, article XVI, section 7, and that the other agreements would not have been entered into absent that state obligation. The court declined, for jurisdictional reasons, to validate the thirteenth agreement, the IID-CVWD Salton Sea Flooding Settlement Agreement.

CVWD and others have appealed the judgment. On March 9, 2010, the California Court of Appeal, Third Appellate District, issued a temporary stay of the judgment pending further briefing and order of the court regarding appellants' request for a stay of the appeal. Since California must still comply with its 4.4 million AFY allocation, it appears likely that some variation of the QSA will be developed if the current invalidation is upheld on appeal.

Therefore, the 2010 WMP Update assumes that the current QSA or a functional equivalent will be in place in the future.

4.7.2 SWP

As described earlier, DWR estimates the current average reliability of the SWP to be 60 percent of Table A Amounts. The 2010 WMP Update assumes future SWP Table A deliveries to the Coachella Valley to be 50 percent of Table A Amounts to account for the potential water reductions associated with the current and future risks affecting Delta water exports in the absence of programs to balance Delta environmental concerns and water supply needs. This 50 percent average reliability factor is considered reasonable for the 2010 WMP Update considering recent and pending water litigation, risks associated with levee failure in the Delta, as well as potential variability associated with climate change through 2045.

4.7.2.1 Delta Environmental Issues

All SWP supplies flow through the Sacramento-San Joaquin River Delta, the largest estuary system on the west coast of the United States. The Delta is the home of more than 750 native plant and animal species, several of which are listed threatened or endangered, and is the hub of water supply for the State. For decades, the Delta has been the focus of competing interests – economic, environmental, urban and agricultural. Significant threats to the Delta are declining fish and wildlife habitat, native plant and animal species being threatened with extinction, degradation of Delta water quality and supply reliability and risk of levee failures.

Attention has focused on the decline in pelagic (open water) organisms in the Delta since the early 2000s. Pelagic organisms that have shown recent declines include Delta smelt, winter- and spring-run salmon, Central Valley steelhead, longfin smelt, striped bass and threadfin shad, among others. Studies conducted over the last five years point toward several factors that affect the decline of these organisms, including toxic runoff, predatory and invasive non-native species (such as Asian clams), wastewater discharges and water diversions. During 2007, DWR ceased pumping and Reclamation significantly limited pumping from the Delta to minimize the take of Delta smelt. The decline in these organisms has resulted in several recent court rulings and administrative decisions reducing or having the potential to reduce Delta water diversions with a corresponding impact on SWP supplies.

A series of legal and regulatory rulings have affected water deliveries from the Delta in recent years. In 2005, environmental groups filed suit alleging DWR did not have proper legal authority to take endangered fish while operating the SWP. In 2007 and 2008, federal Judge Oliver Wanger overturned the 2004 biological opinions addressing the impacts of operation of the SWP and the CVP on the Delta smelt and Chinook salmon. In response to these rulings, in 2009 the U. S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) issued revised biological opinions regarding the Delta smelt, Chinook salmon, steelhead and green sturgeon. State and federal water contractors challenged these recent opinions and, in May 2010, Judge Wanger ruled these opinions did not use the best available scientific data and failed to evaluate the environmental impacts of the export restrictions on humans and the human environment.

In August 2010, the SWRCB adopted a report identifying new flow criteria for the Delta ecosystem that are necessary to protect public trust resources, which include navigation, commerce, fisheries, recreation, scenic, and ecological values (SWRCB, 2010a). Prepared in response to the Delta Reform Act (SB 1x7 2009), this report presents flow criteria based only on a technical assessment of flow and operational requirements that provide fishery protection under existing conditions. The report concluded that Delta outflow should be up to 75 percent of the "unimpaired" outflow from January to June to protect Delta habitat and fisheries with a significant reduction in the amount of water available for export. However, the report does not consider "the allocation of water resources, the application of the public trust to a particular water diversion or use, water supply impacts, or any balancing between potentially competing public trust resources (such as potential adverse effects of increased Delta outflow on the maintenance of coldwater resources for salmonids in upstream areas)" (SWRCB, 2010).

4.7.2.2 Other Risk Factors

Other factors that could further adversely affect SWP delivery reliability are additional environmental restrictions to protect other Delta species, failure of Delta levees, and climate change. Failure of the network of Delta levees due to earthquakes, flooding or sea level rise could disrupt imported water deliveries and allow intrusion of saline water. Climate change could further reduce average reliability by changing the hydrologic pattern, the timing and patterns of snowpack and runoff. Warmer temperatures and decreasing snowpack cause more winter runoff and less spring/summer runoff (DWR, 2009b). DWR attempted to quantify the potential effects of climate change on SWP deliveries in its 2007 and 2009 delivery reliability reports.

4.7.2.3 Delta Planning Activities

A number of planning activities are underway to improve environmental conditions and water supply reliability in the Delta. These include the CALFED Bay-Delta Program, the CALFED Ecosystem Restoration Program Conservation Strategy, the Delta Risk Management Strategy (DRMS) to, the BDCP and the Delta Habitat Conservation and Conveyance Plan (DHCCP). Implementation of these programs may increase the reliability of SWP supplies in the future. The effects of these programs will be taken into account in future updates of the Plan.

The BDCP is being developed in compliance with the Federal Endangered Species Act (FESA) and the California Natural Communities Conservation Planning Act (NCCPA). When completed, the BDCP would provide the basis for the issuance of endangered species permits for the operation of the state and federal water projects. The plan would be implemented over the next 50 years. A public draft of the BDCP is expected to be released in 2011 with adoption of a final plan in 2012 (BDCP, 2010).

The Delta Habitat Conservation and Conveyance Program (DHCCP) was created in 2008 as a result of Governor Schwarzenegger's calls for studies to assess potential habitat restoration and water conveyance options in the Delta. The DHCCP is a partnership between DWR and Reclamation to evaluate the ecosystem restoration and water conveyance alternatives identified by the BDCP. DHCCP activities include an environmental review of the BDCP. The DHCCP will advance the preferred alternative for water conveyance facilities and habitat restoration.

DHCCP goals include:

- Analyzing BDCP proposed actions and alternatives to those actions through a formal EIR/EIS process.
- Analyzing options and considering areas of concern presented by the public during the EIR/EIS process.
- Developing engineering options for habitat restoration and water conveyance.

A draft EIR/EIS is expected to be released in 2011 with adoption of a final EIR/EIS and Record of Decision in 2012.

There currently are no published data or information regarding the effect that the BDCP and DHCCP will have on SWP delivery reliability. Consequently, it is assumed for planning purposes that, if successful, these programs will restore SWP average delivery reliability to the pre-Wanger decision levels of 77 percent of Table A Amounts. This assumption is consistent with planning assumptions being made by Metropolitan (Metropolitan, 2010a and 2010b). The 2010 WMP Update evaluates both low (50 percent) and high (77 percent) reliability in determining future water needs for the Valley.

4.7.2.4 2009 Comprehensive Water Package

In October 2009, the California Legislature and Governor Schwarzenegger crafted a comprehensive plan to ensure future water supply reliability and restore the Sacramento-San Joaquin Delta and other ecologically sensitive areas. The plan consists of four policy bills and an $11.14 billion bond issue. The package establishes a Delta Stewardship Council, sets ambitious water conservation policy, ensures better groundwater monitoring, and provides funds to the SWRCB for increased enforcement of illegal water diversions. With cost-sharing, the bond will fund drought relief, water supply reliability, Delta sustainability, statewide water system operational improvements, conservation and watershed protection, groundwater protection, and water recycling and water conservation programs (DWR, 2009). The bond was withdrawn from the 2010 ballot and may be submitted to the electorate in 2012.

4.7.3 Recycled Water

Recycled wastewater has historically been used for irrigation of golf courses and urban landscaping in the Coachella Valley. The amount of wastewater available for recycling in the future primarily depends on growth in the Valley. Future waste discharge requirements will dictate the level of treatment that would be required at the Valley wastewater treatment plants. More stringent discharge requirements might result in higher treatment costs, which in turn might make recycling a more feasible option. Thus, future growth and water quality regulations will dictate the amount of recycled water available in the Valley.

4.8 NO PROJECT ALTERNATIVE – CONTINUATION OF 2002 WMP

To establish the context for the 2010 WMP Update, a No Project Alternative is present. The No Project Alternative describes what would happen if the 2002 WMP were not updated to account for changes in the existing and projected environment that have occurred since 2002. Evaluation of the No Project Alternative is also required by the California Environmental Quality Act (CEQA).

Figure 4-4 shows the water supply plan for the No Project Alternative through 2045 assuming average hydrologic conditions. For the No Project Alternative, water demands are based upon the current growth forecasts as presented in **Section 3**. Agricultural demands decrease while urban and golf course demands increase. Water conservation is assumed to be implemented at the levels defined in the 2002 WMP. Future SWP reliability is assumed to reduce from its current average of 60 percent to 50 percent of Table A Amounts as described earlier in this section. Use of Canal water and other supplies remain as identified in the 2002 WMP.

In the No Project Alternative, not all available Canal water is used because of the decrease in agricultural demand and because the 2002 WMP anticipated only a relatively small of amount of Canal water deliveries (32,000 AFY) to urban customers. Net groundwater pumping (pumping less imported water recharge) shows a significant increase to meet future urban demands. This is driven by 2002 WMP assumption that most domestic demand would be met primarily by groundwater pumping. Demand due to growth outside the basin results in either a water supply deficit or additional groundwater pumping that would exacerbate future overdraft.

Increased urban development would result in the generation of significantly more municipal wastewater. The 2002 WMP anticipated reuse of a limited amount of treated effluent from WRP-4 for agricultural purposes. All other municipal effluent would be discharged to the CVSC rather than being recycled.

Increased groundwater pumping for urban uses would result in increased overdraft in the long term. As shown on **Figure 4-5**, the No Project Alternative exhibits a positive change in storage (gain) from 2010 through 2025 and overdraft resumes thereafter. In the West Valley, reduced SWP availability, coupled with increased urban use of groundwater use, would result in increased overdraft.

Figure 4-4
Water Supply Plan for No Project Scenario

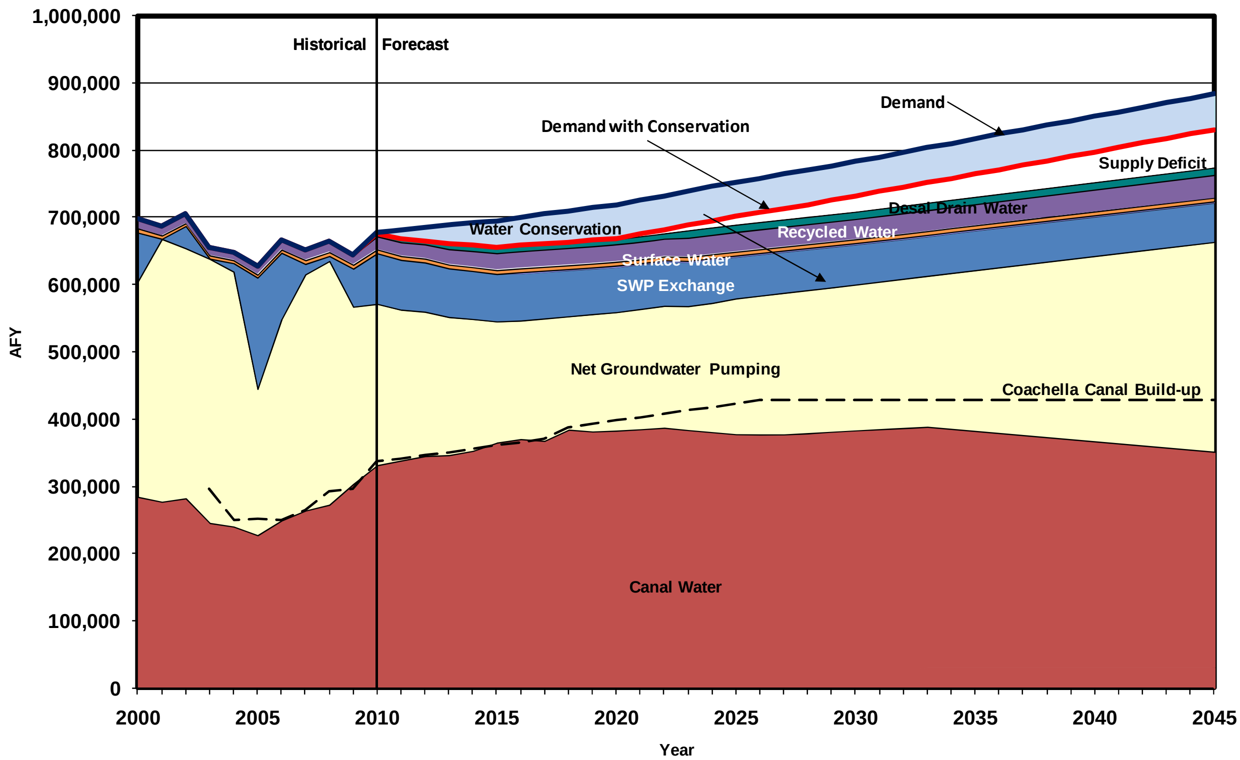
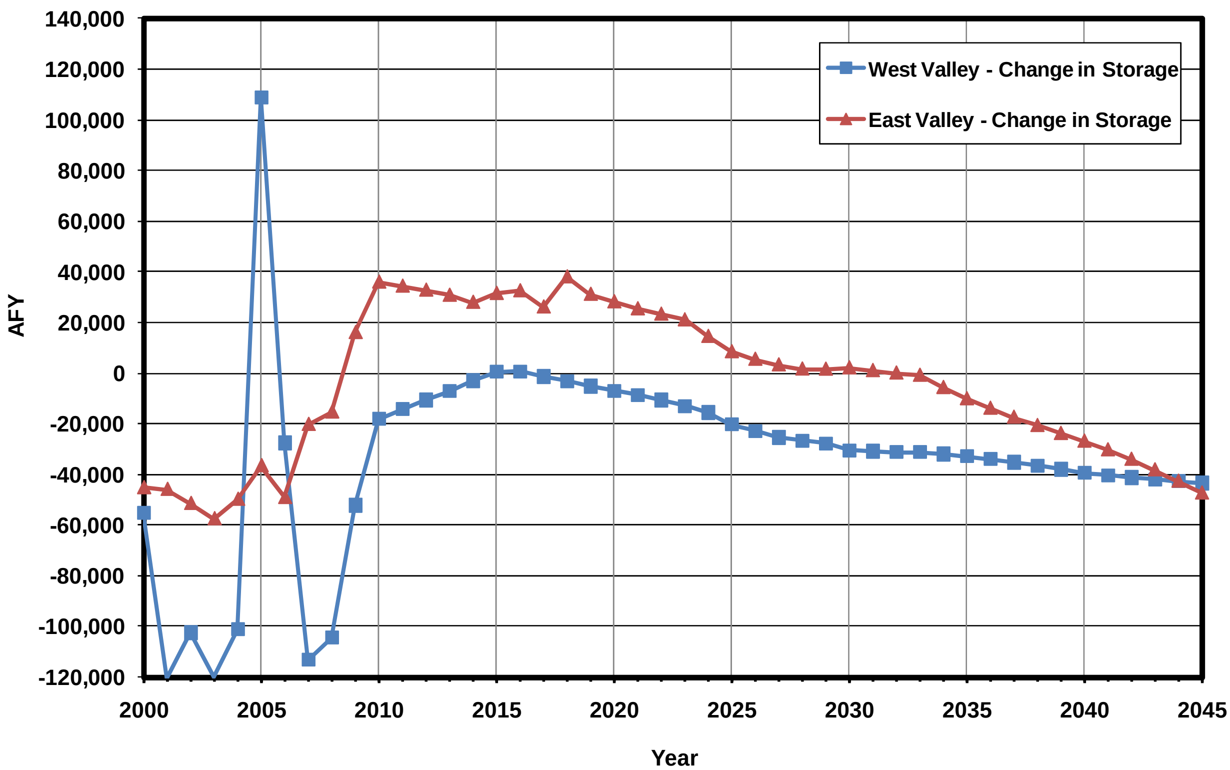
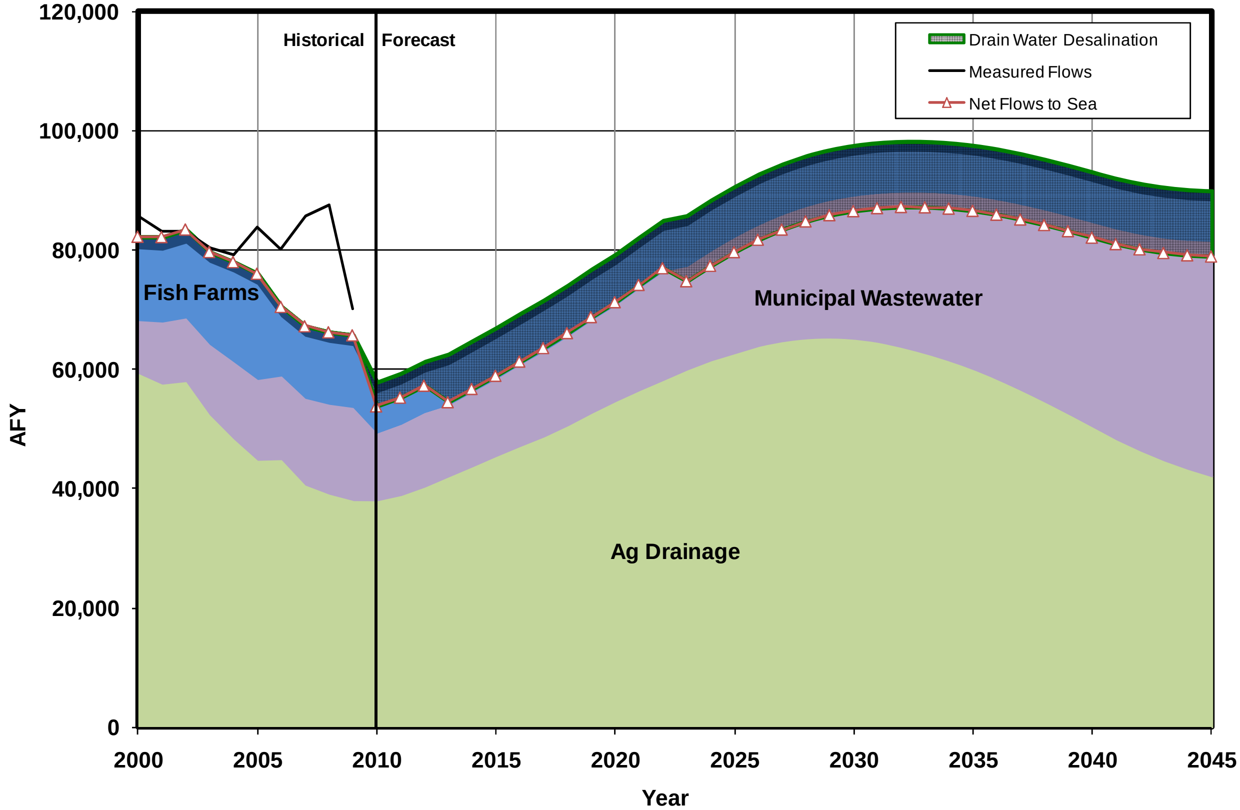


Figure 4-5
Estimated Annual Change in Storage – No Project Alternative



Flows to the Salton Sea consist of agricultural drainage captured by the subsurface drain system, municipal wastewater discharges to the CVSC, fish farm effluent discharged to surface drains and the CVSC, and regulatory water (Canal water releases due scheduling issues). **Figure 4-6** presents estimated flows to the Salton Sea under the No Project Alternative. This chart shows that drainage water initially increases while the East Valley is gaining storage. However, as growth occurs and pumping increases, drainage decreases in response to declining groundwater levels. In addition, wastewater discharges increase as a result of growth. To provide sufficient flow to export salt from the groundwater basin, studies conducted by CVWD indicate that about 90,000 to 100,000 AFY of drain flow may be required.

Figure 4-6
Estimated Annual Flow to Salton Sea – No Project Alternative

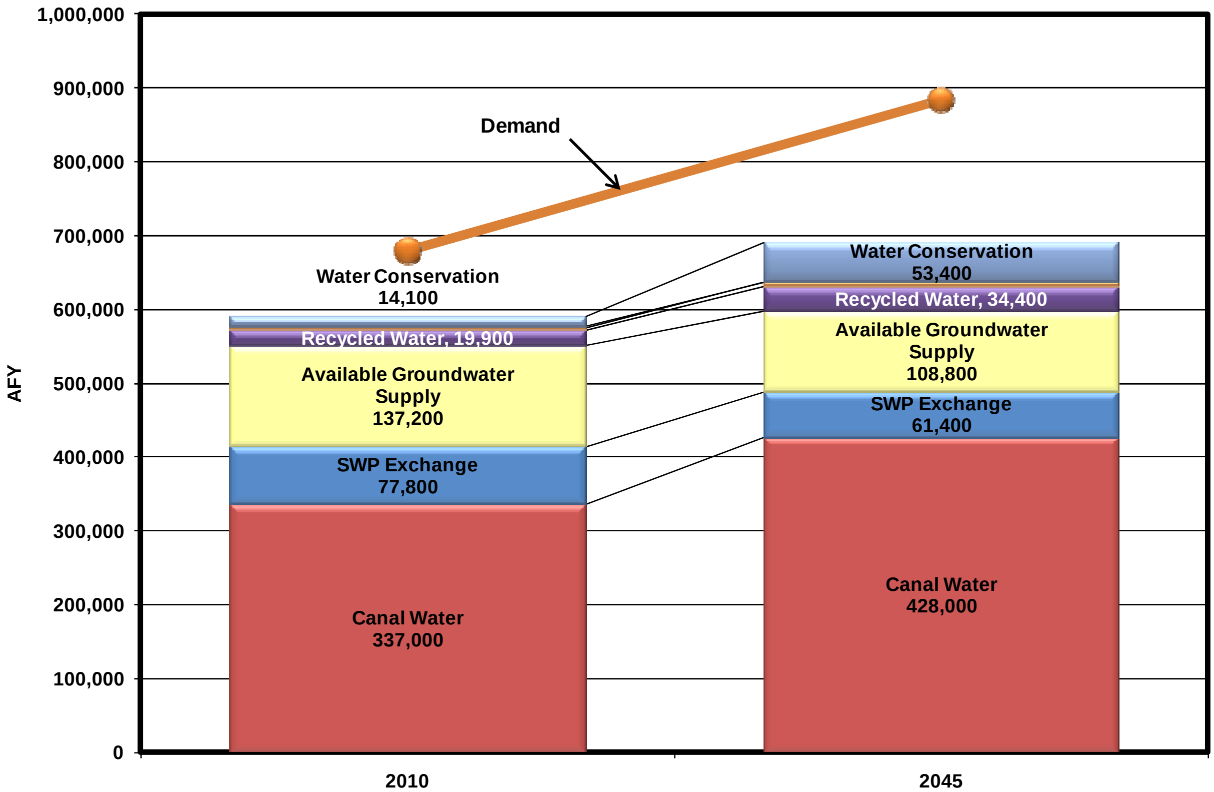


The issues discussed above point out the need to modify the 2002 WMP to adapt to changing conditions. This will require measures to decrease water demands, increase use of Canal water, recycled water and other local resources, acquire additional supplies and manage the groundwater basin. Without these changes, the Valley's water management goal and objectives will not be achieved. Options to accomplish these changes are described in detail in **Section 6**.

4.9 SUMMARY

As described in this section, the Coachella Valley has both imported water and local water sources in its current water supply portfolio. A comparison of the projected water demands (**Table 3-2**) with the currently available supplies is presented in **Figure 4-7**. The figure shows that currently available supplies as planned in the 2002 WMP are not adequate to meet the current demand (2010) or the projected demands in 2045. The Colorado River supply increases significantly due to the QSA. Recycled water use and water conservation also increase due to planned water management activities. Extended drought, climate change, and the recent QSA litigation further increase the uncertainties associated with Colorado River water. Recent and pending water litigation surrounding the endangered species in the Delta, risks associated with levee failure in the Delta, as well as potential variability associated with climate change pose a threat to the reliability of SWP water.

Figure 4-7
Supply and Demand Comparison under Existing Supply Conditions



Notes: 1. See Table 4-2 for Canal water availability in 2010 and 2045.
2. See Table 4-5 for SWP availability.
3. Available groundwater supply is calculated based on the total pumping less recharge and adjusted for change in storage in the East and West Valleys (i.e. overdraft).

The overdraft condition in the East Valley and West Valley groundwater aquifers presents a challenge to both the quantity and the quality of groundwater in the Valley. Future growth and water quality regulations will affect the amount of recycled water available in the Coachella Valley.

Projected growth in the Valley, coupled with uncertain and less reliable future water supplies, is expected to create a supply deficit (gap) as shown in **Figure 4-7** unless new supply sources are developed. The uncertainties surrounding both imported and local water supplies within the Valley make it imperative that the 2010 WMP Update provide a plan to develop new supply sources for the Valley including a contingency factor to assure adequate supplies. A detailed discussion of the future supplies is provided in **Section 6** of this report.

Section 5
Emerging Issues

This section describes emerging issues that may affect the 2010 WMP Update. Some issues that present potential challenges to water management planning in the Coachella Valley have been identified but have not been fully developed. Actions on higher priority issues needing further investigation are included in this Update. However, solutions will be addressed in subsequent planning efforts. A list of issues discussed in this section is presented below:

- Water Quality
    - Basin Plan
    - Salinity Management
    - Groundwater Quality
- Climate Change
- Invasive Species – Quagga Mussels
- State Water Conservation Guidelines
- Subsidence
- Salton Sea Restoration
- Seismic Response

5.1 WATER QUALITY

There are a number of historical, current and future water quality issues that warrant discussion in the 2010 WMP Update. The major issues described below are associated with the Water Quality Control Plan for the Colorado River Basin Region (Region 7, Basin Plan), salinity management in the Valley, and other groundwater quality issues. These issues and recommended future actions for these issues are described below.

5.1.1 Basin Plan

The Water Quality Control Plan for the Colorado River Basin Region (Region 7) (Basin Plan) was prepared and adopted by the Colorado River Basin Regional Water Quality Control Board (Regional Board) in 1993. The planning area includes the Coachella Valley. The Basin Plan was updated with subsequent amendments and was readopted by the Regional Board in June 2006. The Basin Plan was prepared in accordance with the California Porter-Cologne Water Quality Control Act (California Water Code §13000 *et seq.*), the Federal Clean Water Act, and other state and federal rules and regulations. The Plan provides guidelines for optimizing use of state waters within the Colorado River Basin Region by preserving and protecting the quality of these waters. The plan is reviewed periodically by the State Water Resources Control Board (SWRCB) and the U. S. Environmental Protection Agency (USEPA) and updated as necessary.

The various designated beneficial uses of water within Region 7 as described in the Basin Plan include municipal and domestic, agricultural, aquacultural and industrial supply; groundwater recharge; power generation; recreation; and preservation and enhancement of fish and wildlife habitat (Basin Plan 2006). The Basin Plan establishes water quality objectives to ensure the reasonable protection of these beneficial uses. The Basin Plan further describes the implementation programs, projects and actions necessary to achieve these water quality objectives. Policies and issues affecting the Basin Plan and activities related to monitoring and surveillance within the basin are also discussed. The Regional Board implements the Basin Plan by enforcing waste discharge requirements through permits.

5.1.1.1 Triennial Review and Potential Basin Plan Amendments

The Federal Clean Water Act (Section 303 (c)) requires states to hold public hearings for review of the water quality standards at least once every three years. At the end of the triennial public hearings, the Regional Board prepares a priority list of potential water quality problems with the Basin Plan. Plan amendments are then issued to address the identified problems. Amendments can also be prepared to address any urgent issues (not identified in the triennial review) or to reflect new legislation.

The most recent Triennial Review for the Region 7 Basin was in 2007. A Work Plan was completed in January 2008. There were 13 issues identified in the 2007 Triennial Review. Five of these issues were given "High" priority, while the rest had a "Medium" priority. Four out of these five high priority issues affect the Coachella Valley and are briefly discussed below:

Issue 3: Bacteriological Water Quality Objectives and Associated Monitoring Requirements

The proposed revisions to the Basin Plan are: 1) reduce the number of bacterial indicator organisms for surface water quality from three (fecal coliform, *E. coli*, and enterococci) to one bacteria indicator organism (*E. coli*); 2) clarify which indicator organisms apply to which surface waters of the Region, and 3) develop site-specific objectives. A Basin Plan Amendment was adopted in May 2010 (Regional Board Resolutions R7-2010-0027, R7-2010-0028).

Issue 4: Critical Flow Rates in the Coachella Valley Stormwater Channel (CVSC) and their Temporal Impact on Certain Beneficial Uses of the Channel

The Triennial Review identified that storm events in the Coachella Valley result in extremely high flows in the CVSC. These high flows pose a public health and safety hazard. These events also hamper some of the beneficial uses of the CVSC, such as recreation. A Basin Plan amendment addressing this situation is recommended.

Issue 5: Policy to Address Discharges of Agricultural Wastewater

The Triennial Review identified that discharges of agricultural return flows in the Coachella Valley fail to comply with the California Water Code Section 13269 because the existing waivers issued for these discharges have expired. These discharges might have potential and/or actual impacts on the waters of the Region. The Basin Plan amendment will address this water quality control policy issue.

Issue 6: Clarification of State Anti-degradation Policy – State Water Resources Control Board (SWRCB) Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California"

The Regional Board staff recommended that, in order to show consistency between the SWRCB anti-degradation policy and the federal anti-degradation policy, the Basin Plan should include a discussion on how the State Non-point Source Program implements the policy.

The specifics of the proposed changes to the Basin Plan are not available at this time. CVWD continues to actively participate in the development of these changes and will address issues arising from these changes in future Plan updates.

5.1.1.2 303(d) List and TMDLs

Section 303(d) of the federal Clean Water Act requires states, territories and authorized tribes to prepare a list of water bodies that do not or are not expected to attain water quality standards after application of required technology-based controls. The 303(d) list includes the size of the water body, the sampled pollutants affecting designated beneficial uses, the source of the pollutant, and the water body's priority status with regard to developing Total Maximum Daily Loads (TMDLs). To develop a means of correcting these conditions, the statute (Section 303 (c)(1) of the Clean Water Act and California Water Code Section 13240) allows for development of total maximum daily loads (TMDL) to set limits on discharged pollutants that will overcome impairment of water quality. The 303(d) lists are prepared as part of the Water Quality Assessment of the State's major waterbodies, and meet a requirement of section 303(d) of the Clean Water Act.

The Regional Board is currently updating the 303(d) list of impaired water bodies in Region 7. Proposed changes to the list that affect the Coachella Valley are presented below.

CVSC

The TMDLs specified for the CVSC under the 2006 303(d) list are shown in **Table 5-1.**

Table 5-1
TMDLs for the CVSC

TMDL Name	Source	TMDL Completion Date	Comments
Pathogens	Unknown	2014	Found along a 17-mile stretch from Dillon Rd. to Salton Sea.
Toxaphene	Unknown	2019	Used as an insecticide until 1982. Found in the CVSC along a two-mile stretch from Lincoln St. to Salton Sea.
Dichlorodiphenyltrichloroethane (DDT)	Unknown	2021	Used as a pesticide until early 1970s. Found in analysis of fish tissue samples collected between 1986 and 2000.
Dieldrin	Unknown	2021	Used as a pesticide until 1974. Found in analysis of fish tissue samples collected between 1986 and 2000.
Polychlorinated biphenyls (PCBs)	Unknown	2021	Used as coolants and lubricants in electrical equipment until 1977. Found in analysis of fish tissue samples collected between 1986 and 2000.

Source: Colorado River Basin Regional Board, 303(d) TMDL list.

Salton Sea

Table 5-2 presents the TMDLs included in the 303(d) list adopted by the SWRCB Region 7.

Table 5-2
TMDLs for the Salton Sea

TMDL Name	Source	TMDL Completion Date	Comments
Nutrients	Industrial point source, agricultural return flows, out-of-state flows	2006	Phosphorus is the primary concern.
Salinity	Agricultural return flows, out-of-state flows	2019	Need to address this issue by developing an engineering solution collectively with federal, local, and state cooperation.
Selenium	Agricultural return flows	2019	Naturally occurring element in soil. Gets leached out into the water in agricultural drains.
Arsenic	Unknown	2021	Naturally-occurring element in earth's crust. Observed in analysis of fish tissue sample collected between 1985 and 2000.
Chlorpyrifos	Unknown	2021	Used as a household and on-farm insecticide. Found in analysis of fish tissue samples collected between 1996 and 1997.
Dichlorodiphenyltrichloroethane (DDT)	Unknown	2021	Used as a pesticide until early 1970s. Found in analysis of fish tissue samples collected between 1980 and 2000.
Diazinon	Unknown	2021	Used as a pesticide. Found in analysis of fish tissue samples collected between 1996 and 1997.
Enterococcus	Unknown	2021	Genus of lactic acid bacteria. Exceedances observed in samples collected between 2002 and 2003.

Source: Colorado River Basin Regional Board, 303(d) TMDL list.

Specific actions to address these TMDLs will be developed separately in the future and are not addressed in the 2010 WMP Update. These actions might include increased monitoring, development of new treatment technologies, and implementation of additional best management practices (BMPs).

5.1.2 Salinity Management

Salinity management is an important water quality issue in the Coachella Valley. Use of imported water for recharge, agricultural irrigation and municipal irrigation directly results in the addition of salt into the basin. Some areas in the Valley such as the Oasis and Salton City have naturally-occurring high salinity groundwater. If the activities in the basin are not managed properly, the salt could eventually migrate to the Lower aquifer and result in long-term water quality degradation in the groundwater basin.

5.1.2.1 Impacts of Colorado River Water Recharge

Colorado River water used for direct delivery and recharge in the Coachella Valley has higher TDS concentrations on average than most of the local groundwater. Based on historical and projected variations in Colorado River water quality, the TDS range for the SWP Exchange water recharged at the Whitewater River Recharge Facility is 530 to 750 mg/L, averaging 636 mg/L since 1973. SWP Exchange water is Colorado River water delivered via the Colorado River Aqueduct (see **Section 4.1.3**). The TDS range for the Colorado River water delivered via the Coachella Canal is 625 mg/L to 975 mg/L averaging 790 mg/L over the past 60 years. This water is used for recharge in the East Valley.

During the 1930s, TDS concentrations in groundwater throughout the Coachella Valley averaged less than 250 mg/L. In the 1970s, the groundwater typically contained 300 mg/L TDS in the Upper aquifer and 150 to 200 mg/L TDS in the Lower aquifer (WMP, 2002). More recent data show that the TDS in the Upper aquifer averages about 834 mg/L. In the Lower aquifer, TDS concentrations average 355 mg/L (CVWD, 2005). A detailed Valley-wide TDS study will be conducted to better gauge the extent of water quality degradation due to Colorado River water recharge.

CVWD has recharged SWP Exchange water at the Whitewater River Recharge Facility in the West Valley since 1973. In 2009, recharge began at the Thomas E. Levy Groundwater Replenishment Facility Levy in the East Valley. One of the primary elements of both the 2002 WMP and this 2010 WMP Update is continued recharge of Colorado River water to eliminate overdraft in the Valley. After 37 years of operation, TDS levels in wells near the Whitewater River Recharge Facility have increased, while wells farther away have shown little change in quality.

The District is investigating alternatives to reduce water quality impacts of Colorado River recharge. One of these alternatives is direct importation and recharge of lower TDS SWP water. Average TDS concentration (between 1973 and 2009) of the SWP water was 245 mg/L (Lake Silverwood at Devil Canyon). CVWD and DWA, along with other partner agencies, are evaluating the feasibility of importing SWP water to the Coachella Valley via a direct connection to the SWP. The SWP extension would terminate at the Whitewater and Mission Creek spreading facilities. The preliminary construction cost estimate for the aqueduct is between $800 million and $1.5 billion. This project could significantly increase the cost of providing water to Coachella Valley customers, and it would provide water only for recharge in the West Valley, as there are no plans to convey SWP water to the East Valley recharge sites due to the distance, cost, and lack of supply.

Another alternative is the treatment of Colorado River water before recharge. One of the primary deterrents to this alternative is cost. According to preliminary estimates developed for CVWD, the cost of treating Canal water would range from $538 per AF (TDS = 500 mg/L) to $685 per AF (TDS = 250 mg/L). Costs for treating Metropolitan Colorado River aqueduct water (Whitewater) would range from $460 per AF (TDS = 500 mg/L) to $595 per AF (TDS = 250 mg/L). Urban water users in the Valley on an average consume approximately one AF of water annually per connection. Based on this figure, treatment of Colorado River water before recharge could increase the annual water bill for an average customer by up to $450. For major pumpers such as golf courses, the annual impact would be as much as a three to seven fold increase over their current costs.

In summary, the use of Colorado River water for recharge increases salinity in the Valley groundwater basin. The impact of the salinity increase has not been clearly identified. Potential alternatives being investigated to mitigate this condition have high costs. The scope and importance of this Valley-wide issue makes it an ideal candidate for discussion in a forum such as the Integrated Regional Water Management Plan (IRWMP).

5.1.2.2 Recycled Water Use Policy

Recycled municipal wastewater has historically been used for irrigation of golf courses, other municipal greenbelts and landscaped areas in the Coachella Valley. Based on file data from CVWD and DWA, recycled water usage in the West Valley is approximately 12,400 AFY (8,200 AFY CVWD usage, 4,200 AFY DWA usage). Recycled water usage in the East Valley is approximately 700 AFY and is mainly for agricultural irrigation, duck clubs and fish farms. As discussed in **Section 4.5**, the amount of municipal wastewater available for reuse is expected to increase 150 percent by 2045. This water represents a valuable resource that needs to be put to beneficial use to reduce groundwater overdraft.

The SWRCB adopted a Recycled Water Use Policy in February 2009 to regulate the quality and the quantity of recycled water used throughout the state. The goals of this policy are to:

- increase the use of recycled water by at least 1 million AFY over the 2002 levels by 2020 and by 2 million AFY by 2030,
- increase the use of stormwater by at least 500,000 AFY over 2007 levels by 2020 and by 1 million AFY by 2030,
- increase urban and industrial water conservation by 20 percent over the 2007 levels by 2020, and
- substitute potable water with recycled water to the maximum possible extent by 2030.

This policy provides guidelines for appropriate criteria to be used by regulating agencies (Regional and State Water Boards) for issuing permits for recycled water projects. The State will address the conservation and storm water use goals of this policy (listed above) under separate policies.

According to the policy, substitution of recycled water, which is sufficiently treated and which does not have any adverse health or environmental impacts, for potable water, groundwater, or surface water is considered to have beneficial effects.

- The SWRCB has also established a mandate to increase the beneficial use of recycled water within California by 200,000 AFY by 2020 and by an additional 300,000 AFY by 2030.
- Agencies producing recycled water and not putting it to beneficial use shall make this water available to other water purveyors for reuse on reasonable terms and conditions.
- Pursuant to the California Water Code Section 13550 *et seq*., the SWRCB considers it a waste and unreasonable use of water by water agencies if recycled water of adequate quality is available and not put to beneficial use.

These mandates are contingent upon sufficient funding available for the construction of recycled water projects. Development and use of additional recycled water within the Coachella Valley will contribute toward meeting these goals and mandates.

The policy defined the roles of the SWRCB, the Regional Boards, the California Department of Public Health (CDPH), DWR and California Public Utilities Commission (CPUC) in connection with recycled water projects. The policy also requires the preparation of salt/nutrient management plans as discussed below.

5.1.2.3 Salt/Nutrient Management Plans

Some groundwater basins in the state contain salts and nutrients that exceed or threaten to exceed the water quality objectives established by the applicable Basin Plan. At this time, not all Basin Plans incorporate measures for achieving compliance with the water quality objectives for salts and nutrients (SWRCB, Recycled Water Use Policy, February 2009). Over and above recycled water, there are a number of other sources adding salt/nutrients to groundwater such as waste discharge and irrigation using surface water. Consequently, the SWRCB recognized that regulation of recycled water alone will not address these conditions.

The SWRCB Recycled Water Use Policy described previously requires every region in the state to develop a salt/nutrient management plan by 2014. The salt/nutrient management plans are intended for management of all sources contributing salt/nutrients on a basin-wide or watershed-wide basis to ensure that water quality objectives are achieved. The content and length of the plans will vary based on factors such as size and complexity of the basin, source water quality, hydrogeology, stormwater recharge, aquifer water quality and other factors. As specified in the policy, the plans will include:

- Basin/subbasin-wide water quality monitoring plan with an appropriate network of monitoring locations
- Annual monitoring of emerging constituents (e.g., personal care products or pharmaceuticals, endocrine disruptors)
- Water recycling and stormwater recharge/use goals and objectives
- Salt and nutrient source identification, basin/subbasin assimilative capacity and loading estimates
- Transport of salts and nutrients
- Implementation measures to manage salt and nutrient loading in the basin on a sustainable basis
- Anti-degradation analysis

The local water and wastewater entities, together with local salt/nutrient contributing stakeholders, will fund locally driven and controlled salt/nutrient management plans. The plans are to be developed using collaborative processes open to all stakeholders and will include compliance with CEQA and participation by Regional Board staff. The plans are to address and implement provisions for all sources of salt and/or nutrients to groundwater basins, including recycled water irrigation projects and groundwater recharge reuse projects.

5.1.2.4 Anti-degradation vs. Maximum Benefit

SWRCB's Resolution No. 68-16, also referred to as the Anti-degradation Policy, is incorporated into all Basin Plans. The policy applies to high quality waters (surface water as well as groundwater) and requires that the high quality be maintained to the maximum extent possible. The policy allows for degradation if the change is consistent with maximum benefit to the people of the state, such a change does not adversely affect the beneficial uses, and does not result in water quality lower than the acceptable standards.

The policy also considers the use of recycled water for landscape irrigation in accordance with this policy as a beneficial use. Regardless of the source, irrigation activities over time result in degradation of groundwater quality. The SWRCB intends to address this impact by requiring development of salt/nutrient management plans described earlier.

Historically, the Regional Board has recognized the importance of groundwater recharge using Colorado River water to control overdraft and in spite of the higher TDS of this supply. Consequently, the Board has not taken a formal position on recharge with Colorado River water but has encouraged water conservation and recycling (Regional Board, 2006). It will continue to be important that CVWD, DWA and the other valley water agencies and tribes work together to with the Regional Board to develop policies and implementation plans that balance overdraft elimination with water quality protection.

5.1.2.5 Emerging Constituents/Chemicals of Emerging Concerns

There are provisions in the SWRCB Recycled Water Policy to regulate emerging contaminants (ECs). The policy acknowledges the incomplete and evolving knowledge of ECs and provides for research and development of analytical methods to determine potential environmental and public health impacts of ECs. The impact this regulation would have on water management planning efforts in the Coachella Valley is not known at this time. CVWD and other water purveyors in the Valley will continue to monitor the development of this regulation and will take appropriate action in the future to address issues arising from it.

5.1.2.6 Brine Discharge/Management

The Basin Plan prohibits the discharge of brine to facilities that ultimately discharge in areas where such wastes can percolate to groundwater usable for domestic and municipal purposes.

CVWD currently employs offsite hauling and disposal of brine produced by arsenic treatment at three East Valley wells. Because offsite hauling is a cost-prohibitive method of brine disposal, CVWD is evaluating alternative methods. The 2010 WMP Update is considering desalination of Canal water (approximately 90,000 AFY) and drain water from the CVSC (up to 90,000 AFY) for urban and agricultural use in the Valley as water supply options. Desalination of additional Colorado River water used for groundwater recharge (up to 80,000 AFY) has been suggested by some stakeholders. Treatment at these levels would result in production of large volumes of brine (up to 40 mgd of brine assuming an 85 percent recovery rate), which would need to be disposed off in a cost-effective manner and in compliance with the Basin Plan requirements. Some of the options for brine disposal, along with the associated issues to be considered, are:

- Brine evaporation ponds – These are shallow, lined ponds that allow water to evaporate leaving the salt behind. The salt is then hauled away by trucks. The principal environmental concern associated with brine evaporation ponds is that pond leakage could result in groundwater contamination. Also, land acquisition costs should be considered since substantial amounts of land would be required.
- Re-concentration – This involves use of mechanical evaporators to heat the brine solution to boiling temperature. Water evaporates, leaving highly concentrated brine solution for final disposal.
- Deep Well Injection – This technology involves injecting the brine into wells that vary in depth from a few hundred feet to several thousand feet, depending on the geology of the selected site. This method is considered to be one of the most cost effective methods of brine disposal.
- Brine Pipeline – This involves construction of a dedicated pipeline to transfer the brine to the Salton Sea. The primary environmental consideration is the feasibility of using the brine for salt marsh habitat creation around the Salton Sea.
- A combination of the above options can also be used to achieve zero liquid discharge (ZLD).

Based on the above, brine discharge and management will be a major issue in the Coachella Valley in the future. A detailed study should be conducted to evaluate brine disposal alternatives and to select the most cost-effective and environmentally feasible alternative.

5.1.2.7 Agricultural Drainage Discharge Waivers

The California Water Code authorizes State and Regional Boards to conditionally waive waste discharge requirements (WDRs) if this is in the best interest of the public. Historically, the waivers required that the discharges not cause violations of water quality objectives but did not require any water quality monitoring.

Discharges from agricultural lands are irrigation return flow, flows from tile drains, and storm water runoff. These discharges can affect water quality by transporting pollutants such as pesticides, sediment, nutrients, salts (including selenium and boron), pathogens, and heavy metals from fields to surface waters.

As described earlier, the existing waivers issued to CVWD for these discharges have expired. Pursuant to Water Code Section 13269, the Regional Board must develop water quality control policy to address potential and/or actual impacts of these discharges on the waters of the Region. The Colorado River Basin Regional Board has adopted conditional prohibitions as a TMDL implementation plan is incorporated into the Basin Plan (CRRWQCB, 2010). The impacts of any new regulation/policy adopted in the future on this Plan Update are not clear at this time. Appropriate action to resolve this issue will be developed in subsequent updates once the specifics of this regulation become available.

5.1.3 Groundwater Quality

Groundwater quality in the Coachella Valley varies with depth, proximity to faults, presence of surface contaminants, proximity to recharge basins, and other hydrogeologic or cultural features.

Current and emerging groundwater quality issues considered in the 2010 WMP Update consist of salinity, arsenic, perchlorate, chromium-6, uranium, nitrate, carcinogens and endocrine disrupting compounds. With the exception of salinity which is discussed above under "Impacts of Colorado River Water Recharge", these water quality issues are discussed below.

5.1.3.1 Arsenic

Arsenic is a naturally occurring element found in the earth's crust. It is found to have carcinogenic and non-carcinogenic effects on health if ingested at high levels over a long period of time. Before 2001, the primary (health-based) drinking water standard for arsenic was 50 micrograms per liter (µg/L). Under the 1996 Amendments to the Safe Drinking Water Act, the U.S. Environmental Protection Agency (USEPA) was required to publish a revised standard for arsenic by January 2001. USEPA published a final Maximum Contaminant Limit (MCL) for arsenic of 10 µg/L on October 31, 2001. The new standard became enforceable on January 22, 2006. California adopted the federal MCL effective November 28, 2008.

Arsenic concentrations as high as 162 µg/L have been observed in some East Valley municipal water supply wells (CVWD 2005 water quality data). In anticipation of the new regulations, CVWD commenced studies in 2004 to evaluate and design facilities to meet the new arsenic standard at several of its municipal wells that exceeded the new requirements. Three groundwater treatment facilities were constructed using an ion-exchange process with a brine minimization and treatment process that produces a small volume of non-RCRA hazardous solid waste and a non-hazardous liquid waste. These facilities became operational in early 2006 and continue to operate. If needed, they can be expanded to treat additional wells in the future. The waste brine produced by the treatment process is hauled by trucks to Lakeland Processing Company located in Santa Fe Springs for final disposal.

Several mobile home and RV parks in the East Valley that use private wells have arsenic levels exceeding the drinking water regulations. Several Tribal wells providing domestic water also have arsenic levels that exceed the MCL. In Coachella and the unincorporated East Valley communities of Mecca, Oasis and Thermal, Riverside County environmental health officials have identified wells at 19 mobile home and RV parks that recently tested positive for high levels of arsenic ranging from 12 to 91 µg/L (Desert Sun, 2009). These parks are served by private wells and are located some distance from CVWD's potable water system. About half of the parks have installed treatment filters to reduce the arsenic levels. CVWD and other stakeholders have applied for funding to develop a regional solution for the arsenic issue.

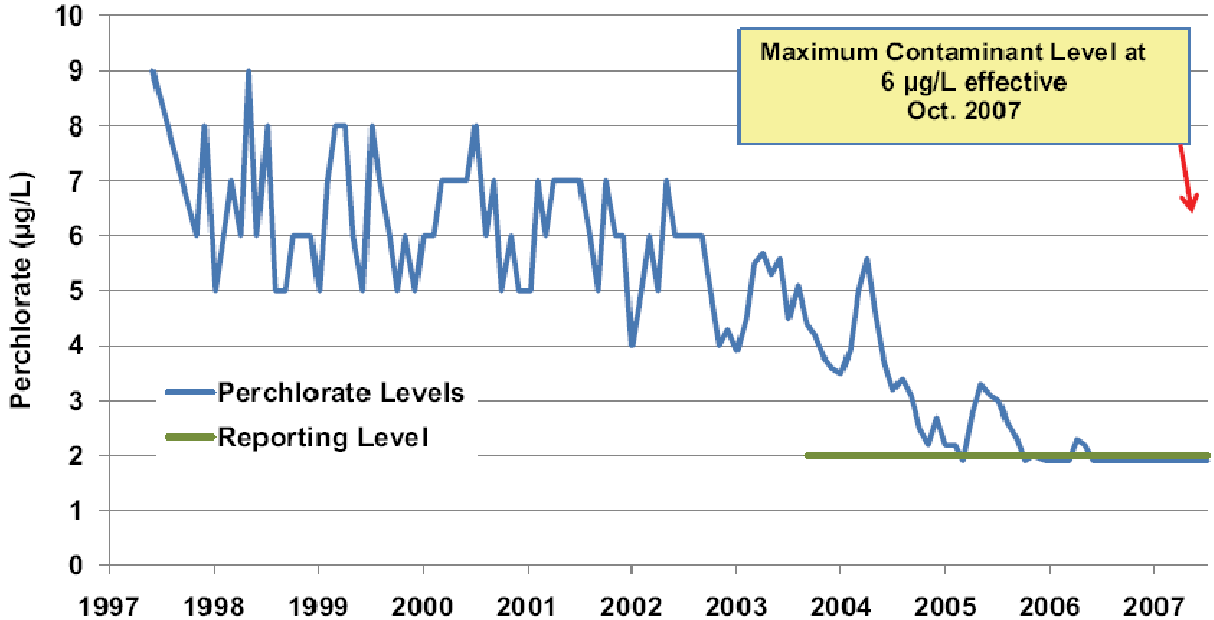
5.1.3.2 Perchlorate

Perchlorate is used for ignition of solid rocket fuel. Perchlorate salts are also found in roadside flares and airbag inflators and are used in the manufacture of matches. Perchlorates are highly soluble in water. Perchlorate reduces production of thyroid hormones in the thyroid gland. The state MCL for perchlorate is 6 µg/L.

Perchlorate found in Colorado River water imported to the Coachella Valley originated from the Kerr-McGee plant in Nevada on Las Vegas Wash upstream of Lake Mead. Colorado River water used in the past for irrigation and recharge in the East Valley led to perchlorate contamination of the groundwater.

Perchlorate seep capture and treatment was initiated in 1999 in Nevada at three different locations. This has resulted in significant reduction in perchlorate concentration in the Lower Colorado River. As shown on **Figure 5-1**, perchlorate concentrations have steadily declined since the initiation of treatment and have reached levels below the state reporting level of 2 µg/L. Based on CDPH's water quality database, quarterly perchlorate data at Lake Havasu near Whitsett intake for 2008 and 2009 show levels below the state reporting level of 2 µg/L, with just one reading of 2.3 µg/L in the second quarter of 2008. Although perchlorate contamination in Colorado River water is no longer a major concern, CVWD monitors the water quality of Canal water annually. Its groundwater wells have been monitored several times between 2000 and 2009 with no detectable perchlorate. Future monitoring of CVWD wells will be on a nine-year cycle. DWA detected low levels of perchlorate (below the MCL) in two of its wells in 2006 and 2008.

Figure 5-1
Perchlorate Concentrations at Lake Havasu



Source: Metropolitan Water District of Southern California Annual Report 2007

Because only a few monitored wells have detectable perchlorate levels, the extent of perchlorate in groundwater is not believed to be significant.

5.1.3.3 Chromium-6

Chromium-6 is currently regulated in California under the 50 µg/L MCL for total chromium. California's MCL for total chromium was established in 1977 under what was then a "National Interim Drinking Water Standard" for chromium. The total chromium MCL was established to address exposures to chromium-6, which is considered to be the more toxic form of chromium.

A public health goal (PHG) for chromium-6 has not yet been established, so the CDPH cannot proceed with the MCL process (CDPH, 2009).

Currently there are no wells in the Coachella Valley that exceed the 50 µg/L total chromium MCL. Coachella Valley water purveyors should continue monitoring the chromium-6 PHG and MCL process and take appropriate action in order to comply with the chromium-6 regulation.

5.1.3.4 Uranium

There are two possible sources of uranium in the Coachella Valley. The first is naturally occurring uranium in the geologic formations of the basin. And the second is contamination along the Colorado River. There has not been enough investigation done to determine the exact source of uranium in the Valley.

One of the country's largest uranium deposits was found in Moab, Utah, located along the Colorado River, in 1952. A uranium reduction mill was operated at this site until 1984. Waste slurry from the uranium reduction process was stored in unlined ponds near the river. These ponds were capped after the mill was shut down. It is believed that waste was leaching from the ponds and contaminating the river with radioactive material (USDOE, 2009).

The site is currently under the control of the U.S. Department of Energy (DOE). The DOE is undertaking a project to move 10.8 million tons of radioactive tailings by rail to a lined pit in Crescent Junction, Utah, about 30 miles from the Colorado River. The removal is expected to take approximately 20 years.

Trace uranium levels have been observed in the groundwater in the Cove communities and Indio Hills system in the Valley. These traces are believed to be naturally occurring and there is no evidence linking the uranium found in the Valley groundwater to Colorado River water. CVWD conducts annual testing of the Colorado River water in the Canal for uranium. Based on sampling in the Canal, uranium concentrations over the last four years have varied from 3.5 pCi/L to 6.1 pCi/L, with the most recent reading of 3.5 pCi/L (May 2010), which is well below the California MCL of 20 pCi/L.

CVWD and other Valley agencies (MSWD, DWA, City of Indio, City of Coachella) will continue to monitor for radioactive materials in the Colorado River water used for recharge.

5.1.3.5 Nitrate

Nitrate is a nitrogen compound that is a nutrient and can also have public health implications in drinking water, especially for babies. The primary drinking water standard for nitrate is 10 mg/L as nitrogen (45 mg/L as nitrate). Higher concentrations of nitrate (as high as 40 mg/L as N in Cove Communities based on CVWD's 2008-09 Annual Review and Water Quality Report) exist in some of the shallower portions of the Coachella Valley groundwater basin. Sources of nitrate include nitrogen-based fertilizers used for agriculture, golf courses and landscaping; septic tank discharges; wastewater disposal through percolation; natural sources like mesquite hummocks; and alluvial fan formations. Generally, nitrates are found in the unsaturated and shallow aquifer zones above 300 to 400 feet, and have not been observed in the deeper aquifer zones below 500 feet. Activities in the basin that could cause nitrate to leach into higher quality groundwater include recharge, pumping, and overdraft reduction.

Nitrate does not adsorb to aquifer sediments and readily migrates in groundwater. Steps that can be taken to reduce the risk of nitrate migration include:

- Locating recharge activities away from areas known or expected to have higher nitrate contamination in shallow aquifer zones.

- Avoid pumping in areas known to have nitrate concentrations that can be leached downward by pumping into lower aquifer zones

- Monitor areas of high nitrate concentration to ensure that they do not become oversaturated as overdraft reduction occurs.

- In areas where shallow pumping can prevent nitrate concentrations from leaching into the deeper aquifer, consider implementing ion exchange treatment or similar approach to remove the nitrate from the pumped groundwater.

5.1.3.6 Carcinogens

The USEPA is considering a new strategy to tighten restrictions on four waterborne compounds that can cause cancer. The four compounds to be addressed as a group are tetrachloroethylene (PCE), an organic compound used in dry cleaning; trichloroethylene (TCE), an organic compound used as an industrial solvent; acrylamide, a compound used in manufacturing; and epichlorohydrin, an organic compound used in plastic manufacturing. Under the new strategy being explored by USEPA, the agency would address chemical contaminants as a group for more expeditious and cost-effective enforcement. This strategy would also foster development of new water-treatment technologies, and partnerships with states to better monitor public water systems. CVWD should continue to monitor for the above constituents and track the development of the new USEPA strategy. Any action that would be required to address the issue of carcinogens in the Coachella Valley, as the new strategy evolves, might be developed in future updates of this Plan Update.

5.1.3.7 Endocrine Disrupting Compounds

There is growing interest by regulatory agencies in possible effects of endocrine disrupting compounds (EDCs) in drinking water and groundwater. EDCs are a class of chemicals that interfere with the natural action of hormones in the body, and are thought to interfere with the reproductive systems of both wildlife and humans. EDCs encompass a wide range of contaminants that include some pesticides and a number of chemicals that may be used in residential, commercial and industrial applications. Some pharmaceuticals and personal care products such as antibiotics, prescription drugs, shampoos and cleansers have also been implicated as potential EDCs.

To date, the documented levels of these compounds in drinking water are generally low, at the low end of the parts per trillion range. Most drinking water standards are set in the mg/L or µg/L range, which are 1,000 to 10,000 times higher than the levels at which EDCs are typically detected in water supplies. What is not presently known is the importance of detection at such low levels, since these compounds may have the potential for impact at low concentrations. Sex abnormalities in aquatic organisms in relation to wastewater discharge and other possible influences in the Potomac River and other rivers are consistent with hormonal imbalances in which EDCs may play a role (USFWS, 2003). The mode of exposure of these populations is quite different and more intense than human exposure by drinking water, making extrapolation questionable. The issue of importance to drinking water is not presently resolved.

Several water treatment technologies can remove EDCs, including nanofiltration and reverse osmosis. Coachella Valley water purveyors should continue to monitor this issue along with the associated regulations and take appropriate action in the future.

5.2 CLIMATE CHANGE

Climate change has the potential to affect Coachella Valley's two major sources of imported water: the Colorado River and the SWP. Potential effects of global warming could also increase water demand within the Coachella Valley.

5.2.1 Colorado River Basin

Precise estimates of future impacts of climate change on runoff throughout the Colorado River basin are not currently available (Reclamation, 2007). These impacts may include decrease in annual flow and increased variability, including more frequent and more severe droughts (see **Section 4.6.1.1**). Furthermore, even without precise knowledge of the effects, increasing temperatures alone would likely increase losses due to evaporation and sublimation, resulting in reduced runoff.

Increased air temperature will result in earlier snow melt runoff and a greater proportion of runoff due to rainfall. Because reservoir storage in the Colorado River basin is so large in comparison to annual basin runoff (roughly four times average runoff), a change in the timing of annual runoff would not be expected to significantly affect basin yield (DWR, 2006).

Potential changes in the amount of precipitation received by the Colorado River basin could affect basin yield. Warmer temperatures could also be expected to increase water demands and increase evaporation from reservoirs and canals. While changes in any particular location will likely be small, the aggregate change for the basin could be significant because so much land is involved. No reliable quantitative estimates of potential changes in precipitation (or increased demand) are available (Reclamation, 2007).

Climate changes impacts were evaluated in the Environmental Impact Study (EIS) on the "Colorado River Interim Guidelines for East Basin Shortages and Coordinated Operations for Lakes Powell and Mead," (Reclamation, 2007). The guidelines extend only through 2026, providing the opportunity to gain valuable operating experience through the management of Lake Powell and Lake Mead, particularly for low flow reservoir conditions, and to improve the bases for making additional future operational decisions during the interim period and thereafter.

The shortage sharing guidelines are crafted to include operational elements that would respond if potential impacts of climate change and increased hydrologic variability occur. The guidelines include coordinated operational elements that allow for adjustment of Lake Powell releases to respond to low average storage conditions in Lake Powell or Lake Mead. In addition, the guidelines enhance conservation opportunities in lower basin and retention of water in Lake Mead.

While impacts from climate change cannot be quantified at this time, the interim guidelines should provide additional protection against impacts of shortage sharing at least through 2026. Coachella Valley water supplies are protected from impacts of climate change and corresponding shortages by 1) California's first priority for Colorado River water supplies in the lower

Colorado River basin, and 2) Coachella's high priority for Colorado River supplies among California users of Colorado River water.

5.2.2 State Water Project

To assess impacts of climate change on the SWP, DWR evaluated four scenarios generated from two different Global Climate Models (GCMs), a Geophysical Fluid Dynamic Lab (GFDL) model and a Parallel Climate Model (PCM). All four scenarios predict a warming trend for California. The likelihood of any one of these scenarios occurring over another has not been assessed (DWR, 2006). DWR conducted an updated analysis using six different global climate models in 2009. The analysis shows a 7 percent to 10 percent reduction in Delta exports by mid century and up to 25 percent reduction by the end of the century. Reservoir carryover storage is projected to decrease by 15 percent to 19 percent by mid century and up to 38 percent by the end of the century.

The models also projected a change in the timing of runoff from the Sierra Nevada and the southern end of the Cascades. More runoff will occur in the winter and less in the spring and summer, making it more difficult for the SWP to capture water and deliver it to contractors.

The 2006 study performed by DWR predicted significant declines in SWP deliveries. **Table 5-3** presents potential impacts on SWP water deliveries.

Table 5-3
Impacts of Five Climate Change Scenarios on State Water Project Table A and Article 21 Average Deliveries (for 2020)

Scenario	Table A			Article 21		
	Average	Difference		Average	Difference	
	TAFY*	TAFY	%	TAFY	TAFY	%
BASE	3,186	0	0	99	0	0
GFDL A2	2,879	-307	-9.6	106	7	7.1
PCM A2	2,964	-222	-7.0	103	4	4.0
GFDL B1	2,861	-325	-10.2	101	2	2.0
PCM B1	3,224	+38	+1.2	88	-11	11.1

TAFY = Thousand acre-feet per year
GFDL = National Oceanic and Atmospheric Administration Geophysical Fluid Dynamics Laboratory CM2.1 model
PCM = Parallel Climate Model
Source: Progress on Incorporating Climate Change into Management of California's Water Resources, DWR, July 2006

DWR assessed the impacts of climate change on SWP Table A and Article 21 deliveries in 2007 and 2009. The assessment included the impact of court rulings to protect the endangered Delta smelt. A review of the effects of climate change, as presented in DWR's 2009 SWP Reliability Report (DWR, 2009), indicates that climate change could decrease average SWP deliveries by as much as 5 percent by 2029 based on interpolation of the 2006 climate change report.

The average SWP reliability factor of 50 percent of Table A Amount used in the 2010 WMP Update is believed to account for potential climate change impacts on supply through 2045.

5.2.3 Coachella Valley Supplies and Demands

Projected potential changes in temperature or evapotranspiration for the Coachella Valley due to climate change are not currently available. However, based on larger scale studies, it can be inferred that increased temperatures in the Coachella Valley would increase water demands for crop and landscape irrigation, municipal water use, and evaporative losses from canals and open reservoirs. It has been suggested that increased summer temperatures could draw increased monsoonal flow resulting in more frequent summer thunderstorms. However, no formal studies have been conducted.

5.2.4 Conclusion

The current projections regarding global warming and climate change increase the uncertainty regarding Coachella Valley water supplies. Consequently, to account for such uncertainty, the 2010 WMP Update has adopted a more flexible approach by assigning book-end targets (ranges) for each of the major project categories. The book-ends represent reasonable minimum and maximum amounts for potential project development. In addition, inclusion of a water supply contingency over and above the supplies required to meet projected demands provides an additional buffer in the event that water supplies do not produce the expected amounts. Implementing the elements of the 2010 WMP Update is expected to be a good means of dealing with this additional uncertainty. Water conservation and development of alternative supplies such as recycled water and desalinated drain water increase the reliability of supplies to the Coachella Valley.

5.3 INVASIVE SPECIES – QUAGGA MUSSELS

The non-native mollusk, *Dreissena bugensis*, also known as Quagga mussel, has been found in the Colorado River system. A Quagga mussel invasion could significantly affect the Coachella Valley's water quality, aquatic ecosystems, and water delivery systems.

Figure 5-2
Quagga Mussels in a Pipe

Quagga mussels were first discovered in Lake Mead in January 2007. They infested the CRA by way of Lake Havasu, and now exist in many lakes in the San Diego area. They have been found at Imperial Dam, but have not been detected in the Coachella Canal.

Quagga mussels cause the greatest economic damage when infesting the pipes, pumps or other components of water supply systems. Impacts can include loss of intake head, obstruction of valves, blockage of rotating screens, cavitation-mediated wear on pump bowls and impellers, putrefactive decay of mussel flesh and the related methane gas production, and increased electro-corrosion of steel and cast iron pipelines resulting from bacterial growth around the mussels' attachments.

Ecological impacts of Quagga mussels include:

- Remove food and nutrients from the water column efficiently, leaving less or nothing for native aquatic species.
- Potential of collapsing existing food webs.

Economic impacts include:

- Clog pipelines and pumps, ruin boat motors and damage aquatic recreational equipment.
- Routine maintenance of water resource infrastructure is necessary and perpetual.
- Maintenance costs are enormous, particularly for industrial raw water users like power stations and water supply agencies.

Methods for controlling the infestation of Quagga mussels include:

- Turbulence – physical pigging of pipes and intake structures
- Chlorination – high doses of chlorine kill the mussels
- Desiccation – drying and manual cleaning of the infested components
- Heat – exposure to elevated water temperatures kills the mussels. High temperature is obtained by passing the water through a heat exchanger.

CVWD has been proactively working to prevent the infestation and spread of Quagga mussels in the Coachella Canal and the irrigation system. Since July 2008, the District has been chlorinating Canal water just downstream of the turnout from the All American Canal. In addition, turbulence is generated by keeping the Canal gate partially closed. The District also performs monthly testing of Canal water samples for Quagga mussel DNA, and routinely performs visual inspection of sample coupons and infrastructure.

The cost of this chlorine treatment is funded through a mitigation charge of $5 per AF paid by Canal water users. The District also chlorinates at the Mid-Valley Pipeline pumping station.

5.4 STATE WATER CONSERVATION GUIDELINES

The proposed California 20x2020 Program (Program) is a statewide municipal water conservation program. In February 2008, Governor Arnold Schwarzenegger established a statewide goal of 20 percent reduction in per capita municipal use of potable water by the year 2020. Urban domestic users in California consume 8.7 million AFY of potable water; under the Program, Californians would save enough water (approximately 1.74 million AFY) to serve more than two million families each year (SWRCB, 2010b).

Several state and federal agencies (Program Team) have teamed up to assist with the development and implementation of the Program. The state agencies involved in the Program are:

- DWR
- SWRCB
- California Energy Commission (CEC)
- CDPH
- CPUC
- California Urban Water Conservation Council (CUWCC)

In addition to the above mentioned state agencies, Reclamation is also a part of the Program Team.

The Program supports other statewide water planning efforts such as Delta Vision and the California Water Plan Update (Bulletin 160). The common goals are identifying and implementing strategies for sustainably managing the valuable water resources of California to support both its environmental and economic functions (SWRCB, September 5, 2008).

The Governor also invited legislation to incorporate the goal of the Program into statute. Senate Bill x7-7 (SBx7-7) supporting the Program was passed in the state Senate and Assembly in late 2009. This bill requires a statewide reduction in per capita urban water usage by 20 percent by December 31, 2020. The bill also requires that the state achieves incremental progress towards the goal by reducing the per capita usage by 10 percent by December 31, 2015. The bill requires each urban water supplier to develop interim and final urban water use targets consistent with the requirements of the bill. Urban water suppliers are required to comply with the requirements established by the bill on or before July 1, 2016 in order to be eligible for state water grants or loans.

DWR is working on developing a methodology to calculate the baseline water use and compliance water use targets. According to the current DWR schedule, this methodology will be made available by December 2010. CVWD is closely monitoring the work being performed by DWR under the purview of SB 7. CVWD will incorporate the requirements of the bill in their subsequent planning efforts (e.g., 2010 Urban Water Management Plan). Additional information on compliance with the requirements of SBx7-7 is presented in **Section 6**.

5.5 SUBSIDENCE

Declining groundwater levels can contribute to or induce land subsidence in aquifer systems that contain a significant fraction of unconsolidated fine-grained sediments (silts and clays). Land subsidence can disrupt surface drainage; cause earth fissures; and damage wells, buildings, roads, and utility infrastructure.

Pumping of groundwater has resulted in water level declines as large as 50 feet through the late 1940s. In 1949, the importation of Colorado River water to the East Valley caused a reduction in groundwater pumping and a recovery of water levels during the 1950s through the 1970s.

Since the late 1970s, however, the demand for water in the East Valley has exceeded the deliveries of the imported surface water. Pumping has increased and water levels have again declined. By 2005, water levels in many wells in the East Valley had declined 50 to 100 ft and some wells were at their lowest recorded water levels. Results of previous studies by the U. S. Geological Survey (USGS) indicate that land subsidence may have been as much as about 0.5 ft (150 mm) in the eastern parts of the Valley between 1930 and 1996.

In 1996, the USGS, in cooperation with CVWD, established a geodetic network of monuments to monitor vertical changes in land surface in the East Valley. In 2007, USGS published the results of the monitoring program (USGS, 2007). The objectives of this study were to detect and quantify land subsidence that has occurred in the Coachella Valley from 1996 through 2005. The study is the fourth in a series of Coachella Valley land subsidence studies completed by the USGS in cooperation with CVWD. The location and magnitude of vertical land-surface changes during 1996-2005 were determined with measurements spanning the area from Palm Desert on the north to the Salton Sea on the south.

At least four areas in the Coachella Valley experienced land surface elevation changes, indicating that land subsidence occurred in three of the areas (Palm Desert, Indian Wells, and La Quinta) and both subsidence and uplift apparently occurred in one of the areas (Indio-Coachella) between February 26, 2003 and September 25, 2005. Other local areas in the Coachella Valley also may have deformed, but the size of these areas and the amount of deformation generally are small compared with the Palm Desert, Indian Wells and La Quinta areas.

Eight of the fourteen measurement sites for which subsidence rates could be compared show subsidence rates increased by as much as a factor of 10 between 2000 and 2005, compared with subsidence rates prior to 2000. The data showed drops in surface elevation of less than an inch at three Global Positioning Satellite (GPS) benchmarks and about a one-foot drop at three other benchmarks. At one benchmark near the intersection of 54th Avenue and Jackson Street in Coachella, a one-foot drop occurred between 2000 and 2005. The data indicate that subsidence rates in the Palm Desert, Indian Wells and La Quinta areas have significantly increased since 2000.

These studies to date have not confirmed the relationship between land subsidence and declining water levels. The USGS Scientific Investigation Report 2007-5251 states, "Although the localized character of the subsidence signals is typical of the type of subsidence characteristically caused by localized ground-water pumping, the subsidence may also be related to tectonic activity in the valley." This report also concludes additional monitoring is needed to permit meaningful interpretations of the aquifer-system response to water level changes. CVWD's Board of Directors approved additional funding to continue these cooperative subsidence studies with the USGS. Future studies include additional monitoring designed to evaluate the potential relationship between declining water levels and land subsidence. Potential land subsidence caused by declining water levels was addressed by mitigation measures described in the 2002 Coachella Valley Water Management Plan Programmatic Environmental Impact Report (CVWMP PEIR).

5.6 SALTON SEA RESTORATION

The Salton Sea is a saline terminal lake located at the east end of the Coachella Valley. It is California's largest lake and is a main stop on the Pacific Flyway for migratory birds. Over 400 bird species have been documented there. The Sea is about 35 miles long and 9-15 miles wide with approximately 360 square miles of water surface and 105 miles of shoreline. The surface of the Sea currently lies approximately 232 feet below mean sea level (MSL). One of the major functions of the Salton Sea is to serve as a sump for agricultural wastewater from the Imperial and Coachella valleys. Executive Order of Withdrawal (Public Water Reserve No. 114, California No. 26), signed by President Coolidge in 1928, designated lands within the Salton Basin below elevation 220 feet below MSL as storage for wastes and seepage from irrigated lands in the Imperial Valley. Approximately 90 percent of the freshwater inflow to the Sea is agricultural drain water from Imperial Valley, Coachella Valley and Mexicali Valley (Salton Sea Authority website, 2010). Because the Sea has no outlet, salts concentrate in it by evaporation and concentrated nutrients increase eutrophic conditions. Salt concentrations in the Sea are currently about 51,000 mg/L or about 45 percent higher than ocean water, with salinity increasing at approximately 1 percent per year (DWR, The Resource Agency, Department of Fish and Game, November 2009 Update).

The Salton Sea Reclamation Act of 1998 (Public Law 105-372) directed the Secretary of the Interior, through Reclamation, to study options for managing the salinity and elevation of the Sea to preserve fish and wildlife health and to enhance opportunities for recreation use and economic development while continuing the Sea's use as a reservoir for irrigation drainage.

In January 2003, a status report was released by the Secretary of the Interior about the Salton Sea Restoration Project. In September of that year, state legislation was passed in which the State of California accepted responsibilities for ecosystem restoration at the Sea. The legislation directed DWR to prepare an ecosystem restoration study and programmatic environmental document. The study, conducted in consultation with a legislatively mandated advisory committee and with the Authority, included a proposed funding plan for implementing the preferred alternative (Reclamation, 2008).

In June 2006, the Salton Sea Authority (SSA) published a study entitled "Salton Sea Authority Plan for Multi-Purpose Project". As part of this study, the SSA developed a combined, multi-purpose revitalization/restoration project. The preferred project design resulting from this study included components such as in-sea barrier and circulation channels, water treatment facilities, habitat enhancement features, Colorado River water storage reservoir, park, open space and wildlife areas (SSA, 2006).

In May 2007, the State published the "Salton Sea Ecosystem Restoration Program Preferred Alternative Report and Funding Plan". The Plan and the accompanying PEIR/EIS considered eight restoration alternatives along with a no project alternative. The preferred alternative includes Saline Habitat Complex in the northern and southern sea bed, a Marine Sea that extends around the northern shoreline from San Felipe Creek to Bombay Beach in a "horseshoe" shape, Air Quality Management facilities to reduce particulate emissions from the exposed playa, Brine Sink for discharge of salts, Sedimentation/Distribution facilities, and Early Start Habitat to provide habitat prior to construction of the habitat components (California Resources Agency, 2007).

Salton Sea Restoration Project - SB 187 was approved by Governor Arnold Schwarzenegger on September 27, 2008 (Chapter 374, Statutes of 2008). SB 187 limits expenditures of funds from Proposition 84, upon appropriation by the Legislature, to those activities to be completed in the first five years (Period I) identified in the Resources Agency's report entitled "Salton Sea Ecosystem Restoration Program Preferred Alternative Report and Funding Plan." Activities identified for completion in Period I include a demonstration project, early start habitat, and additional biological, inflow, sediment, water and air quality investigations.

The 2010 WMP Update projects that in order to meet the 2045 demand conditions in the Valley, up to 112,000 AFY of drain flow to the Salton Sea will be captured and desalinated for urban use (see **Section 6.4.1.3**). This might result in a significant reduction of projected flow to the Salton Sea from the Coachella Valley compared to the figures in the 2002 CVMWP PEIR. The impacts associated with this reduced flow to the Salton Sea will be discussed in the 2010 WMP Update Subsequent PEIR.

5.7 SEISMIC RESPONSE

The USGS performed a study in 2008, which projected that the probability of a magnitude 6.7 or higher earthquake occurring in California over the next 30 years is greater than 99 percent. The probability of this earthquake occurring in Northern California is 93 percent and for the southern half of the state is 97 percent. When such an earthquake occurs, it is expected that, along with the loss of life and serious injuries, there will be major damage to infrastructure across the state.

California has hundreds of faults splaying from the San Andreas fault, which is the main locus of the slip. According to the USGS study, the highest probability of a major earthquake in the next 30 years is along the southern San Andreas fault (USGS Fact Sheet 2008-3027). Due to the close proximity to the southern San Andreas fault, infrastructure serving the Coachella Valley (especially the Coachella Canal) is considered as highly vulnerable. In the event of such a calamity, water and other utility services in the Coachella Valley is likely to be compromised.

CVWD has prepared an Emergency Response Plan in compliance with the Public Health Security and Bioterrorism Preparedness and Response Act of 2002, and in accordance with the latest USEPA Office of Water – Planning Guidelines published in July 2003. The Plan is routinely updated to assure compliance. CVWD has recommended emergency preparedness measures for such events, which can be found on the District website at: http://www.cvwd.org/news/emergency.php.

Other agencies in the Valley have similar disaster/emergency preparedness plans. Information for the DWA area can be found at: http://www.dwa.org/water_info/disaster.aspx. Information for the MSWD area can be found at: https://mswd.org/preparedness.aspx. Information for the City of Coachella can be found at: http://www.coachella.org/index.aspx?nid=28.

5.8 SUMMARY

As discussed above, there are several current and emerging issues that might impact water management planning in the Coachella Valley. Some of these issues will be addressed as part of the 2010 WMP Update while others will be addressed in other subsequent planning efforts. **Table 5-4** presents a summary of the issues along with proposed actions to resolve these issues.

Table 5-4
Summary of Emerging Issues

Issue	Impact to Coachella Valley Water Management Planning	Proposed Action
Basin Plan Amendment/Triennial Reviews	New policies/guidelines specifying water quality requirements might impact projects identified in 2010 WMP Update	Coachella Valley water agencies to keep tracking proposed changes to the Basin Plan and actively participate in development of new policies
TMDLs	May limit discharges into the CVSC and Salton Sea	Might include actions such as additional monitoring, increased treatment, and implementation of additional BMPs in the Valley
Salinity Management	Might require treatment of Colorado River water before recharging or recharging with better quality imported water	CVWD to work with other water purveyors in the Valley to develop a plan for addressing this issue. IRWMP might be an ideal forum for addressing this issue
Recycled Water Use Policy	Requires increased use of recycled water in the Valley and development of Salt/Nutrient Management Plans	Implement Valley-wide recycled water projects identified in the 2010 WMP Update and prepare Salt/Nutrient Management Plan in compliance with Recycled Water Use Policy
Brine Discharge Management	Disposing of large quantities of brine and its associated cost could limit the extent of desalination projects proposed in 2010 WMP Update	Detailed study investigating alternatives for brine disposal is recommended in this Update

Table 5 4 (continued)
Summary of Emerging Issues

Issue	Impact to Coachella Valley Water Management Planning	Proposed Action
Agricultural discharge waivers	Not clear at this time	Continue to monitor the development of this regulation and take appropriate action when necessary
Arsenic	Degrades water quality in the basin	Arsenic treatment before distribution
Perchlorate	No significant impact	Continue monitoring for perchlorate in the Colorado River water and groundwater
Chromium-6	Once the MCL for chromium-6 is established, treatment at wells with high chromium-6 might be required	Coachella Valley water agencies to keep monitoring the chromium-6 PHG and MCL process
Uranium	No significant impact	Continue monitoring for uranium in Colorado River water and groundwater
Nitrate	Impacts groundwater quality	Locate recharge activities away from areas with high nitrate concentration and treat pumped groundwater high in nitrate
Carcinogens	Not clear at this time	Continue to monitor the development of this regulation and take appropriate action when necessary
Endocrine Disrupting Compounds	Impairs drinking water	Continue to monitor the development of this regulation and take appropriate action when necessary
Climate Change	Affects the reliability and availability of imported water in the Valley	2010 WMP Update provides for water supply contingency and flexibility by implementing a "book-end" approach to address uncertainties associated with climate change
Quagga Mussels	Physical, ecological, and environmental impacts to waterbodies and water infrastructure	CVWD to continue implementing chlorination, turbulence in the Coachella Canal and the irrigation system
Urban Water Conservation	Compliance with Senate Bill SB x7-7 required	Implement the proposed conservation measures in the 2010 WMP Update
Subsidence	Might limit the quantity of pumping in the Coachella Valley	Continue Valley-wide subsidence studies
Salton Sea Restoration	Might limit the quantity of drain flows available for treatment and reuse	The 2010 WMP Update provides for existing drain flows into the Salton Sea to remain at the current level
Seismic Response	Major earthquake along the southern San Andreas fault might cause major damage to water infrastructure in the Valley	Coachella Valley water agencies have Emergency Preparedness/Response Plans to address this issue

Section 6
Management Plan Elements

The water management plan elements included in the 2002 WMP were water conservation, development of additional water sources, source substitution and groundwater recharge. These elements were combined into a preferred plan to meet current and future demands while eliminating groundwater overdraft in the Valley. Since the 2002 WMP was adopted, changed planning conditions require modification of the elements included in the 2002 WMP. In addition to the elements considered in the 2002 WMP, the 2010 WMP Update considers and evaluates additional management options as well as potential water quality improvements.

This section discusses the need for changes to the 2002 WMP and presents the water management elements that are considered in the 2010 WMP Update. Evaluation of these elements is presented in Section 7.

6.1 NEED FOR FLEXIBILITY

The preceding sections of this report describe the need for changes to the Coachella Valley's water management strategy. Expectations for population growth have increased significantly, and result in a corresponding increase in the projected urban development of agricultural and vacant land in the Valley. Areas that were previously expected to have little growth are now expected to develop within the next 35 years. At the same time, the reliability of imported water supply from the SWP has declined due to a combination of extended drought, climate change, legal and environmental restrictions and risk of levee failure in the Sacramento-San Joaquin Delta (Delta). Increasing demands coupled with reduced imported water supply reliability have increased the potential for future supply deficits that must be addressed in the 2010 WMP Update. In addition, a number of other emerging issues may affect water management in the future including more stringent water quality regulations, the need for salt and nutrient management plans, land subsidence, infrastructure needs, control of invasive species, integrated regional water management planning, Salton Sea Restoration plans and climate change. To address these uncertainties, the 2010 WMP Update incorporates a more flexible and adaptive approach to water resources management. Such an approach will allow the Valley's water agencies to adjust the implementation strategy when future changes occur.

Sections 3, 4 and 5 of the 2010 WMP Update have identified some of the uncertainties that affect water resources planning and management in the Coachella Valley. However, it is not possible to quantify all of the uncertainties affecting the Valley's water resources. Consequently, the 2010 WMP Update has adopted a more flexible approach by assigning book-end targets (ranges) for each of the major project elements. The book-ends represent reasonable minimum and maximum amounts of supplies provided by the projects included in the Plan elements. This allows Valley water managers to plan more pragmatically in the near term and adjust those plans in the future as more information becomes available and the level of uncertainty is reduced.

The 2002 WMP identified specific objectives and projects for water conservation, new sources, groundwater recharge and source substitution. The goal of the 2002 WMP is to assure adequate quantities of safe, high-quality water at the lowest cost to Coachella Valley water users. This would be accomplished by meeting the following objectives:

1. Elimination of groundwater overdraft and its adverse impacts, including:
   - Groundwater storage reductions,
   - Declining groundwater levels,
   - Land subsidence and
   - Water quality degradation.
2. Maximizing conjunctive use opportunities,
3. Minimizing adverse economic impacts to Coachella Valley water users,
4. Minimizing adverse environmental impacts.

The 2010 WMP Update has refined these goals and objectives to better match the current needs of the Valley. The basic goal of the WMP remains the same but has been modified to reflect a more holistic approach: "to reliably meet current and future water demands in a cost-effective and sustainable manner." However, the underlying objectives have been refined based on the water resources uncertainties facing the Valley. The programs and projects identified in the 2010 WMP Update are based on the following objectives:

1. **Meet current and future water demands with a 10 percent supply buffer.** As discussed previously, the water resources environment in California faces significant uncertainties due to growth, legal and environmental restrictions of water exports from the Delta, legal uncertainty associated with the Quantification Settlement Agreement, and climate change. Because of this uncertainty, the 2010 WMP Update includes a water supply planning buffer of 10 percent of projected demand. This buffer will provide Valley water managers with a contingency in the event that growth is greater than expected or that water supplies are lower than expected.

2. **Eliminate long-term groundwater overdraft.** Groundwater overdraft reduction was the primary driving force behind the 2002 WMP. Overdraft reduction continues to be an important objective of the 2010 WMP Update because of the importance placed of sustainability. Water supplies must be sufficient to reduce the current overdraft and manage future overdraft such that future generations will have adequate dependable water supplies. However, the water managers recognize that the large amounts of water stored in the groundwater basin provide a valuable resource for meeting water demands during periods of imported water shortage. Consequently, overdraft should be managed in a way that allows this storage to be used when needed to avoid shortages.

3. **Manage water quality.** The quality of the groundwater is generally very high. However, localized water quality issues such as arsenic exist that currently require treatment to make water suitable for potable use. Concerns have been expressed about recharging the basin with Colorado River water which has a higher salinity than the existing groundwater. The need to manage water quality is addressed in the 2010 WMP

Update, including the cost of treatment which could significantly increase the cost of water.

4. **Manage future costs.** The cost for development and management of the Coachella Valley water resources is expected to increase in the future in response to resource scarcity, increasing regulatory requirements, and growth. While there are few if any "cheap" water supply solutions remaining, the 2010 WMP Update seeks to meet future water needs in the most cost-effective manner.

5. **Minimize adverse environmental impacts.** The California Environmental Quality Act (CEQA) requires the evaluation and mitigation of adverse environmental impacts. The WMP minimizes and mitigates adverse environmental impacts to the extent practical.

6.2 WATER MANAGEMENT ELEMENTS

Water management elements that are included in the 2010 WMP Update consist of:

- Water conservation measures
- Acquisition of additional water supplies,
- Conjunctive use programs to maximize supply reliability,
- Source substitution programs
- Groundwater recharge programs
- Water quality protection measures
- Other management activities

These elements are discussed in detail in the following sections.

6.3 WATER CONSERVATION

Water conservation is a major component of water management. As a desert community heavily reliant upon imported water supplies, the Coachella Valley must use its water resources as efficiently as possible. It is essential that the region continue to invest in water conservation. This is also a requirement of the California Water Code and recent legislation such as 20x2020 (SB 7x7) in order to maintain eligibility for State funding opportunities through compliance of AB 1420 demand management measures (DMMs). This section describes urban, agricultural and golf course conservation activities, and describes potential water conservation implementation strategies.

The primary focus of water conservation is on urban/residential use, agricultural irrigation and golf course irrigation, since these are the principal water uses. Other water use groups represent a relatively small portion of the total demand and will be handled on a case-by-case basis.

Consistent with Plan objectives, the 2010 WMP Update achieves a level of water use reduction consistent with applicable State law without causing dramatic lifestyle changes on the part of those conserving. In the future, as total demand increases and the landscape ordinance is applied to new growth, the volume of water conserved will increase, representing the equivalent of a substantial source of supply.

6.3.1 Urban Conservation

Example of Desert Landscaping

Urban water use is expected to grow significantly in the future as development occurs. CVWD, DWA, IWA and the City of Coachella are implementing a number of on-going water conservation programs for both large landscape customers and residential customers. Water efficient plumbing is being installed in all new homes consistent with existing building code. Most water purveyors and several cities have implemented landscape audit programs and rebates for replacements of lawns with water-efficient landscaping.

6.3.1.1 California Law and Policies

California law establishes a number of policies regarding water conservation. It mandates several water conservation techniques, which have been already implemented in the Valley. For example, California plumbing codes have required the installation of ultralow-flush toilets (1.6 gallons/flush) and low-flow showerheads (2.5 gpm maximum) on all new construction since 1992. The Federal Energy Policy Act of 1992 (PL 102-486) mandated these same standards nationwide on all plumbing fixtures manufactured since January 1994.

Water Conservation in Landscaping Act: The Water Conservation in Landscaping Act (California Government Code, Sections 65591-65600) required each city and county to adopt a water efficiency ordinance for landscaping or enforce the Department of Water Resources' model ordinance by January 1, 1993. Amendments to this law in 2006 required DWR to update the model landscape ordnance and local agencies to adopt an updated ordinance that meets or exceeds the new model ordinance. In 2003, CVWD adopted an updated model landscape ordinance (CVWD Ordinance No. 1320) that required a 25 percent reduction in outdoor water use over that required by the State's model ordinance. The CVWD ordinance was further tightened in 2007 requiring an additional 17 percent reduction in outdoor use by new development (CVWD Ordinance No. 1302-1, 2007). Recently, the Coachella Valley cities, water districts, Riverside County and CVAG developed a single model landscape ordinance that each city and water district would adopt to promote maximum landscape water use efficiency (CVWD Ordinance No. 1302-2, 2009). The 2009 ordinance provides uniform landscaping standards throughout the Valley. The ordinance is based on the 2007 CVWD ordinance and is one of the most stringent in the State. It is one of the few ordinances in the state to establish turf limitations for new golf courses.

California Urban Water Conservation Council MOU: In addition to state law requirements, water agencies and public interest groups formed the California Urban Water Conservation Council (CUWCC) and developed the Memorandum of Understanding Regarding Urban Water Conservation (MOU), dated September 1991 (as amended June 9, 2010 – CUWCC, 2010). The MOU asks that participating water agencies commit to make a “good faith effort” to: (1) develop comprehensive conservation Best Management Practices (BMPs) programs using sound economic criteria and (2) consider water conservation on an equal basis with other water management options.

The MOU identified 14 BMPs for urban water conservation that are generally recognized as producing more efficient water usage and are considered technically and economically feasible. The list of BMPs has been updated several times since the MOU was first developed. In December 2008, the MOU was amended and the BMPs were revised. This revision reorganized the CUWCC’s 14 BMPs into five categories. Two categories, Utility Operations and Education, are referred to as “Foundational BMPs,” because they are considered to be essential water conservation activities by any utility and are adopted for implementation by all signatories to the Urban MOU as ongoing practices with no time limits. The remaining BMPs are “Programmatic BMPs” and are organized into Residential; Commercial, Industrial, and Institutional (CII); and Landscape categories.

The MOU now allows a more flexible approach to implementing the Programmatic measures. Signatories may implement the specific measures described for each BMP, implement a set of additional measures which achieves equal or greater water savings (Flex Track Menu) or may choose a “gpcd” compliance option which requires an 18 percent water use reduction in per capita water use by 2018 compared to 1997-2006 baseline usage.

California 2008 Water Conservation Plan: In February 2008, Governor Schwarzenegger proposed a goal of reducing statewide urban water usage by 20 percent by the year 2020 and directed state agencies to develop plans to implement this goal. In April 2009, a draft plan was released for public review. The final 20x2020 Water Conservation Plan was released in February 2010 (SWRCB, 2010b).

SBx7-7: As part of the 2009 comprehensive water package, the California Legislature adopted SBx7-7 (Steinberg) which mandates California urban water agencies to achieve a 10 percent reduction in urban per capita water demand statewide by 2015 and a 20 percent reduction by 2020. Water use reductions are compared on a per capita basis to a 10-year baseline period. Water agencies may select their target either individually or on a regional basis.

Table 6-1 presents the new BMPs along with their old designation.

Table 6-1
Urban Water Conservation Best Management Practices

Type	Category	Best Management Practice
Foundational BMPs	Utility Operations	Conservation Coordinator (BMP 12)
		Water Waste Prevention (BMP 13)
		Wholesale Agency Assistance Programs (BMP 10)
		Water Loss Control (BMP 3)
		Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections (BMP 4)
		Retail Conservation Pricing - water and wastewater rates ((BMP 11)
	Education	Public Information Programs (BMP 7)
		School Education Programs (BMP 8)
Programmatic BMPs	Residential	Residential assistance program (BMP 1 & 2)
		Landscape water survey (BMP 1)
		High-efficiency clothes washers (BMP 6)
		WaterSense Specification (WSS) toilets (BMP 14)
		WaterSense Specifications for residential development
	Commercial, Industrial, and Institutional	Conservation Programs for Commercial, Industrial, and Institutional (CII) Accounts (BMP 9)
	Landscape	Large Landscape Conservation Programs and Incentives (BMP 5)

SBx7-7 will require Coachella Valley urban water users to increase conservation over and above the goal established in the 2002 WMP.

6.3.1.2 Water Conservation Targets

Several alternative targets for achieving increased conservation in the Valley are considered in the 2010 WMP Update. Valley water purveyors could continue to implement their existing conservation measures such as the Landscape Ordinance, tiered water rates and landscape rebates as appropriate. Alternatively, the water purveyors could implement more aggressive conservation measures to achieve greater levels of conservation. Areas like Las Vegas, Phoenix, Tucson and the San Bernardino High Desert communities have average water uses ranging from 120-180 gpcd, less than half of the average Coachella Valley water use. This level of conservation would be achieved through aggressive measures such as water use restrictions and enforcement programs that may include turf reductions, penalties for wasteful water use, and possibly even punitive water rates.

For the 2010 WMP Update, several levels of conservation are considered:

<u>**Level 1:**</u> **Continuation of the goals established in the 2002 WMP**. The 2002 WMP required a ten percent reduction in urban water use. Based on review of available water usage data, urban water users have met this goal. However, with the adoption of SBx7-7, this level is no longer adequate as a higher reduction is now required by law.

<u>Level 2:</u> Meet State-mandated 20 percent per capita use reduction by 2020 relative to the DWR 10-yr baseline water usage. Existing customers are reducing their water use in response to conservation measures already adopted by local water agencies. New development uses less water due to stringent plumbing and landscaping requirements. Consequently, it is expected that per capita use will gradually decline more than the 20 percent level mandated in the 20 by 2020 program. The demand projections in the 2010 Plan Update include these savings.

<u>Level 3:</u> Implementation of Current Conservation Measures. This option involves the continued implementation of the conservation measures already adopted by local water agencies for existing and new customers plus additional measures to reduce the use of existing customers. This option is expected to reduce per capita use by nearly 40 percent and achieve an additional 8 percent reduction in urban water use in 2045 compared to the baseline demand projection. This would reduce urban water demand by an additional 43,000 AFY over Level 2 by 2045. However, the potential for higher savings due to implementation of the landscape ordinance and water budget-based rates could raise this amount to as much as 100,000 AFY depending on the type of development.

<u>Level 4:</u> Achieve Colorado River Region's per capita use target. This conservation level would achieve a per capita use consistent with the water conservation target assigned to the Colorado River Region under the Final 20x2020 Plan (SWRCB, 2010b), about 211 gpcd. This would require a 41 percent reduction in water demand or 219,000 AFY in 2045 compared to the Level 2 projection.

<u>Level 5:</u> Reduce per capita use comparable to Tucson. The highest level might be to implement a program to reduce usage comparable to that of Phoenix or Tucson (about 177 gpcd). This approach might require per capita water usage reductions by as much as 50 percent demand reduction or 266,000 AFY by 2045 compared to the Level 2 projection used in the 2010 WMP Update.

A challenge associated with these latter two approaches is the potential adverse impact of such significant usage reductions on the Coachella Valley economy. In addition, the cost to achieve higher conservation targets increases as the target increases. The Water Conservation Alliance of Southern Arizona (Water CASA) completed the *Evaluation and Cost Benefit Analysis of Municipal Water Conservation Programs* (ECoBA) in 2006. The ECoBA study evaluated the cost and water savings associated with implementing a variety of water conservation measures including water audits, device giveaways, washing machine rebates, landscape conversion rebates, toilet rebates, toilet distribution, water rates and other measures. The study found that the cost per AF of conservation ranges from $101 to $3,276/AF with a median cost of $876/AF among all measures. Consequently, urban conservation measures must be carefully evaluated so the most cost effective measures are implemented first before moving to more costly measures.

Although the Valley could likely meet the requirements of SBx7-7 without implementing additional conservation measures, water savings in excess of SBx7-7 requirements are likely given the significant emphasis placed on reduced water use by existing and future customers in the 2010 WMP Update. Based on the potential range of domestic water conservation actions identified herein, additional urban water conservation savings could potentially range from 43,000 AFY to 266,000 AFY by 2045. Extreme changes in lifestyle would be required to reduce water use to an amount comparable to Tucson (50 percent reduction) or the Colorado River Region's target in the 20x2020 Plan (41 percent reduction).

Methods available for achieving the Level 3 option include the following:

- Continued implementation of the 2009 Valley-wide Landscape Ordinance (Ordinance 1302-2)
- Installation of automated or "smart" water meters
- Extension of the landscape ordinance to include all landscaping regardless of size (current limit is 5,000 square-feet or larger for homeowner furnished landscaping)
- Implementation of water budget-based tiered water rates or other conservation based rates by other water agencies
- Further decreases in the water allocations for landscape irrigation consistent with good irrigation practices and desert landscaping
- Landscape retrofit rebates – i.e., economic incentives for replacing high water use landscaping, also known as "cash for grass"
- Restrictions on the total amount of turf allowed
- Mandated use of smart irrigation controllers by all customers
- Audits of new development to assure continued compliance with the Landscape Ordinance
- Plumbing retrofits for existing properties including mandatory retrofit (ultra low flush toilets, showerhead replacement, etc.) prior to sale of property
- Conservation rebates for high-efficiency clothes washers
  Compliance with California Green Building Code Standards (California Code of Regulations Title 24, Part 11, 2009)
- Water distribution system audits and loss reduction programs

6.3.2 Agricultural Conservation

Agriculture is an essential part of the Coachella Valley economy generating more than $500 million per year in production. Agriculture typically uses an average of 6.2 AFY per cropped acre, including allowances for multiple cropping, and accounts for more than 40 percent of Valley water use.

6.3.2.1 Agricultural Conservation Activities (2002 through 2009)

Since the 2002 WMP was prepared, CVWD has implemented in a variety of agricultural water conservation efforts:

- Extra-ordinary Conservation
- Water 2025

Extra-ordinary Conservation Measures

With the signing of the QSA, the U. S. Bureau of Reclamation (Reclamation) adopted the Inadvertent Overrun and Payback Policy (IOPP). This policy defined procedures that account for contractor diversions of Colorado River water in excess of their respective allocation and the requirements for paying back those excess diversions. The QSA specified that CVWD, Imperial Irrigation District (IID) and Metropolitan Water District of Southern California (Metropolitan) had overrun their allocations in 2001 and 2002 by a combined total of 313,200 AF of which the CVWD share was 73,200 AF. The QSA required this water to be paid back within eight years (2004 through 2011).

The District's response to the IOPP requirements included the implementation of the CVWD Extra-ordinary Conservation program. This program consisted of District funded and grower participation in a number of agricultural conservation programs. Grower participation was entirely voluntary. Through the Extra-ordinary Conservation Program, the District was able to completely payback the IOPP overrun (73,200 AF) by 2009, two years early. Conservation program measures included:

- Scientific Irrigation Scheduling
- Salinity Management
- Salinity Field Mapping
- Conversion to Micro-Irrigation
- Distribution Uniformity Evaluations
- Grower Training and Meetings
- Engineering Evaluations

Drip irrigation of grapes reduces water use

Water 2025

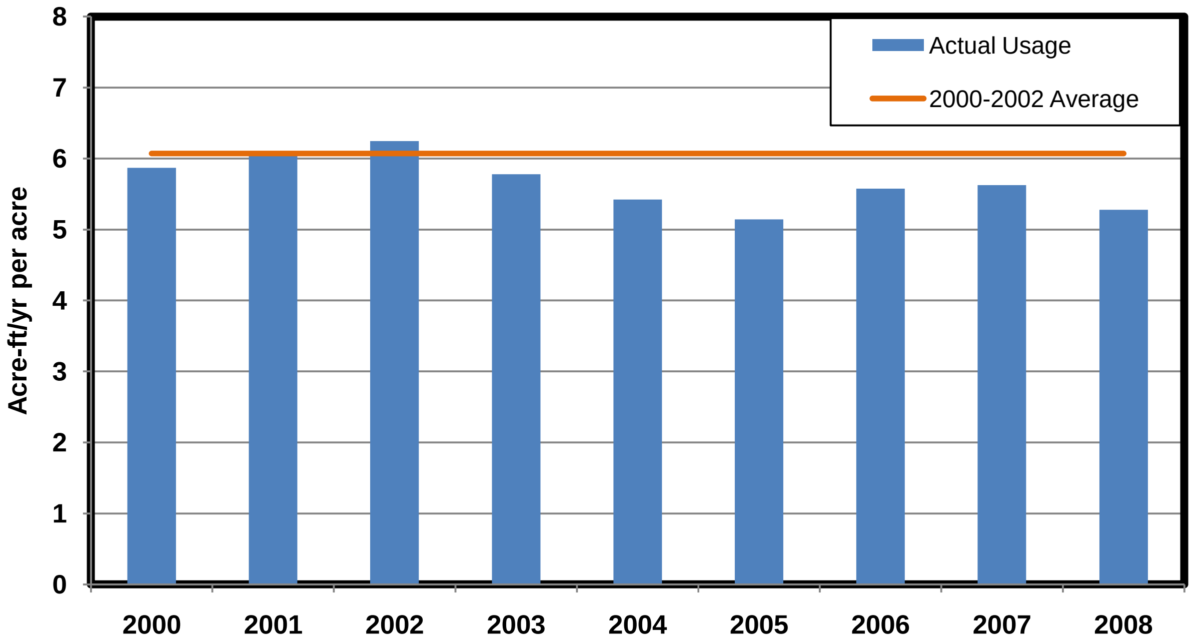
Water 2025 was a cooperative study effort funded by Reclamation, CVWD, and participating growers and suppliers within the Coachella Valley. The objectives of the study were to provide unequivocal quantification of reductions in applied water resulting from specific farm practices and to develop a market mechanism for saved water (DOI/CVWD, Water 2025, October 2007). The Water 2025 study identified the following conservation measures as cost-effective:

- Conversion to drip from furrow or sprinkler,
- Scientific irrigation scheduling,
- Scientific salinity management, and
- Overhaul/maintenance of irrigation systems.

Water Conservation Achievements

Agricultural water use in any given year is a function of weather conditions, cropping patterns and water conservations efforts. The annual average crop water use per acre is calculated by dividing total agricultural water deliveries (Canal, groundwater and other sources) by the number of acres irrigated in that year. For comparison purposes, a baseline was established using the 2000-2002 average water use to represent pre-Plan conditions. As shown on **Figure 6-1**, this comparison indicates that agricultural water conservation performance has varied from 2003 through 2008, averaging about 9.9 percent.

Figure 6-1
Historical Agricultural Water Usage



In response to the IOPP, Coachella Valley farmers implemented extraordinary water conservation measures that reduced agricultural water usage by as much as 15 percent on an AF/acre basis in 2005. However, since the payback obligations were met, agricultural conservation has declined. It should be noted that some of the apparent decline may be due to ET variations, inaccuracy of reported groundwater production, estimates of irrigated acreage outside ID-1 and variations in cropping patterns.

6.3.2.2 SBx7-7 Considerations

SBx7-7 requires all water suppliers to increase the water use efficiency and it requires the implementation of specified efficient water management practices for agricultural water supplies by July 31, 2012. The law also requires the preparation of agricultural water management plans paralleling the UWMP requirements. However, the bill specifically excludes agricultural water suppliers that are a party to the QSA from implementing specified conservation requirements for the duration of the QSA. The conserved water created as part of the QSA projects is to be credited against the obligations of the agricultural supplier as specified in the bill. CVWD is exempt from the requirement to develop an agricultural water management plan due to being a party to the QSA.

6.3.2.3 Agricultural Program for 2010 WMP Update

For agricultural conservation, it has been demonstrated that District-provided programs with voluntary grower participation are effective in increasing water use efficiency through both the 2025 and the Extra-ordinary Conservation Measures programs. However, the levels of conservation that will be required from the agricultural community to eliminate overdraft are significant and additional incentives or regulations are likely to be needed. For the 2010 WMP Update, a building block approach is used. Initially, education, training and audits would be implemented. If these programs fail to provide sufficient conservation, additional District-provided programs with voluntary grower participation would be implemented. If the additional programs still do not produce sufficient conservation, then the next step is taken and so on until the desired level of conservation is achieved. The following provides the building blocks for agricultural conservation.

Grower Education and Training: This would consist of grower meetings and grower training programs funded by the District. In order to encourage grower participation, the District would implement confidential grower audits.

District-Provided Services: This would include District-funded conservation programs provided as a service to growers within the District. Programs would include scientific irrigation scheduling, scientific salinity management, moisture monitoring and farm distributions uniformity evaluations. From 2004 through 2009, 73,400 AF of documented extraordinary conservation occurred using these programs for a total program cost of $2,954,000 (about $40/AF). Additional expenditures of $200,000 in 2009-10 resulted in savings of 3,400 AFY ($59/AF).

Irrigation Upgrade/Retrofit: This would add full funding, partial funding or financial support to growers that wish to convert from flood and sprinkler to micro-sprinkler and drip systems. In a fully funded program, the District would provide reasonable reimbursement to a grower that upgrades his irrigation system or retrofits an aging drip system. A partially funded program would cost-share the expenses and a program that offers financial support would provide low or no-interest loans for the upgrades or retrofits.

Economic Incentives: This would involve adoption of one or more pricing approaches to encourage conservation, if needed. This might be accomplished by establishing an irrigation water allocation based on evapotranspiration and a crop-specific coefficient. Water use in excess of the base allocation would be charged at a higher rate.

Regulatory Programs: These types of programs would be considered as a last resort, and would include regulations that support and provide for agricultural conservation. Programs could include the following:

- Grower-prepared on-farm water management plans defining the methods of applying water and the water conservation measures utilized, and
- All new permanent crops would use drip and/or micro-spray irrigation systems. All current crops must be converted within a 5 year period.

Each of these "building blocks" represents increased investment and potential for agricultural water use reductions. Evaluation of grower practices and crop requirements indicates that a savings of up to 14 percent of current water use can be achieved through incremental implementation of these measures. Assuming no change in cropping patterns and average ET conditions, agricultural water use is expected to decrease from 6.2 AFY per acre to about 5.33 AFY per acre. As agricultural land is removed from production in response to urban development, it is expected that the amount of water saved through agricultural conservation will decrease from almost 39,500 AFY in 2020 to 23,000 AFY in 2045. In general, CVWD program experience indicates the cost of agricultural conservation is in the range of $30 to $60/AF of water conserved, making it a very cost-effective method for extending the water supply.

Continued investment in agricultural conservation programs is needed to meet the higher levels discussed in this report.

6.3.3 Golf Course Conservation

The CVWD Landscape Ordinance established maximum allowable turf area and associated water demands for new golf courses by limiting turf to 4 acres per hole plus 10 acres for associated practice areas (driving ranges and putting greens). Other landscaping must use low water-using plant materials. Based on a typical 18-hole course encompassing about 125 acres of landscaped area, the expected water use would be about 700 AFY, which is an additional 22 percent reduction compared with the 2002 WMP goal for new courses.

New golf courses incorporate desert landscaping to reduce water use

CVWD continues to work with new and existing golf courses to reduce water demands through programs such irrigation system audits, soil moisture monitoring, plan checking, inspecting new golf courses for plan check compliance, and monitoring maximum water allowance compliance.

Existing golf courses could achieve enhanced water savings by the following methods:

- Scientific irrigation scheduling
- Water audits - each course is audited every five years
- Monitoring of maximum water allowance compliance

As described earlier, the water demand for future golf courses is expected to be 22 percent less than the amount used in the 2002 WMP for new courses. This reduction can be achieved by the following methods:

- Full implementation of turf limitations specified in the Landscape Ordinance

- Plan checking for all new golf courses
- Inspection of all new courses after construction
- Water audits every five years

Implementation of conservation measures could reduce golf course demands by 11,600 AFY by 2045. The cost per AF of water saved to implement golf course conservation is expected to be comparable to that of agriculture ($30 to $60/AF), making golf course conservation a cost-effective source of water.

6.3.4 Potential Savings from Water Conservation Programs

Based upon the water conservation measures described above, the ranges of potential savings used in this plan are shown in **Table 6-2**. Total water savings would range from 60,000 to 145,000 AFY by 2045. Urban conservation in excess of 100,000 AFY is considered if cost-effective compared to other water supply options.

Table 6-2
Range of Water Conservation Savings – 2045

Type of Conservation	Low Range (AFY)	High Range (AFY)
Urban [1]	43,000	100,000
Agriculture [2]	11,000	23,000
Golf Courses	6,000	22,000
Total	60,000	145,000

Notes:
1. Low range for domestic conservation represents the amount of additional water saved as a result of currently adopted conservation programs.
2. Agricultural savings declines over time as agricultural land is developed for urban uses.

6.4 ADDITIONAL WATER SOURCES

CVWD and DWA should continue their efforts to obtain additional water supplies to meet projected water demands and help eliminate overdraft. Sources of additional water include Colorado River water, SWP water, recycled water, exchanges, entitlements and transfers, dry year purchases, water development projects, other groundwater supplies, and desalination.

6.4.1 Colorado River Water

In addition to the supplies made available to CVWD under the QSA (Section 4), the potential may exist to develop some additional Colorado River water supplies in the future. It is expected that these additional supplies would be the result of improved water use efficiency either in the scheduling of water deliveries to reduce wastage, improvements in irrigation efficiency and infrastructure improvements. The water transfers under the QSA and the Interim Surplus Guidelines are based on these approaches.

Coachella Canal

Intentionally Created Surplus Program: The potential may exist to develop additional supply under the Intentionally Created Surplus (ICS) program. The ICS program was created by the Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead in December 2007 (Reclamation, 2007). This program allows a water user to create additional supplies through:

1. Extra-ordinary conservation where a user implements conservation measures such as land fallowing, canal lining or desalination that result in increased storage at Lake Mead;
2. Tributary conservation where a user fallows pre-1929 rights on a Colorado River tributary;
3. System efficiency where a user funds a project that reduces water losses on the Colorado River system; and
4. Imported ICS where a user conveys non-Colorado River water to the River for credit.

CVWD is currently not participating in the ICS program. Although options for CVWD to develop additional supplies under the ICS program have not been identified at this time, they would most likely occur within the first and third categories.

Reduced Canal Losses: The potential may also exist to deliver additional Colorado River water by further reducing canal and distribution system conveyance losses. Current conveyance losses are estimated to be approximately 31,000 AFY.

CVWD could potentially obtain additional water by reducing its allocated losses in the All-American Canal and the first reach of the Coachella Canal. If these losses could be reduced cost-effectively, potentially as much as 10,000 AFY of additional supply may be available to CVWD. For comparison purposes, the cost of the Coachella Canal Lining Project (CCLP) was $71 million. Based on a water savings of 26,000 AFY, the cost of water saved by the CCLP was $194/AF of saved water.

Fallowing/Irrigation Systems Improvements by Others: Other potential projects to generate additional Colorado River water might include retrofit of irrigation systems to improve efficiency and land fallowing in other districts. System efficiency and retrofit projects include conversion from flood irrigation to sprinkler or drip technology or similar on-farm improvements financed by CVWD in return for the saved water. This approach was the basis for the original IID-Metropolitan transfer agreement and the IID-San Diego County Water Authority (SDCWA) and IID-CVWD transfers under the QSA. The potential amount of water saved would be a function of the existing distribution system, crop types, irrigation methods and current disposition of return or tail water flows as well as the cost of system efficiency improvements.

Metropolitan has implemented targeted fallowing activities with Palo Verde Irrigation District (PVID) to provide Colorado River water since 1992. The current agreement (authorized in 2004) has a 35-year term and provides a minimum of 26,000 AFY up to 118,000 AFY of water for Metropolitan. Under this agreement Metropolitan pays an up-front cost per acre to participating land-owners plus an annual cost per acre of land fallowed in a given year. The cost of water under this program is currently about $192/AF. Although the Metropolitan-PVID program has obligated much of the available water, CVWD executed a one-time water transfer with PVID in 2003 for 32,000 AF to offset expected delivery reductions prior to execution of the QSA. Additional supplies might be developed on a temporary basis through similar targeted land fallowing activities with PVID or other agencies. The amount of water available from a fallowing program would be a function of many factors including the landowner willingness, cost, political acceptability, environmental impacts and third party impacts.

Yuma Desalter Saved Water: In 2009, the Seven Colorado River Basin States issued the Study of Long-term Augmentation Options for the Water Supply of the Colorado River (CRWC, 2008). Among the options consider are ocean water desalination and operation of the Yuma Desalter. Ocean water desalination is discussed in **Section 6.4.8**. The Yuma Desalter was constructed by Reclamation in 1992 to treat saline agricultural return flows from the Wellton-Mohawk Irrigation and Drainage District. The treated water was intended for inclusion in water deliveries to Mexico thereby preserving a like amount of water in Lake Mead. The plant has been maintained since construction but only operated twice since then. The facility could potentially produce up to 78,000 AFY of water to augment Colorado River supplies. A one-year pilot program is planned for 2010-2011 that will produce up to 29,000 AF of ICS water for Metropolitan, SNWA and Central Arizona Water Conservation District. The cost of operations was estimated to be $322-556/AF in 2007. If the pilot program is successful, water from the desalter could be available to CVWD.

Based on the foregoing, there may be somewhat limited future opportunities to obtain additional Colorado River supplies beyond that provided by the QSA. Of these options, reduction in Canal conveyance losses is considered for additional evaluation. However, CVWD will continue to monitor potential opportunities for obtain additional Colorado River supplies when available.

6.4.2 SWP Exchange Water

As discussed in Section 4, the SWP faces many challenges including the on-going drought, risk of Delta levee failure, legal and regulatory restrictions on exports due to environmental degradation, water quality degradation and climate change. In the absence of definitive measures to resolve these challenges, SWP reliability is likely to continue declining. The current average SWP reliability is 60 percent of the Table A Amounts consistent with DWR's 2009 SWP Delivery Reliability Report. for planning purposes, the 2010 WMP Update assumes two cases for future SWP reliability. As a worst case, the future average SWP reliability will decline to 50 percent of the Table A Amounts without Delta conveyance and habitat improvements. Under these conditions, the Valley's SWP supply would be about 72,200 AFY in the future, of which about 61,400 AFY would be available to recharge the Whitewater River Subbasin (see **Table 4-5** for derivation**)**. In order to increase the amount of Whitewater recharge to levels comparable to those of the 2002 WMP (103,000 AFY on average), additional SWP Exchange water, improved SWP reliability or other supplies will be required.

As a best case, if the BDCP and DHCCP in conjunction with the water bond issue are successfully implemented, SWP reliability would be restored to the level that existed before the Wanger decision. This reliability level is assumed to be 77 percent of Table A Amounts based on the 2005 SWP Delivery Reliability Report and is consistent with Metropolitan's planning (Metropolitan, 2010b). Delta conveyance improvements are expected to begin operations by 2023 with full operations by 2026. Under this assumption and based on its existing Table A Amounts and Metropolitan call-backs, CVWD and DWA could potentially increase their average annual SWP deliveries by about 39,000 AFY (from 72,200 AFY to 111,200 AFY). Of this incremental amount, up to 85 percent (32,600 AFY) would be allocated for use in the Whitewater River Subbasin with the balance used for recharge in the Mission Creek Subbasin, as discussed in **Section 4**.

The cost of the BDCP and DHCCP are currently being developed; however, preliminary estimates suggest a capital cost for conveyance facilities in the range of $7 to $12 billion (BDCP 2010). Water costs could be roughly $400-500/AF in addition to existing SWP conveyance costs for a total cost of about $600-700/AF. Increased SWP reliability is considered under the discussion of alternative water supply scenarios in **Section 7**.

6.4.3 Future Imported Water Acquisitions

Water transfers involve the temporary or permanent sale or lease of a water right or contractual water supply between willing parties. Water can be made available for transfer from other parties through a variety of mechanisms:

- Transferring surface water from storage that would have otherwise carried over to the following years
- Pumping groundwater instead of surface water delivery and transferring the surface water
- Transferring previously stored groundwater either by direct pumping or exchange for surface water
- Reducing consumptive use through crop idling/shifting or implementing water use efficiency measures
- Reducing return flows or conveyance losses

The water made available from these mechanisms would then be delivered through existing facilities such as the SWP.

The ability to successfully execute a water transfer depends upon a number of factors including:

- Water rights (pre- vs. post-1914 rights) and place of use requirements
- Regulatory approval (SWRCB, DWR, Reclamation)
- Ability to convey the transferred water
- Delta carriage water[1] and conveyance losses
- Environmental impacts (CEQA/NEPA compliance)
- Third-party impacts
- Supply reliability
- Cost

Potential sources of water transfers include the Sacramento Valley and the San Joaquin Valley. DWR and Reclamation typically limit water transfers involving crop idling to no more than 20 percent of the total agricultural land in a county to minimize economic impacts. CVWD and DWA acquisitions are described below.

Future Acquisitions: CVWD, DWA and the City of Indio (IWA) are considering the acquisition of additional imported water supply to augment existing supplies. However, specific plans for these acquisitions have not yet been identified. For the 2010 WMP Update, it is assumed that up to 50,000 AFY of additional water supplies could be acquired through either long-term leases or entitlement purchase from willing parties. Potential sources might include the Delta Wetlands Project which would store surplus water at two Delta islands for later delivery, Sacramento Valley irrigation water transfers or purchase of additional Table A water from other SWP contractors.

The cost of long-term leases is likely to be in the range of $400 to $600/AF plus the cost of SWP conveyance (pumping), for a total cost of $550 to $750/acre-ft. The up-front cost of Table A purchase is currently about $5,300/AFY of Table A Amount (Mojave Water Agency's purchase of 14,000 AFY of SWP from Dudley Ridge Water District) plus SWP capital and operating costs. The total cost for a SWP Table A acquisition including amortization of the up-front purchase cost is expected to be in the range of $1,100 to $1,400/AF assuming an average SWP reliability of 50 percent. These costs are likely to increase in the future in response to increasing demand for water transfers.

As opportunities arise, CVWD and DWA should make water purchases from programs such as Governor's Drought Water Bank. Additional purchases from the SWP and from others with water rights, mainly in the Central Valley of California, will be evaluated as they become available to determine whether they meet CVWD's and DWA's needs.

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[1] Delta carriage water is the extra water needed to carry a unit of water through the Delta to the SWP or CVP pumping plants while maintaining Delta water quality. Carriage losses range from 0 to 25 percent depending on hydrologic conditions.

6.4.4 Other Water Exchanges and Transfers

Other potential water transfers and exchanges could include development of a new source of water elsewhere in the region or State that could be used in lieu of an existing supply. The existing supply would then be transferred to the Coachella Valley and delivered via the SWP, Metropolitan's Colorado River Aqueduct or the Coachella Canal. As an example, CVWD and DWA could pay the capital and operations cost to develop and install a drain water treatment facility in Central California that allowed a local water district that currently uses SWP or CVP water to reuse the drain water instead for irrigation. The local district's SWP or CVP water would be delivered to CVWD and DWA via the SWP aqueduct. Contractually, the local district's water would continue to be used locally while the reclaimed drain water would be transferred to CVWD and DWA. Conveyance would likely be on an "as-available" capacity basis, meaning that the water could be transferred only when sufficient SWP aqueduct capacity is available. This operational limitation might require some type of storage agreement in addition to development and exchange agreements.

Another option would be to pay for the installation of water conservation devices (such as drip irrigation, tailwater pumpback systems or urban conservation) or recycled water delivery systems at a local water district in central or northern California in exchange for their transferring the saved water to CVWD and DWA.

At this point, no specific transfer projects have been identified that follow this model and none are included in the 2010 Plan Update.

6.4.5 Recycled Wastewater

Recycled water is a significant potential local resource that could be used to help reduce overdraft. Wastewater that has been highly treated and disinfected can be reused for landscape irrigation and other purposes; treated wastewater is not suitable for potable use. Recycled wastewater has historically been used for irrigation of golf courses and urban landscaping in the Coachella Valley.

6.4.5.1 Potential Supply

Urban growth is expected to increase the amount of wastewater generated and will make additional water available for reuse, primarily in the East Valley. As discussed in **Section 4**, with water conservation measures, East Valley wastewater will total about 67,000 AFY by 2045.

Pumping station delivers recycled water to golf courses in Palm Desert

In addition, growth is expected to occur in areas that are not currently served by wastewater treatment facilities. It is expected that the wastewater agency serving these areas will extend their wastewater collection systems as development occurs. For the areas within the cities of Coachella and Indio and their respective spheres of influence that are northeast of the San Andreas fault, it is expected that one or more satellite treatment facilities will be constructed to treat wastewater generated in these areas. This wastewater should be reused for outdoor use within those developments to reduce the need for additional imported water supplies. Based on order of magnitude estimates of water demands and wastewater flows, recycled water could meet as much as 12,000 AFY of non-potable demand in this area by 2045.

6.4.5.2 Potential Approaches for Reuse

The approach to reuse implementation will depend on the location of the wastewater discharges in the Valley.

West Valley: In the West Valley, all treated municipal wastewater is either reused for irrigation uses or percolated for disposal. No treated wastewater is discharged to surface waters. When reused, the recycled water offsets groundwater pumping by golf courses and other large landscape irrigators. Wastewater that is not recycled is disposed to percolation-evaporation ponds where most of the percolated water enters the groundwater basin. This typically occurs during the winter months when irrigation demands are low. Consequently, from a groundwater balance point of view, there is little difference between recycling the water for irrigation and disposal by percolation. However, from a water quality point of view, treated wastewater contains nutrients like nitrogen that can adversely affect groundwater quality. When the water is recycled for irrigation uses, much of the nutrients are taken up by the plants and turf reducing the need for fertilizer. Thus, reuse provides a water quality benefit.

One issue in the West Valley is that the demand for non-potable water typically exceeds the available supply, especially in the summer months. Irrigators using recycled water currently must supplement that supply with local groundwater to meet their peak summer demands. This limits the amount of overdraft reduction that is possible to the available recycled water supply. CVWD has implemented the Mid-Valley Pipeline (MVP) project to convey Canal water to WRP-10 where it is blended with recycled water for delivery to large urban irrigators. Eventually, the delivery system will be expanded to serve additional golf courses and significantly reduce their groundwater use. The MVP is discussed in more detail in **Section 6.3.1.3**. CVWD also supplements the recycled supply from WRP-7 with Coachella Canal water. However, other treatment facilities do not have access to supplemental water. For the West Valley, a planning target of recycling 90 percent of the available treated wastewater has been established. Where feasible, recycled water would be supplemented with available imported water sources to reduce pumping by large landscape irrigators.

East Valley: In the East Valley, little reuse of wastewater is occurring. With the exception of a small amount of wastewater used for pasture irrigation at the VSD plant, essentially all wastewater produced from the three East Valley plants (City of Coachella, VSD, and CVWD WPR 4) is discharged into the CVSC, pursuant to permits issued by the Colorado River Regional Water Quality Control Board (Regional Board). As growth occurs in the East Valley, significantly more wastewater will be generated and require treatment. This represents a significant resource that could be used to offset groundwater pumping.

The 2002 WMP focused on reuse from the WRP-4 facility. In that plan, up to 8,000 AFY of tertiary treated effluent was proposed to be delivered for agricultural use. Since CVWD does not control the VSD and City of Coachella treatment facilities, a decision was made at that time not to establish reuse targets for these facilities. However, given the East Valley growth projections and the changing water resources picture, this 2010 WMP Update identifies planning targets for all wastewater treatment facilities in the East Valley. The cities of Indio and Coachella are evaluating the feasibility of recycling water from the Valley Sanitary District and Coachella facilities, respectively (IWA, 2008 and Coachella, 2008).

Two options have been identified to define the range of possible reuse options for the East Valley. Option 1 would involve recycling all wastewater generated by future growth in the East Valley. However, any existing wastewater discharges to the CVSC would continue to maintain flows that support riparian and marsh habitat in the CVSC and at the mouth of the Salton Sea. Option 1 is expected to generate about 37,000 AFY of additional water supply by 2045. Option 2 would involve a “zero discharge” approach where all treated wastewater is reused. This option would eliminate all municipal wastewater discharges to the CVSC but would provide additional water supply benefits. Option 2 could generate about 53,000 AFY of additional water supply in the East Valley; however, there may be an adverse impact on habitat in the CVSC and at the mouth of the Salton Sea. A benefit of Option 2 is that treatment requirements for non-potable water reuse are likely to be less stringent than future regulatory requirements for surface water discharges. Uses for recycled water are discussed in **Section 6.5.1.**

Cost of Recycled Water: The cost of water recycling consists of treatment and distribution components. Tertiary treatment is currently provided at each West Valley reclamation facility; consequently the only treatment costs that might be incurred are related to the future expansion of these facilities. In the East Valley, the wastewater treatment facilities provide secondary-level treatment with disinfection prior to discharge to the CVSC. Additional tertiary treatment will be required to make the recycled water suitable for unrestricted non-potable water uses such as golf course, landscape or agricultural irrigation. The typical cost of adding tertiary treatment is in the range of $250 to $400/AF. Distribution costs vary with the size and distance from the reclamation facility and can range from about $200/AF systems serving large nearby users to more than $1,000/AF for systems serving smaller more scattered users. By comparison, the cost of wastewater treatment for continued discharge will depend on future discharge requirements and the level of treatment needed to meet those requirements. If wastewater discharge requirements become too stringent, the cost of treatment for compliance could exceed the cost of reuse.

6.4.6 Other Local Groundwater

Development in the areas northeast of the San Andreas fault outside the Whitewater River Subbasin could potentially use local groundwater to meet a portion of the new demand. The Fargo Canyon Subarea is located east of the San Andreas fault within the Desert Hot Springs Subbasin. Groundwater is generally of poor quality (TDS >1,000 mg/L) and the native yield is limited. DWR estimated the average mountain runoff to the entire Desert Hot Springs Subbasin to be 2,900 AFY (DWR, 1964). Since the Fargo Canyon subarea represents less than one-third of the subbasin, the natural inflow is likely less than 1,000 AFY.

Since there is currently no significant development in this area, basin return flows are currently minimal. With development, the potential return flows from landscape irrigation might be on the order of 13 percent of total applied water (assuming anticipated demand levels with conservation) or 7,000–11,000 AFY at build-out. Thus, local groundwater might produce 8,000–12,000 AFY assuming capture of all native and return waters. Due to the elevated TDS of groundwater in this subbasin, some level of desalination may be required to make the groundwater suitable for irrigation. Additional investigation of water quality would be required.

6.4.7 Desalinated Drain Water

CVWD plans to use treated agricultural drainage water for irrigation purposes. The 2002 WMP recommended that a drain water desalination facility commence operation between 2010 and 2015 with a 4,000 AFY facility. The facility would be expanded to 11,000 AFY capacity by 2025. Product water would be delivered to the Canal distribution system for non-potable use.

Drain water desalination pilot facility

A brackish groundwater treatment pilot study and feasibility study was completed in 2008 (Malcolm-Pirnie, 2008a and 2008b). A variety of treatment technologies, brine management approaches and source water supply combinations were compared and assessed over a range of treatment capacities. The treatment alternatives compared reverse osmosis (RO) with dew evaporation, and RO was the chosen technology. Source water supply options consist of the collection of agricultural drainage water at select outfall locations and the installation of a well field to extract groundwater in the upper part of the aquifer influencing the agricultural runoff water.

The 2008 study recommended a combined source water strategy involving wells and direct connection to the open drain outfalls. Such a combined approach will provide additional flexibility and reliability to this new water supply. The study also developed a detailed evaluation of performance and cost of the two technologies, and RO was the recommended treatment technology to meet the current water quality goals and provide additional flexibility in the level of water quality produced should the facility's objectives change in the future. After a similar evaluation of brine management strategies, the recommended approach was to convey the RO concentrate via pipeline to constructed wetlands located at the north shore of the Salton Sea. This approach takes advantage of the water quality characteristics of the RO concentrate to generate and sustain a new saline wetlands habitat. This study concluded that agricultural drainage water can effectively be treated for reuse as non-potable water and potentially as new potable water. The estimated cost of drain water desalination including brine disposal to managed wetlands ranges from $480 to $740/AF depending on the facility capacity and source configuration. Brine disposal by way of zero liquid discharge approaches could increase the cost of drain water desalination to as much as $1,200/AF (CVWD, 2010f).

The amount of drain water that would be treated and recycled depends on supply availability (the amount of drain flow occurring), the overall supply mix (the amount of additional water needed), and the cost of treatment and brine disposal. For this evaluation, a maximum of 100,000 AFY is considered.

Treated drain water could be delivered to the Canal water distribution system and used as a non-potable supply for agricultural, golf course and landscape irrigation and potentially for potable water supply. Since the desalinated drain water is local water, it could be used anywhere within the CVWD service area. This could provide opportunities to deliver the water to users outside the Colorado River service area (ID-1) including the West Valley through a Colorado River water exchange. Such an exchange would involve delivering the treated water to existing Colorado River users in exchange for using an equal amount of Colorado River water elsewhere in the District. This exchange could allow desalinated drain water to be used for recharge at Whitewater or other locations via exchange for Colorado River water. The quality of desalinated drain water exchanged for Colorado River water would be the same as the existing SWP Exchange water.

6.4.8 Desalinated Ocean Water

Coastal communities in southern California are conducting feasibility studies and developing plans to desalinate ocean water as a water supply source. A 50 mgd capacity ocean water desalination in Carlsbad, California has received final approval and is expected to be operational in late 2012, providing water for San Diego County (Poseidon, 2010). This source offers the potential for essentially unlimited water supply. However, desalinating ocean water has relatively high costs due to the energy required to operate reverse osmosis facilities and potential environmental impacts associated with seawater intakes supplying the plant and disposal of brine.

Since the Coachella Valley is located a significant distance from the ocean, desalinated ocean water would need to be exchanged with an imported water source (SWP or Colorado River water) for delivery to the Valley. The amount of water that could be developed through ocean water desalination and exchange is likely to be limited by economics the physical capacity to deliver desalinated ocean water into the coastal water delivery systems and water quality. Conveyance limitations may require that participation in multiple desalination projects be undertaken. Because the quality of desalinated seawater would be better than the exchanged water, a flow adjustment for quality might be required. For the 2010 WMP Update, it is assumed that up to 100,000 AFY of desalinated seawater could be developed and exchanged for Colorado River water. The cost of desalinated seawater is in the range of $1,000 to as much as $2,000/AF of water produced including treatment, conveyance and exchange costs.

6.4.9 Stormwater Capture

Stormwater capture has been identified as a potential method to augment local water supplies in the Coachella Valley. The following presents background information on the stormwater characteristics of the Valley and the potential to capture additional flows.

The Coachella Valley drainage area is approximately 65 percent mountainous and 35 percent typical desert valley with alluvial fan topography buffering the valley floor from the steep mountain slopes. The mean annual precipitation ranges from 44 inches in the San Bernardino Mountains to less than 3 inches at the Salton Sea. Three types of storms produce precipitation in the drainage area: general winter storms, general summer storms and local thunderstorms. Longer duration, lower intensity rainfall events tend to have higher recharge rates, but runoff and flash flooding can result from all three types of storms. Otherwise, there is little or no flow in most of the streams in the drainage area.

The 70-mile-long Whitewater River/Coachella Valley Stormwater Channel and its tributaries have been channelized and improved to safely convey flood flows. Improvements typically consist of debris basins and concrete channels to capture debris and convey flash flood flows to the main channel. Debris basins also have the added benefit of capturing and infiltrating small storm flows, thus enhancing recharge of stormwater. The East Valley and especially the Oasis area on the west side of the Salton Sea lack flood control improvements. As future development occurs in the East Valley and flood control funding becomes available, debris basins and channels will be constructed. Debris basins detain flood flows and enhance stormwater capture (CVWD, 2009). Significant amounts of local runoff are currently captured at the Whitewater River Recharge Facility and in the debris basins and unlined channels of the West Valley. Additional stormwater will be captured when the 1000 Palms Flood Control Project is completed and when flood control is constructed in the Oasis area. However, limited data exist to estimate the amount of additional stormwater that could be captured by new facilities in the Coachella Valley.

CVWD maintains rain and flow gauges and also participates in flow measurement with the USGS, which maintains 16 stream gauging stations in the Valley. Analysis of historical flow data at the Whitewater River station near Indio indicates that average flows are about 3.5 cfs; however, measurable flow only occurs about 2.3 percent of the time or about 8 days per year. When flow is occurring, the average flow rate is 142 cfs with peak flow exceeding 5,000 cfs. The amount of storm water that could be recovered is a function of diversion and storage capacity. For example, if a 10 AF storage facility were constructed, an average of about 50 AFY of additional flow could be captured. A 100 AF facility would capture about 250 AFY on average. A 10,000 AF facility might be required to capture all flow and would yield about 2,600 AFY. Consequently, large-scale stormwater capture is not expected to yield sufficient water to be worth the investment as a single purpose project. However, small-scale stormwater retention systems located in areas of suitable geology to allow percolation could capture small intensity storms as well as street runoff. The potential yield of these smaller systems is not known at this time. Consequently, stormwater capture should be considered in conjunction with projects that construct stormwater and flood control facilities.

6.4.10 Conjunctive Use

Conjunctive use is the coordinated and planned operation of surface and groundwater resources to maximize the overall availability and reliability of regional water supplies. The Coachella Valley has practiced conjunctive use activities since the early 1970s when it began recharging imported SWP Exchange water at the Whitewater River Recharge Facility to replenish the groundwater basin. In the mid-1980s, CVWD, DWA and Metropolitan commenced an advanced delivery operation at Whitewater where Metropolitan stores surplus water for future exchange with CVWD and DWA. This program has allowed the Valley to benefit from higher groundwater levels while water is stored and allowed Metropolitan to essentially discontinue Exchange water deliveries during dry periods, drawing upon its stored water. CVWD and DWA also purchase and store available surplus water for groundwater storage.

With the increased variability of SWP deliveries and uncertainty regarding the QSA, increased emphasis will be placed on conjunctive use. Since the Valley has a large groundwater basin, it can provide groundwater storage opportunities for other water agencies in the State. As part of the QSA, CVWD and IID have signed an agreement that allows IID to store surplus Colorado River water in the Coachella Valley. Under the agreement, CVWD would store water for IID subject to availability of storage space, delivery and recharge capacity and the prior storage rights of CVWD, DWA and Metropolitan. Stored water would incur a 5 percent recharge loss and a 5 percent annual storage loss. IID may also request CVWD to investigate and construct additional locations for direct or in-lieu recharge facilities. CVWD would return stored water to IID by reducing its consumptive use of Colorado River water. This could be accomplished by temporarily reducing or eliminating groundwater recharge. If reduced recharge were not sufficient to produce the required delivery reduction, CVWD or its customers could pump groundwater and reduce Colorado River water deliveries to source substitution projects. This program would benefit Coachella Valley by providing higher levels of groundwater storage while IID water is stored in the Valley.

The 2002 WMP did not identify specific conjunctive use projects, but instead recommended that flexibility be provided for conjunctive use. For the 2010 WMP Update, it is recommended that recharge facilities have sufficient capacity to allow capture of surplus water deliveries during future wet periods. This could be accomplished by providing additional recharge basins or by changing the operations of existing facilities to recharge water on a more continuous basis. The ability to recharge additional water may be limited by water delivery system capacity and the need to meet existing customers' demands.

In addition to providing sufficient recharge capacity, additional pumping capacity may be required to maximize the potential for conjunctive use. Under the Advanced Delivery and Exchange Agreements, the mechanism for returning stored water to entities outside the basin is through a reduction in SWP deliveries. If stored water is to be returned through reductions in Canal water deliveries, then deliveries for recharge would need to be reduced during the payback period. If recharge reductions are insufficient, then reductions in direct deliveries would need to be offset through increased groundwater pumping.

6.5 SOURCE SUBSTITUTION

Source substitution is the delivery of an alternate source of water to users that currently pump groundwater. The substitution of an alternate water source reduces groundwater extraction and allows the groundwater to remain in storage, thus reducing overdraft. Source substitution projects include:

- Conversion of existing and future golf courses in the West Valley from groundwater to recycled water

- Conversion of existing and future golf courses in the East Valley from groundwater to Colorado River water
- Conversion of existing and future golf courses in the West Valley from groundwater to Colorado River water via the Mid-Valley Pipeline
- Conversion of agricultural irrigation from groundwater to Colorado River water, primarily in the Oasis area
- Conversion of urban use from groundwater to treated Colorado River water in the East Valley
- Conversion of outdoor urban use to non-potable water including Colorado River water or recycled water in the East Valley

The following discussion of source substitution projects is presented by water source and by location within the Valley.

6.5.1 Recycled Water Uses

Recycled water is a significant potential local resource that could be used to help reduce overdraft. Wastewater that has been highly treated and disinfected can be reused for landscape irrigation and other purposes; treated wastewater is not suitable for potable use. Recycled wastewater has historically been used for irrigation of golf courses and urban landscaping in the Coachella Valley. Future recycled water uses could also include indirect potable reuse (IPR), which is the planned use of highly treated wastewater to directly augment water supplies via direct or indirect groundwater recharge, or blending with other potable sources.

6.5.1.1 Non-potable Uses

The principal non-potable uses for recycled water in the Coachella Valley are:

- Agricultural irrigation
- Golf course irrigation
- Urban landscape irrigation

Each of these recycled water uses could be implemented through: 1) direct blending with Coachella Canal water and delivery through the existing Canal water distribution system or the MVP system, 2) construction of an isolated distribution system that delivers recycled water only, 3) expansion of existing dedicated recycled water systems to serve new customers, and 4) a combination of these options. Each approach has advantages and disadvantages.

The first option has a significant potential cost advantage in that the distribution system is in place; little additional capital expenditures would be needed to deliver recycled water to a wide range of non-potable water users. Recycled water (even blended with Canal water) may not be acceptable to certain agricultural users; however, the California Department of Public Health (DPH) regulations allow the use of tertiary treated municipal effluent to irrigate "food crops, including all edible root crops, where the recycled water comes into contact with the edible portion of the crop" (CCR Title 22, 2010). However, the introduction of recycled water into the Canal system could pose significant permitting issues for the future potable use of Canal water.

This may require isolating portions of the system that receive recycled water from those that would ultimately deliver water to urban water treatment facilities.

The second option would avoid the issues created by serving a blend of recycled and Canal water by operating a dedicated recycled delivery system. However, this option is most feasible where the suitable users are located relatively near the recycled water source. It is also difficult to balance demand and supply with this type of system because irrigation needs fluctuate seasonally.

The third option is partially in place. Existing dedicated recycled water systems have been constructed near each of the West Valley wastewater treatment facilities. Expansion of these systems makes sense when the users can be served recycled water from a cost-effective extension.

The fourth option may be the most viable approach in the East Valley where agriculture is expected to transition to urban land uses. Here, the existing Canal water distribution system can serve Colorado River water to most users. This also allows the system to convey water to future potable water treatment facilities. New non-potable water systems could be designed to use both Canal and recycled water where appropriate. Portions of the Canal distribution system located near the recycled water sources that can be isolated could be used to deliver a blend of water to non-potable customers.

6.5.1.2 Indirect Potable Reuse

An additional recycled water use in the East Valley is indirect potable reuse (IPR). IPR is the planned use of highly treated wastewater to directly augment water supplies. IPR is likely to become an important element of water resources development in southern California due to the limitations on imported water supplies. Orange County Water District and West Basin Municipal Water District have been pioneers in the development of IPR for injection at the coastal seawater intrusion barriers. Several other agencies in southern California including Metropolitan, Los Angeles County Sanitation Districts, Water Replenishment District of Southern California, Upper San Gabriel Valley Municipal Water District, Eastern Municipal Water District and the City of San Diego are investigating IPR for either groundwater replenishment through surface spreading and/or injection prior to extraction or blending with surface water supplies prior to diversion for potable use.

In all cases, multiple barriers are provided to protect the safety of the water supply. Most commonly, membrane treatment processes (microfiltration/nanofiltration and reverse osmosis) followed by ultraviolet light and hydrogen peroxide addition are being used or investigated to meet the stringent public health requirements established by the State of California DPH and the Regional Boards. In addition, strict source control programs prevent the introduction of harmful pollutants to the wastewater supply coupled with comprehensive monitoring and blending with natural and imported water supplies. The cost for IPR is high due to the extensive treatment requirements with capital costs in the range of $4.50 to $6.50 per gallon of plant capacity. Including conveyance and operations/maintenance costs, recent IPR projects have unit costs in the range of $900-$1,200/AF.

In the Coachella Valley, IPR could be practiced through treatment and groundwater recharge via spreading or injection or through treatment and blending with Coachella Canal water. However, it is likely that simple blending with Coachella Canal water may not provide sufficient retention time to satisfy the regulatory agencies without construction of a large surface reservoir. IPR is an emerging approach that may be considered in future WMP updates, but are not included in the 2010 Plan Update.

6.5.2 Groundwater to Canal Water Conversion

Canal water is a significant water supply source for the Coachella Valley. One of the underlying principles in the development of the 2010 WMP Update is to fully use the available Canal water supply. This is achieved by conversion of agricultural users and golf courses from groundwater to Canal water, development of dual piping for urban users and treatment of Canal water for urban use and groundwater recharge. Recharge activities are discussed in **Section 6.6**.

6.5.2.1 Agricultural Conversion from Groundwater

Agriculture accounted for approximately 314,000 AFY (69 percent) of the water use in the Coachella Valley in 2009. Of the total agricultural use, about 66,000 AFY of demand is estimated to be supplied from groundwater pumping.[2]

The 2002 WMP focused on conversion of agricultural groundwater use to Canal water use and proposed two principal measures:

- expansion of the distribution system to areas within ID-1 not served by the current distribution system, and
- conversion of groundwater users who have Canal water available for use but choose to irrigate with groundwater

Expansion of the Canal Water Distribution System: CVWD is currently working with two farming groups (Gold Coast Growers and Ocean Mist, et al.) to extend the Canal water delivery system to serve agricultural operations that are not currently served with Canal water. One extension will deliver water outside the ID-1 to serve agriculture that pumps groundwater from the Lower Whitewater River Subbasin. The other extension will serve a group of farmers located south of Mecca in a portion of the ID-1 service area that did not originally receive Canal water. Implementation of these two extensions will increase Canal water use by about 5,300 AFY.

A third location of potential expansion of the Canal water delivery system is the Oasis area. This area is included in the ID-1 service area but did not receive Canal water because the soils were not suitable for farming based on the irrigation technology of the time. Currently, much of this area is irrigated with groundwater using drip irrigation.

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2 Reported pumping in 2009 was 25,748 AFY. About 40,000 AFY of additional pumping is estimated based on historical power records.

In 1996, CVWD completed a study investigating the feasibility of expanding the distribution system to serve farmers on the Oasis slopes (Summers, 1996). Desalinated drain water and recycled water would be served to the areas outside ID-1 via an exchange to avoid then existent limitations preventing delivery of Canal water outside ID-1. The 2002 WMP recommended construction of this system with additional facilities to serve farmers located outside ID-1 with the system being operational in the mid-2020s. However, farmers considered the system too costly. Recently, there has been renewed interest in expanding the irrigation system in the Oasis area. Since the QSA now allows Canal water to be used outside ID-1 to reduce groundwater overdraft in ID-1, the need for delivering non-Canal water via exchange has been eliminated. If completed, this system is expected to deliver about 27,000 AFY of Canal water to offset groundwater pumping. As development occurs in the Oasis area, the system could be converted to serve non-potable water for landscape irrigation.

A 1958 agreement between CVWD and Reclamation allows the extension of the Canal water distribution system to serve tribal lands if requested by the tribes. The cost of the extension is to be paid by the federal government. The Torres-Martinez tribe has expressed interest in obtaining Canal water service. Since much of the land is not currently farmed, this represents a new use of Canal water. The potential amount of Canal water that could be used has not been quantified.

Increased Use by Existing Canal Water Customers: A review of reported groundwater extraction from the Engineer’s Report on Water Supply and Replenishment Assessment for the Lower Whitewater River Subbasin Area of Benefit (CVWD, 2010b) shows agriculture pumped at least 25,748 AFY in 2009. It is believed that significantly more agricultural pumping (up to 40,000 AFY) may be unreported, based on historical power records. Eight of the largest farming operations that pump 1,000 AFY or more represent 92 percent of the reported agricultural pumping. Most of these operations are within the ID-1 service area. Of these, about 65 percent of their water use is from groundwater and 35 percent is Canal water.

If these operations could increase their Canal water use to 90 percent of their demand, then 20,700 AFY of additional Canal water could be utilized, with a corresponding reduction in groundwater overdraft. Since many of these agricultural operations have Canal water connections, it is expected that little additional cost would be incurred to increase their usage. The District should determine what obstacles exist that prevent these pumpers from using additional Canal water and encourage them to reduce their groundwater pumping.

Summary of Agriculture Conversion Potential. For the 2010 WMP Update, agricultural use of groundwater is assumed to decrease from about 66,000 AFY in 2009 to about 7,000 AFY by 2045, a decrease of 59,000 AFY or 89 percent.

6.5.2.2 Golf Course Conversion

There are currently about 80 golf courses in the West Valley and 35 golf courses in the East Valley (Palm Springs Life, 2010). Additional golf courses are expected to be constructed as development occurs, primarily in the East Valley. In 2010, CVWD developed a new non-potable water use agreement that requires golf courses with access to Canal or recycled water to meet at least 80 percent of their irrigation demand from that source (CVWD, 2010e). For the 2010 WMP Update, a target is established of 90 percent use of Canal water by 2015.

East Valley Golf Course Conversion: The use of Canal water by golf courses has increased from 6,500 AFY in 1999 to 14,900 AFY in 2009 in the East Valley. There are 19 existing golf course operations in the East Valley that have Canal water connections. The total water usage (Canal water and groundwater) for these courses was 26,100 AFY in 2009. Existing Canal water use constituted approximately 57 percent of their total annual water use. Based on the 90 percent non-potable usage target, there is a potential for an additional 8,800 AFY of Canal water usage at these golf courses. Since these customers have Canal water connections, there is little additional cost associated with increasing their non-potable water use.

In addition to golf courses that currently have Canal water connections, there are nine golf course operations that rely solely on groundwater. In 2009, these courses used about 8,300 AFY of groundwater. All of these courses are located within or adjacent to ID-1; however, not all have access to Canal water. The Canal water distribution system is nearby the Eagle Falls, Indian Palms, La Quinta Country Club, La Quinta Resort and Rancho Casablanca courses. However, the system would need to be extended about one mile to serve The Quarry and several miles to serve Bermuda Dunes and Palm Royale. The district plans to serve the latter two courses from the MVP. These courses could reduce their groundwater pumping by up to 7,800 AFY when connected to non-potable water.

CVWD currently requires new golf courses with access to Canal water to meet at least 80 percent of their demand with that source. With an estimated additional demand of 34,000 AFY, new courses should use at least 27,000 AFY of Canal water. Based on this assessment, non-potable water use by golf courses could reduce groundwater pumping by 44,000 AFY by 2045 as shown in **Table 6-3**.

West Valley Golf Course Conversion: In the West Valley, the MVP will provide 37,000 AFY of Canal water and 15,000 AFY of WRP-10 recycled water to golf courses in lieu of groundwater pumping. The MVP project is discussed further in **Section 6.5.3.** Additional golf course conversion in the West Valley could be accomplished using recycled water from the Palm Springs WRP and WRP-7. Canal water, amounting to 2,300 AFY, will also be provided to Mountain Vista, Shadow Hills and Classic Club in the West Valley by 2045. Conversion of all feasible golf courses in the West Valley to use at least 80 percent non-potable water would reduce groundwater pumping by 56,800 AFY by 2045 as shown in **Table 6-4**. These figures are applied in the 2010 Plan Update.

Table 6-3
East Valley Golf Course Conversion Potential

User	Demand (AFY)	Current Non-potable Use [1] (AFY)	Future Non-potable Use [2] (AFY)	Pumping Reduction (AFY)
Existing Courses with Canal Water Connections	26,100	14,900	23,900	8,800
Existing Courses without Canal Water	9,200	0	8,300	8,300
New Courses	34,000	0	27,000	27,000
Totals	**69,300**	**14,900**	**59,200**	**44,100**

1 Current non-potable use is Canal water.
2 Future non-potable use includes both Canal water and recycled water.

Table 6-4
West Valley Golf Course Conversion Potential

User	Demand (AFY)	Current Non-potable Use [1] (AFY)	Future Non-potable Use [2] (AFY)	Pumping Reduction (AFY)
Palm Springs Area Courses	16,500	4,300	13,200	8,900
Mid-Valley Courses	50,700	6,600	45,600	39,000
North Indio Area Courses	4,800	4,300	4,300	0
New Courses	11,200	0	8,900	8,900
Totals	**83,200**	**15,200**	**72,000**	**56,800**

1 Current non-potable use is principally recycled water with limited Canal water use.
2 Future non-potable use includes both recycled water and Canal water.

6.5.2.3 Potable Urban Use in the East Valley

As growth occurs in the East Valley and farms are converted to urban land uses, agricultural demand for Canal water will decrease. To avoid increased urban groundwater pumping, there will be a need to begin treating Canal water for urban use. The 2002 WMP anticipated this need and proposed that treatment be provided beginning in the late 2020s and about 32,000 AFY be treated by 2035. Increased domestic water demand coupled with reduced agricultural demand is expected to increase this amount.

Several possible approaches exist for defining the range of treated Canal water required in the future. By 2045, urban water demand in the East Valley is projected to be about 190,000 AFY with conservation. Because water treatment infrastructure is relatively costly, one approach would be to treat only the amount of potable demand created by new growth. Since about 25 percent of domestic water is used for potable purposes, about 48,000 AFY of treatment would be required to meet new indoor potable demands in the East Valley. A somewhat larger program might involve treating all indoor demands in the East Valley. Based upon a 2045 urban demand of about 265,000 AFY (with conservation), about 62,000 AFY of treated Canal water could be used to meet the indoor water demands. A third approach would be to treat all urban water demand not met by groundwater and non-potable Canal water deliveries. This might require 75,000 to 90,000 AFY of treated water depending on the amount of non-potable water delivered for irrigation. Using these approaches, treated Canal water capacities might range from 48,000 to 90,000 AFY compared to the 32,000 AFY identified in the 2002 WMP. This represents a significant increase in the amount of Canal water that would be treated for urban use compared to the 2002 WMP. Treatment strategies are discussed further in **Section 6.7.1**.

6.5.2.4 Non-potable Urban Water Systems in the East Valley

One approach for reducing future groundwater use and overdraft while increasing Canal water use is the installation of dual source water systems, which refers to the operation of separate but parallel potable and non-potable systems to serve urban development.

An urban non-potable distribution system may be achieved by the following methods:

- Developer installation of on-site non-potable irrigation system (treatment if needed, storage, pumping and piping) which connects to Canal water distribution system or recycled water systems as available and feasible.
- Rehabilitation and extension of the existing Canal delivery system, as needed
- Separate potable water system that meets indoor and other uses requiring a potable supply.

A separate non-potable system could reduce the amount of groundwater that would have to be treated for arsenic removal, minimize the number of new wells required to serve growth and could be designed to meet fire protection needs, thus reducing the size of the potable water system. In addition, delivery of non-potable water for urban use would reduce the amount of Canal water treatment need for potable use. The non-potable system would need to be distinguishable from the potable water system to prevent cross-contamination and backflow issues. In California, non-potable systems are installed using “purple pipe” in compliance with the California Health and Safety Code §116815, to clearly indicate that the water is not for drinking purposes.

For this 2010 WMP Update, it is estimated that distribution systems could be installed for at least two-thirds to as much as 80 percent of the new development in the East Valley by 2045. This estimate is based on the following:

- Growth will create about 190,000 AFY of new demand in the East Valley with conservation. Of this amount, about 75 percent or 143,000 AFY is expected to be outdoor demand.
- Larger developments must mitigate for their incremental demand on the basin.
- Large developments are more likely to have the financial capability to distribute the costs of infrastructure among more housing units, thereby lowering the individual unit’s cost.

Based on these premises, about 95,000 to 115,000 AFY of non-potable use with Canal water and desalinated drain water could potentially be implemented by 2045. Additional investigations should be conducted into the feasibility of delivering non-potable water on this scale over the next five years.

6.5.3 Mid-Valley Pipeline

The MVP is a pipeline distribution system to deliver Colorado River water to the Mid-Valley area for use with CVWD's recycled water for golf courses and open space irrigation. This source substitution project will reduce groundwater pumping for these uses. Construction of the first phase of the MVP from the Coachella Canal in Indio to WRP-10 (6.6 miles in length) was completed in 2009. Implementation of later phases will expand the MVP to be able to serve approximately 50 golf courses in the Rancho Mirage-Palm Desert-Indian Wells area that currently use groundwater as their primary source of supply with a mixture of Colorado River water and recycled water.

Construction of the Mid-Valley Pipeline

The 2010 WMP Update assumes that the MVP will serve about 37,000 AFY of imported water and 15,000 AFY of WRP-10 recycled water on average by 2045. The MVP will meet approximately 72 percent of the West Valley golf course demand by 2045.

Since the MVP has not been fully implemented, the amount of water it can currently deliver is limited by the demands of existing non-potable customers. There are eight golf courses and five other users in the West Valley currently connected to the WRP-10 recycled water system, which can receive both recycled water and canal water via the MVP. If all of these courses use at least 90 percent of their irrigation needs with non-potable water, then about 2,700 acre-ft/ of groundwater pumping could be eliminated.

There are four golf courses adjacent to the MVP that can be connected to the system by undertaking minimal construction, thus making them ideal candidates to receive Canal water through the MVP. In fact, construction of Phase 1 of the MVP included outlets along the pipeline to serve these courses. However, pipeline connections to deliver Canal water from the MVP to each course have yet to be constructed. When all of these courses are connected, about 4,500 AFY of additional pumping could be eliminated. At least ten additional courses could be connected to the MVP downstream of WRP-10 with relatively simple pipeline connections, reducing pumping by about 11,200 AFY. In total, about 18,400 AFY of golf course pumping could be eliminated.

In addition to delivering water for non-potable uses, another possible use for the MVP is conveyance of Canal water to urban water treatment facilities. Although this use was not contemplated when the MVP concept was developed, it is possible that one or more small-scale water treatment facilities could be constructed to offset urban groundwater pumping. The locations and economic feasibility of this approach has not been evaluated. However, since the MVP has a capacity of 92 cfs at the Coachella Canal diversion, conveyance of Canal water to water treatment facilities would reduce the capacity available to serve golf courses. Thus the cost to treat and deliver potable water would need to be compared with the cost to expand the MVP distribution system to serve additional golf courses.

CVWD should implement the near-term extensions to the MVP and prepare a master plan to lay out the remainder of the MVP system. In addition to non-potable uses, the feasibility of using a portion of the capacity to treat water for urban water uses will be evaluated.

6.5.4 Source Substitution Scenarios

Potential source substitution options are arrayed by size as summarized in **Table 6-5**. For this table, the amount of source substitution is determined by comparing the change in groundwater production after deducting the effects of planned water conservation. The amounts of source substitution included in the 2002 WMP are also shown for comparison.

Table 6-5
Range of Source Substitution Options
(AFY)

Scenario	Agriculture	Golf Courses	Urban-Treated	Urban-Untreated	Total
2002 WMP	51,000	59,000	32,000	0	142,000
Minimum	5,300	108,200	48,000	95,000	256,500
Moderate	33,000	120,000	62,000	105,000	320,000
Maximum	38,000	142,600	90,000	115,000	385,600

6.6 GROUNDWATER RECHARGE

Groundwater recharge is an important component of basin management. Groundwater recharge can be accomplished by surface spreading or by injection. The feasibility of each method is a function of geologic conditions, land availability, cost and other factors. With surface spreading, water is placed in shallow ponds where it is allowed to percolate into the underlying aquifers. Surface spreading requires large areas of open land for construction of ponds and the absence of significant confining clay layers that would prevent the water from reaching the aquifers. With injection, water is put directly into the aquifers through a well. Frequently, injection wells are also used to extract the stored water. Injection wells have a relatively small footprint compared to recharge basins and the cost is only slightly higher than the cost of a new production well; however, injected water needs to be treated prior to injection to ensure that it meets drinking water regulations and to prevent well clogging.

Since 1973, CVWD and DWA have recharged the West Valley basin at the Whitewater River Spreading Facility with over two million AF of SWP Exchange water. As a part of the 2002 WMP, CVWD investigated recharge in the East Valley using Colorado River water and finished construction at the Thomas E. Levy Groundwater Replenishment Facility (Levy facility) and is planning the construction of another major recharge facility at Martinez Canyon. Additional surface recharge sites in the Mid-Valley area will be considered on the basis of geologic suitability and availability of sufficient vacant land.

6.6.1 West Valley Recharge Facility

The Whitewater River Recharge Facility has a recharge capacity of in excess of 300,000 AFY. The 2002 WMP established a future average annual recharge goal at this facility of about 100,000 AFY. Consequently, no additional recharge capacity expansion is required. The available capacity is valuable for conjunctive use operations by CVWD and DWA as well as Metropolitan or other interested parties.

Whitewater River Spreading Facility
located north of Palm Springs

As described in **Section 6.4.2**, to reach the 100,000 AFY goal for the Whitewater facility, CVWD and DWA would need to acquire additional SWP Table A Amounts or other imported water sources. As discussed in **Section 4**, the SWP Exchange supply can currently provide about 77,700 AFY for the Whitewater facility. However, the 2010 WMP Update assumes the reliability of the SWP will decline to about 50 percent of the Table A Amounts without improvements in the Delta. Consequently, under future conditions, it is possible that recharge at Whitewater could be limited to the available future supply of about 61,400 AFY unless it is augmented with other supplies. If Delta habitat and conveyance improvements can be successfully implemented, this supply could increase to 93,000 AFY.

6.6.2 East Valley Recharge Facilities

CVWD has operated a pilot recharge facility at Dike 4 near Avenue 62 since 1997. Construction of the full-scale Levy facility was completed in mid-2009. This facility is located on the west side of the Valley in La Quinta and has an estimated average recharge capacity of 40,000 AFY. Currently, the capacity is limited by hydraulic and water delivery constraints within the Canal water distribution system to a long-term average of about 32,000 AFY. Consequently, construction of an additional pipeline and pumping station from Lake Cahuilla may be required in the future.

Thomas E. Levy Groundwater Replenishment
Facility located in La Quinta

The Martinez Canyon recharge facility is a pilot project underway since 2005. Upon completion of a full-scale facility, this project (according to the 2010 WMP Update) is expected to recharge 20,000 to 40,000 AFY on average. The Martinez Canyon facility is projected to start initial operation in 2016 and is expected to reach full capacity by 2018.

CVWD is also evaluating alternative recharge locations that might allow recharge in the vicinity of areas of significant groundwater pumping. A settlement agreement between the City of Indio and CVWD specifies a process for proposing and evaluating additional recharge facilities in the vicinity of Indio (CVWD-Indio, 2009). CVWD and the City of Indio are investigating the potential of a recharge site within the City of Indio which would benefit the Indio area.

IWA conducted a preliminary investigation (performed by Petra Geotechnical) that identified Posse Park (Avenue 42 and Golf Center Parkway adjacent to the Coachella Canal) as a potential location for recharge of both the upper and lower Coachella Valley aquifer by either spreading or injection wells. IWA recently drilled two exploratory wells at this location and plans to conduct further studies to validate the use of Posse Park to replenish the aquifer. The amount of potential recharge at this location has not been determined. The 2010 WMP Update assumes for planning purposes that an Indio facility could recharge 10,000 AFY.

As discussed previously, surface recharge facilities are only effective in areas where the geology is suitable. In the Coachella Valley, significant portions of the East Valley are underlain by relatively thick clay and silt which impedes the vertical percolation of water into the deep aquifers from which most groundwater is produced. Consequently, most surface recharge facilities are located on the fringes of the East Valley where these clay and silt layers are not present. As an alternative, the groundwater basin can also be recharged by injection through either dedicated recharge wells or aquifer storage and recovery (ASR) wells which can be used for both recharge and groundwater production. Injection has the benefit of placing replenishment water at the same location where pumping has occurred. However, injection requires a high quality, turbidity-free source of water. In most areas where injection is practiced, a treated water source that meets federal and state surface water treatment rules is used.

Injection was considered in the 2002 WMP as a potential means of recharge. However, injection was deferred from consideration at that time due to the cost. In the future, injection may become more viable as a recharge approach when treated Colorado River water becomes more widely available. However, impacts of injection on local water quality may affect feasibility.

6.6.3 Recharge Scenarios

Three alternative recharge scenarios are considered for possible implementation in the 2010 WMP Update: minimum, intermediate and maximum.

A minimum scenario would involve continued operation of the existing Whitewater, Levy and Martinez recharge facilities based on capacity and existing supply limitations. Recharge at Whitewater is assumed to be limited by future SWP supply availability (about 61,400 AFY) without Delta habitat and conveyance improvements. In the East Valley, the Levy facility would operate at 40,000 AFY and the Martinez demonstration project operate at 3,000 AFY. This would provide about 101,000 AFY of recharge on average.

An intermediate scenario is considered that is similar to that proposed in the 2002 WMP. This option would increase recharge at Whitewater to 100,000 AFY through the use of supplemental water from either the QSA or agricultural drain desalination, construct the Martinez facility to an average capacity of 40,000 AFY as indicated in the 2002 WMP, and add recharge at a potential site in Indio. This would increase the total recharge capacity to 190,000 AFY on average. Recharge at the Levy and Martinez facilities could be adjusted if needed to manage water levels and drain flows.

The maximum scenario would maximize recharge by significantly increasing recharge at each of the three East Valley facilities. This scenario could be coupled with a minimum source substitution option but would require a significant increase in groundwater pumping capability. Based on modeling results, it is unclear whether this maximum option is technically feasible due to mounding at the recharge sites, a condition that occurs when recharging at a faster rate than the rate at which water can be flow downward and outward through the soil into the basin (transmissivity rate). This is a hydrogeologic constraint, and the only possible solution would be to recharge at lower rates, but at more recharge sites. Since the number of sites where recharge is viable in the East Valley is limited, a different approach to recharge such as the use of injection wells might be required. Should injection wells prove cost-effective in the Valley, this recommendation should be revisited. **Table 6-6** presents the range of recharge options considered.

Table 6-6
Range of Groundwater Recharge Scenarios
(AFY)

Scenario [1]	Whitewater	Levy (Dike 4)	Martinez	Indio [4]	Total
2002 WMP [2]	103,000	40,000	40,000	0	183,000
Minimum [3]	61,000	40,000	3,000	0	104,000
Moderate	100,000	40,000	40,000	10,000	190,000

Notes:
1. Maximum recharge was dropped due to technical feasibility concerns.
2. The 2002 WMP envisioned 140,000 AFY of SWP Exchange water, of which 37,000 AFY would be used to supply the MVP.
3. Whitewater recharge is limited by the amount of available supply.
4. Indio recharge is tentatively set at 10,000 AFY until studies indicate the actual capacity that could be implemented.

6.7 WATER QUALITY IMPROVEMENTS

Water quality has been identified as a significant issue. **Section 5** identifies several water quality issues including salinity and metals such as arsenic.

6.7.1 Urban Water Treatment

The use of Colorado River Water (Canal water) for potable uses will require treatment to meet drinking water regulations. In anticipation of constructing potable water treatment facilities, CVWD completed a pilot treatability study for Canal water in 2008 (Malcolm-Pirnie, 2008c). This study investigated three alternative treatment approaches for meeting the Surface Water Treatment Rule and reverse osmosis to improve the salinity of Colorado River water delivered for urban use. The study recommended that blending of treated Colorado River water with local groundwater be carefully evaluated to minimize the potential for customer complaints.

The size of individual water treatment plants is a function of economies of scale with larger facilities being more cost-effective than small facilities. However, larger treatment plants require higher capacity transmission pipelines to deliver the water to the distribution system. Since the current potable water systems are designed around a highly distributed groundwater source, the cost of treated water transmission may be more costly for larger treatment facilities. Consequently, an investigation of the economic tradeoffs between large-scale centralized facilities and small scale facilities should be conducted.

6.7.2 Recharge Water Quality Improvement

The Colorado River water delivered to the Coachella Valley contains more than one ton of salt in every acre-foot of water delivered (600 to 700 ppm). If outflows to the Salton Sea are not sufficient, this salt accumulates in the groundwater basin. The Native American tribes and other interested parties have expressed concern about the long-term effect that increased recharge with Colorado River water might have on Valley groundwater quality. Although this concern was addressed in the 2002 WMP and a Statement of Overriding Considerations was adopted for the PEIR, this concern remains. Two options have been identified for reducing the salt load of the water used for recharge: desalination and importation of SWP water.

6.7.2.1 Colorado River Desalination

Desalination of Colorado River water has been mentioned as an approach for reducing the salt load in the recharged water. As discussed above, CVWD conducted pilot testing of alternative treatment processes which concluded that reverse osmosis was the only viable approach for removing salt from the Colorado River water. If desalination were determined to be the best approach for water quality improvement, three or more separate treatment facilities might be required, one at each recharge location. Significant issues impacting a decision to implement desalination prior to recharge include the cost of treatment, methods and costs of brine disposal, and how the costs of treatment would be recovered. Preliminary costs to desalinate Colorado River water are in the range of $500 to $650/AF depending on the desired treated water salinity (Malcolm-Pirnie, 2008c). In addition, between 10 and 20 percent of the treated water would be lost as brine. Brine disposal methods involving zero liquid discharge might reduce these losses but could increase the cost to more than $1,000/AF. Initial investigations indicate that if the cost of recharge water desalination were borne by the groundwater producers, the replenishment assessment charge might triple in the West Valley and increase more than seven times its current level in the East Valley. It is believed this level of cost increase would have a devastating effect on the local economy.

6.7.2.2 SWP Importation

Direct importation of SWP water to the Coachella Valley has been considered since 1963. Direct delivery of SWP offers the potential for improved water quality compared to the current SWP Exchange with Metropolitan. However, previous investigations concluded that the cost of constructing a conveyance facility was too great. In 2007, CVWD and DWA in association with Metropolitan, San Gorgonio Pass Water Agency and Mojave Water Agency commenced an investigation of alternative routes for a Coachella Valley extension of the California Aqueduct. This study initially considered four alternative alignment corridors: 1) North Pass alignment from Devil Canyon Afterbay in San Bernardino roughly paralleling Interstate 10 to the Whitewater River area, 2) South Pass alignment from Lake Perris roughly paralleling CA-60 to

Beaumont and then following the I-10 corridor, 3) San Jacinto Tunnel alignment from Lake Perris paralleling Metropolitan's San Jacinto Tunnel and then following the I-10 corridor, and 4) a Lucerne Valley alignment through the high desert from Hesperia through Yucca Valley and into the Coachella Valley. More detailed studies focused on a Modified North Pass alignment that included joint use of a portion Metropolitan's Inland Feeder system and the Lucerne Valley alignment.

These studies are expected to be completed in 2010. The participating agencies will then decide whether to proceed with detailed environmental studies for CEQA and NEPA compliance. Construction of a SWP extension could cost in the range of $1.0 to 1.5 billion dollars and have an average cost of $450-600/AF of water delivered. This option would be capable of reducing the salinity of water recharged at the Whitewater and Mission Creek recharge facilities from about 700 mg/L to about 350 mg/L. However, it would have no effect on the salinity of Canal water recharged in the East Valley.

Both of these approaches involve significant capital and operating costs. If the cost of recharge water desalination or SWP importation were borne solely by groundwater producers through the replenishment assessment charges, these producers might expect a significant increase in their costs which could affect their ability to operate. Assessment of this impact is beyond the scope of the 2010 WMP Update. Therefore, these options are not considered in the 2010 WMP Update. Consequently, methods for improving recharge water quality might be considered as part of the future Integrated Regional Water Management Plan (IRWMP) or similar approach involving broad stakeholder involvement.

6.7.3 Groundwater Quality and Treatment

A wide variety of water quality constituents can affect groundwater use. Among the more important for the Coachella Valley are:

- Salinity
- Nitrate
- Fluoride
- Arsenic
- Chromium VI
- Perchlorate
- MTBE
- VOCs
- DBCP

Several of these constituents are discussed in **Section 5.1.3** and are considered to be emerging issues because they do not violate water quality standards. In addition to salinity, the water quality constituents of primary concern for the 2010 WMP Update are arsenic, fluoride and dibromochloropropane (DBCP). Other constituents will continue to be monitored for possible action in the future.

The quality of Coachella Valley groundwater is high and most of the groundwater delivered to urban customers receives only disinfection. Currently, the only groundwater treatment being undertaken is for arsenic removal in the East Valley. Naturally-occurring arsenic is found in the eastern Coachella Valley groundwater from Mecca to Oasis and appears to be associated with local faults and geothermal activity. CVWD identified six of its domestic water wells that showed arsenic levels above the revised federal maximum contaminant limit (MCL) (0.01 mg/L). In early 2006, CVWD completed construction of three groundwater treatment facilities that use an ion-exchange process with a brine minimization and treatment process to remove arsenic. If needed, they can be expanded to treat additional wells in the future.

A number of mobile home and recreational vehicle (RV) parks in the East Valley that utilize private wells have arsenic levels that exceed the drinking water regulations. In addition, several tribal wells have arsenic levels exceeding the MCL. These parks are served by private wells and are located some distance from CVWD’s potable water system. CVWD is working with Riverside County and the Torres-Martinez tribe and has applied for federal grants to fund a portion of the cost to extend the potable water system to these communities. CVWD is also evaluating the feasibility of treating Colorado River water instead of constructing additional groundwater treatment facilities.

Fluoride is a naturally occurring element that is found in concentrations exceeding drinking water regulations (2 mg/L) in portions of the Coachella Valley. Most commonly, elevated fluoride concentrations are found near faults and geothermally active areas such as near the San Andreas fault and in the Oasis area. CVWD typically avoids drilling wells in these areas. However, private drinking water wells drilled in susceptible areas may have high fluoride concentrations. Fluoride can be removed from water by using reverse osmosis or activated alumina filtration.

Between 1955 and 1977, DBCP was injected into the soil to control nematodes, parasitic thread-like worms that damage the roots of crops and other plants. DBCP was used in portions of the Coachella Valley, most notably in an area north of Interstate 10 and west of Indio. Detectable concentrations of DBCP that do not exceed drinking water regulations (less than 0.2 µg/L) have occasionally been found in the groundwater of this area. CVWD water quality specialists are concerned that groundwater recharge activities in this area could raise water levels and allow the migration of DBCP to potable water wells. Consequently, the 2010 WMP Update has avoided locating recharge facilities in this area.

6.8 OTHER MANAGEMENT ACTIVITIES

In addition to the five principal management elements described in this Section, additional management considerations are discussed in this section. These include source water protection programs, drainage control, flood control, data monitoring and management, and stakeholder involvement.

6.8.1 Source Water Protection

Well management programs are required to ensure that existing and future wells do not impact the usability of the groundwater resource. Specific programs applicable to the Coachella Valley are: well construction/destruction/abandonment policies, artesian well management and well capping. Each program is described below.

6.8.1.1 Construction/Destruction/Abandonment Policies

Improperly constructed wells can result in poor yield and contaminated groundwater by establishing a pathway for pollutants to enter a well, allow communication between aquifers of varying quality, or the unauthorized disposal of waste into the well. Inactive or improperly abandoned wells present a physical danger and can allow groundwater pollution.

Well construction, destruction and abandonment policies should be developed in cooperation with Riverside County. These policies should include the following principles:

- All wells drilled in the Coachella Valley must be in compliance with the California Water Code §13700 through §13806.
- All well drilling contractors must be in possession of an active C-57 Contractor's license.
- Permits for the drilling, deepening, modification, or repair of any well must be obtained and be in accordance with Riverside County Ordinance 682.3. These permits should conform to well construction standards that are specified in DWR Bulletins 74-81 and 74-90.
- All wells within the Coachella Valley, whether active, inactive, abandoned or improperly destroyed, should be identified by conducting a well canvass. All identified wells should be included in the groundwater GIS.
- The status of all wells should be evaluated to identify which wells should be destroyed and which wells can be capped or retained as monitoring wells. If no future use is anticipated, wells must be properly destroyed according to the destruction procedures are also specified in the DWR Bulletins 74-81 and 74-90. If future use is anticipated, wells can be capped and maintained as outlined in Riverside County Ordinance 682.3.
- Coordination between Riverside County and the District should take place to ensure that property owners, who are responsible for proper well destruction and capping of wells, follow the destruction procedures and guidelines.

6.8.1.2 Artesian Well Management Program

The State of California defines an artesian well as "… any artificial hole made in the ground through which water naturally flows from subterranean sources to the surface of the ground for any length of time." (Water Code, Section 300) Historically, artesian groundwater conditions existed in much of the East Valley. In the vicinity of Lincoln Street and Avenue 72, about 30 ft of artesian pressure occurred in 1939 (Huberty, 1948). DWR estimated flows from 21 artesian wells and three springs to be about 2,400 AFY in the summer of 1961 (DWR, 1964). Artesian flows occurred in decreasing amounts until the early 1990s (CVWD, 2010g).

Artesian Well in the East Valley

As water management actions in the Valley restore water levels, groundwater levels in the deep aquifers will once again become higher than the ground elevation, resulting in artesian conditions. Recently, evidence of a return to artesian flowing conditions has been observed near Mecca.

Although artesian flowing conditions can reduce the amount of pumping energy required to extract groundwater, most wells are not properly equipped to deal with artesian pressure. This can result in loss of water from improperly controlled wells. Water from flowing wells could also cause property damage if not routed to drainage channels. Such nuisance water flows could cause issues with vectors. Under State Law, allowing an artesian well to flow uncontrolled without putting the water to beneficial use is considered a waste. Any artesian well which is not capped or equipped with a mechanical appliance which will effectively arrest and prevent the flow of any water from the well is a public nuisance, a misdemeanor under California law.

To avoid unnecessary waste of water and the potential for property damage, CVWD will develop a program to educate and work with well owners to properly control artesian wells. The California Groundwater Association has prepared standards of practice for management of artesian wells which should be provided to affected well owners.

6.8.1.3 Well Capping Program

As discussed in **Section 6.8.1.1**, unused and improperly abandoned wells can provide a pathway for groundwater contamination. Rather than destroying the wells, a capping program could allow the well's continued use for groundwater monitoring.

CVWD will implement a cooperative program to identify and cap wells that are no longer being used for groundwater production.

6.8.2 Drainage Control

Throughout geologic time, the Colorado River would flood, carving new channels on its way to the Gulf of California. Historic evidence and geologic studies have shown that the Colorado River periodically changed course near its delta and flowed into the Salton Sink, the basin currently occupied by the Salton Sea. Freshwater lakes formed in the Salton Sink until the river again changed course. These lakes deposited significant layers of fine-grained sediments which underlie much of the East Valley from Indio south. Much of these soils contained large amounts of salt, left by the evaporating lakes.

The arrival of Coachella Canal water brought a significant increase in agricultural activities. Land previously considered too salty for agriculture could now be irrigated if the fine-grained soils could be leached of salt and the shallow water levels could be maintained below the rooting depth. This was accomplished by the construction of subsurface agricultural tile drains buried at depths between 5 and 10 ft below ground which collect the shallow saline groundwater and convey it to the Salton Sea. The first farm drainage systems were installed in February 1950. From the early 1950s through the 1970s, CVWD constructed more than 187 miles of open channel and pipe drains and farmers constructed nearly 2,300 miles of shallower tile drains. Today, about 37,400 acres of land have tile drains. Most of the drains empty into the CVSC;

however, 25 smaller open channel drains at the southern end of the Coachella Valley discharge directly to the Salton Sea. These drains are the principal mechanism for exporting salt from the groundwater basin.

Since most of the original drainage system was constructed more than 50 years ago, it is approaching the end of its useful life. Significant maintenance and replacement will be required. The anticipated transition of land use from agriculture to urban will not eliminate this need because the underlying fine-grained sediments continue to impede the percolation of irrigation water. As development occurs in locations susceptible to shallow perched groundwater, the existing drainage system will need to be replaced and new drains constructed to control the shallow groundwater. The cost to construct and maintain these replacement drainage systems will need to be considered as development occurs. Funding sources will be needed to replace, expand, enhance and maintain the system for urban development in the future. CVWD is evaluating alternative methods for funding the drainage system and will undertake a study of the improvements needed to continue system operation in the future.

6.8.3 Flood Control

As discussed in Section 6.4.9, portions of the Coachella Valley including the Thousand Palms area in the West Valley and much of the East Valley especially the Oasis area on the west side of the Salton Sea lack flood control improvements. While flood control is not the subject of the 2010 WMP Update, flood control will be an important consideration facing CVWD. As the designated flood control agency for much of the Valley, CVWD, in conjunction with the cities, Riverside County and the development community, will need to develop and implement plans to improve flood protection in vulnerable areas. Integration of future flood control projects with water management activities offer the potential for maximizing regional benefits to the Valley.

6.8.4 Monitoring and Data Management

The primary objective of the monitoring and data management program is to evaluate the effectiveness of the water management programs and projects identified in the WMP and modify actions and plans based on factual data, also referred to as adaptive management. Although a significant amount of data is currently collected, opportunities exist for improvements in data collection, sharing and evaluation. This section summarizes the existing program, data gaps and actions that will be implemented to enhance the existing program and eliminate data gaps. New elements to be added to the monitoring and data management program are identified. Details of the current and proposed monitoring are presented in **Appendix C.**

6.8.4.1 Existing Monitoring Program

The hydrologic system of the Coachella Valley has been extensively monitored by a number of agencies for many years. This section provides a general overview of the types of data currently being collected and action items that will be implemented to improve the existing program.

Existing monitoring activities include:

- Weather data – precipitation, temperature and evapotranspiration

- Hydrologic data – streamflow
- Well logs – drillers logs of wells
- Groundwater production – pumping records for each well
- Water levels – groundwater elevations in wells
- Water quality – surface water and groundwater quality data
- Subsidence – ground surface elevation changes

CVWD and DWA each prepare annual engineer's reports on water supply and replenishment assessment for the groundwater basins within their respective service areas that subject to a groundwater replenishment assessment charge. These reports describe the groundwater basins, water supply conditions, groundwater production, replenishment program and the annual replenishment assessment charged for production within each basin. Annual reports are currently prepared for the Mission Creek, Upper Whitewater River and Lower Whitewater River subbasins. No reports are prepared for the Desert Hot Springs or Garnet Hill subbasins as production from these basins is not currently subject to a replenishment assessment.

The following new action items will be performed with regard to existing monitoring and reporting activities:

- Summaries of annual precipitation and ETo should be presented in the annual engineer's reports on water supply and replenishment assessment.
- Work with DWR to improve the quality and consistency of data obtaining from existing CIMIS[3] stations.
- Work with the U. S. Geological Survey (USGS) to restore/improve the gauging station on the CVSC at Lincoln Street to provide continuous flow recording.
- Enter data from all well completion reports into a centralized GIS database that allows visualization of the well construction data to improve the usability of the well completion reports for future investigations.
- Conduct an updated survey of production wells in the East Valley to determine the owner/operator, location, operational status and production reporting for each well.
- Use power records and pump tests to develop more accurate estimates of pumping by unmetered wells.
- Install meters on wells where necessary to obtain accurate production data.
- CVWD will need to apply to DWR and be designated as the groundwater level monitoring and reporting entity for the Valley. DWR will work with CVWD to determine reporting requirements for the groundwater elevation data to DWR.
- Present additional water level information in the annual engineer's reports for each groundwater basin in response to the public reporting requirements of SBx7-6 reflecting the areal distribution of wells in the basin.

[3] CIMIS – California Irrigation Management Information System.

- Compare measured groundwater levels with groundwater model results to document progress toward meeting the WMP objectives.

6.8.4.2 Data Gaps

Specific data gaps identified in this 2010 WMP Update are:

- Surface water flow data to estimate potential yield from stormwater capture projects.
- Insufficient data documenting water requirements for habitat, water quality and compliance with water quality regulations.
- Lack of a centralized groundwater database that allows all water agencies to share data.
- Uniform reporting of urban water use by user class to track water conservation efforts.
- Groundwater production data for wells in the East Valley, especially agricultural wells.
- Non-uniform water quality monitoring data for several constituents of concern, especially perchlorate.
- Existing groundwater models lack water quality predictive capabilities.

Evaluation of data gaps will be performed on an on-going basis to identify areas where data being collected in the Valley are insufficient. The monitoring program will be updated to ensure provision of data needed to manage water resources and evaluate the effectiveness of WMP activities.

6.8.4.3 New Monitoring and Data Evaluation Elements

To eliminate the data gaps identified above, several new programs/projects will be implemented:

- Develop water resources database to facilitate data sharing between agencies and tribes.
- Construct additional monitoring wells in conjunction with new recharge facilities.
- Develop a water quality assessment documenting on-going monitoring activities in the basin.
- Conduct a joint investigation of the distribution of perchlorate in water supply wells in the Valley.
- Update and recalibrate Coachella Valley groundwater model based on current data and conduct a peer review of updated model.
- Develop a new planning interface and database that can be linked with land use plans and agricultural activities to better distribute pumping and return flows to the model.
- Develop and calibrate a water quality model capable of simulating the changes in salinity and possibly other conservative water quality parameters in conjunction with the salt/nutrient management plan.
- Develop a coordinated approach among the water purveyors and CVAG for calculating urban per capita water usage including methodologies for determining service area population.

6.8.5 Stakeholder Involvement

The implementation of a water management plan such as this requires the cooperation of many entities. The Groundwater Management Planning Act (Section 10750 et seq. of the California Water Code, commonly referred to as Assembly Bill 3030) encourages the formation of a technical advisory committee of interested parties within the plan area to help guide the development and implementation of the plan and provide a forum for resolution of controversial issues. Although the Coachella Valley WMP was not prepared under this statutory authority, CVWD sought stakeholder input during the development of the 2002 WMP and the 2010 WMP Update.

When the 2002 WMP was prepared, CVWD met with a broad cross-section of Coachella Valley stakeholders to provide information about the importance of water management in the Valley and to seek their input. After the 2002 WMP was adopted, CVWD developed a WMP Implementation Program. Preparation of the Implementation Program was guided by the Stakeholder Task Force, which was involved in all aspects of the Program development (see Section 2).

CVWD established an advisory committee in conjunction with implementation of the replenishment assessment program in the Lower Whitewater River Subbasin. This committee consists of representatives of the water agencies and pumpers that extract groundwater from this area. The committee meets periodically to discuss progress in implementing the WMP and the financing of groundwater replenishment programs using the Replenishment Assessment Charge (RAC).

CVWD and the Valley’s Native American tribes have met several times over the past three years to discuss the issues to be addressed in 2010 WMP Update. Additional meetings have been held between CVWD and individual tribes to discuss specific water issues affecting the tribes.

Implementation of the 2010 WMP Update will require on-going coordination among the water agencies, tribes, cities, Riverside County and affected stakeholders. In addition, the IRWMP process has opened additional forums for dialogue on water management issues in the Valley.

6.9 SUMMARY

The water management needs of the Coachella Valley are evolving in response to a variety of uncertainties. Reduced imported water reliability, urban growth, reduction in agricultural demand, water quality and climate change are just of few of these factors. The Valley will likely face additional management issues in the future. Section 6 has presented the water management elements that have been considered in the development of the 2010 WMP Update. These elements include water conservation, additional water supplies, source substitution, groundwater recharge, water quality protection and other water management activities. Many of these elements can be implemented to varying degrees in response to future needs. The 2010 WMP Update seeks to provide the water agencies of the Coachella Valley with additional flexibility to adapt the plan to the future needs.

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Section 7
Plan Evaluation

This section presents an evaluation of the water management elements that are considered as part of the 2010 WMP Update as presented in **Section 6**. These elements consist of water conservation, additional water sources, source substitution, groundwater recharge and water quality improvements. Next, this section discusses the important factors that are considered in developing a balanced plan – basin management considerations and costs – and how these factors are used to revise the recommendations of the 2002 WMP. Finally, the section describes the approach for the development of the elements that are included in the 2010 WMP Update.

7.1 EVALUATION APPROACH

The 2010 WMP Update evaluates the need for changes in direction and strategies to meet changing conditions. Consequently, the 2010 WMP Update revisits decisions made in the 2002 WMP to the extent that changed conditions necessitate a change in strategy. The evaluation of future plan elements considers the goals of the Plan and criteria needed to measure the effectiveness of the updated Plan.

7.1.1 Evaluation Factors

To evaluate the effectiveness of water management elements, evaluation factors have been developed. Each factor is described along with how the factor is considered in the evaluation process.

7.1.1.1 Potential Supply

The initial consideration of a management action or project within an element is the amount of water it can produce in the case of conservation and water supply elements, or the amount of overdraft reduction that can be accomplished in the case of source substitution and recharge elements. The amount of water is expressed in terms of average supplies or deliveries considering the range of hydrology or the potential magnitude of the potential element.

7.1.1.2 Water Quality

Water quality is an important factor for maintaining the long-term salt-balance and use of the basin. In the case of water sources, water quality is identified principally in terms of total dissolved solids (TDS) expressed in milligrams per liter (mg/L) or other critical water quality components.

7.1.1.3 Cost

A major consideration in updating the plan is minimizing the future cost to Valley water customers to the extent practicable. Costs are expressed in dollars per acre-foot ($/AF). Where program costs have not been well defined a range of potential costs are identified.

7.1.1.4 Reliability

The reliability of water source is important for determining its availability during a range of wet and dry cycles. A supply is considered to have high reliability if it can provide water on a more-or-less continuous basis; that is, average supply is greater than 90 percent of the maximum supply. In the case of source substitution and groundwater recharge, reliability is judged on the basis of the option's ability to reduce overdraft on a continuous basis over the planning period.

7.1.1.5 Technical Feasibility

Many factors can affect the technical feasibility of a management element. For example, an element that is well defined and/or uses a proven technology would be rated higher than one that is very conceptual. Where possible, technical issues are identified that may affect feasibility.

7.1.1.6 Environmental Impacts

Many water management elements can have impacts on the environment. Ideally, a management element that has no environmental impacts or whose impacts can be fully mitigated would be rated much higher than one that has significant adverse impacts that cannot be mitigated.

7.1.1.7 Permitting

Many management elements require some level of permit approval by regulatory agencies prior to construction. The level of difficulty to obtain permit approval or the number of permits required for the option being evaluated is considered in this evaluation factor.

7.1.1.8 Public Acceptance

Management elements that are acceptable to the public have a much higher chance of being successfully implemented than are those which are opposed by the public. In some cases, the level of public acceptance is not well known.

7.2 WATER SUPPLY EVALUATION

Prudent water supply planning dictates the need to include a supply buffer due to the uncertainties associated with water demand projections and the risks in developing and implementing new water supplies. The 2010 WMP Update differs from the 2002 WMP in that a 10 percent supply buffer is applied to the projected water demands while eliminating overdraft. This buffer compensates for uncertainties such as demands higher than forecast or supplies that cannot be implemented or do not deliver as much water as planned.

Future water demand for the Valley is presented in **Section 3** along with possible ranges of growth. Water demands could range from 793,600 AFY to 971,500 AFY with a planning value of 885,400 AFY. Consequently, the WMP seeks to identify sufficient water supplies and conservation to provide 974,000 AFY by 2045 (supply with 10% buffer as discussed earlier).

With this supply buffer, the Valley would be better able to adapt to higher water demands that anticipated or further supply reductions.

From a water supply planning point of view, conservation activities are viewed on par with water supply measures. Water conservation efforts, mandated through state law, plumbing codes and landscaping ordinances and voluntary efforts help meet future demands in the same way that additional supplies meet those demands.

7.2.1 Water Supply Scenarios

Water supply planning scenarios are identified that describe a range of possible future outcomes for the 2010 WMP Update. The scenarios are based on existing local water supplies and differing levels of imported water supply availability. For each scenario, the amount of additional water supply required is estimated by subtracting the existing supply from the water demand including the 10 percent buffer.

Local Water Supplies: The existing local water supplies in the Valley consist of surface water diversions, local mountain-front runoff that recharges the groundwater basin, recycled water and return flows from use that replenish the basin, minus any groundwater consumed by native vegetation, drain flows discharged to the Salton Sea and subsurface outflow from the basin. The local supply available in 2045 is estimated to be about 176,200 AFY as shown in **Table 7-1** without implementation of the 2010 WMP Update.

Table 7-1
Summary of Local Supplies

Source	Amount in 2045 (AFY)
Natural Inflow	60,600
Surface Water (direct use)	3,400
West Valley Recycled Water	34,500
Returns from Use	183,300
Less	
Drain flows to Salton Sea	(96,800)
Phreatophyte Evapotranspiration [1]	(7,800)
Subsurface Outflow to Salton Sea	(1,000)
Total	**176,200**

1 Phreatophytes are native vegetation located near the Salton Sea that utilize groundwater.

Coachella Canal Supply – Colorado River: Two scenarios are considered for the Coachella Canal supply – with and without the QSA. Under a "with QSA" scenario, no changes are made to the delivery schedule prescribed in the QSA and CVWD would receive 459,000 AFY of supply by 2027 less 31,000 AFY of conveyance losses. Reclamation has stated that it views the QSA and the federal Water Delivery Agreement as binding and it intends to honor and implement the provisions of these agreements (Reclamation, 2010).

If the QSA invalidation is upheld on appeal, CVWD management believes that revisions to the existing agreements involving the State of California and the other QSA parties would be developed to address the Court's concerns or that a water transfer arrangement similar to the QSA would be developed to ensure California's compliance with its 4.4 million AFY Colorado River allocation. Although considered to be a remote possibility, the 2010 WMP Update addresses the actions that might need to be taken if CVWD's Coachella Canal usage were reduced to 300,000 AFY as a worst case scenario. It is assumed that the Coachella Canal supply would be not less than about 300,000 AFY based on long-term historical usage. CVWD management believes such a low level is unlikely.

SWP Supply: Two options are considered regarding the existing available SWP supply – existing reliability (50 percent, assumed, see Section 4) and improved reliability (77 percent) resulting from construction of a Delta conveyance facility as described in **Section 4.** Under future conditions without Delta conveyance improvements, about 61,400 AFY of the existing SWP supply would be available for use in the Whitewater River Subbasin.

If SWP reliability were restored to 77 percent, it is estimated that about 93,000 AFY of SWP water would be available to the Whitewater River Subbasin on average[1] as shown in **Table 7-2**. Based on DWR's current implementation schedules, it is assumed that any additional water provided by the Delta conveyance facility would begin in 2023 and be fully available by 2026. CVWD and DWA are required to financially participate in the final Delta facility through their respective SWP contracts.

Table 7-2
SWP Availability for the Coachella Valley under Delta Fix

SWP Components	Existing (AFY)	Future Delta Fix (AFY)
Table A Amount (Existing)	194,100	194,100
Assumed SWP Reliability [1]	60%	77%
Average SWP Delivery	116,460	149,457
Less Metropolitan Call-back [2]	(32,856)	(40,435)
Average Net SWP Supply [3]	83,604	109,412
Upper Whitewater Share		
Percent of Total Production[4]	93%	85%
Allocated to Upper Whitewater	77,752	93,000
Mission Creek Share		
Percent of Total Production[4]	7%	15%
Allocated to Mission Creek	5,852	16,412

1 – Based on California DWR's 2009 SWP Reliability Report and adjusted based on the combined CVWD-DWA Table A Amounts and assumed reliability amounts.
2 – Average callback in 4 wet years during a 10 year period.
3 – Net supply is calculated by deducting the Metropolitan callback from the Table A Amount with SWP Reliability.
4 - Percent of total production is the percent of production in each subbasin to the combined total production.

[1] This expected average amount of SWP water is based on a pro-rata increase in both the total amount of water delivered and the expected amount of water that Metropolitan could recall under the terms of the 2003 Water Transfer Agreement.

For the two principal imported water sources, Colorado River and SWP supplies, future availability is summarized in **Table 7-3** based on whether a long-term solution to the problems of the Delta is implemented and whether the QSA is upheld by the courts. Using these possible outcomes, four supply planning scenarios emerge, each with an associated amount of average water availability.

Table 7-3
Water Supply Planning Scenarios – 2045

Scenario	QSA Validated	Delta Conveyance	Local Supply (AFY)	Colorado River Supply (AFY)	SWP Supply (AFY)	Available Supply (AFY)
1	Yes	Yes	176,200	428,000	93,000	697,200
2	Yes	No	176,200	428,000	61,400	665,600
3	No	Yes	176,200	300,000	93,000	569,200
4	No	No	176,200	300,000	61,400	537,600

Table 7-4 shows the amount of additional supply required to meet the projected needs including the 10 percent buffer. This table indicates that between 276,800 and 436,300 AFY of additional supplies may be required to meet the 10 percent buffer demand of 974,000 AFY depending on the final outcome of the QSA litigation and the Delta water conveyance programs.

Since CVWD and DWA would pay for and receive any increased yield resulting from the BDCP and Delta conveyance facilities, Scenario 1 is considered the most likely to occur. The other scenarios indicate how much additional water might be required. Under Scenario 4, the worst case might be that the Valley needs to develop almost 161,000 AFY of additional conservation and supplies beyond that required for Scenario 1 to meet demands, provide a supply buffer and manage overdraft.

Table 7-4
Water Supply Needs – 2045

Scenario	QSA Validated	Delta Conveyance	Demand (AFY)	Demand with 10% Buffer (AFY)	Available Supply (AFY)	Additional Supply Required (AFY)
1	Yes	Yes	885,400	974,000	697,200	276,800
2	Yes	No	885,400	974,000	665,600	308,400
3	No	Yes	885,400	974,000	569,200	404,800
4	No	No	885,400	974,000	537,600	436,400

7.2.2 Evaluation

The evaluation of supply and conservation elements centers on a comparison of the relative rankings of each element with respect to the evaluation factors presented in **Section 7.1.1**. **Table 7-5** presents a summary comparison of the water conservation and supply elements considered in the 2010 WMP Update. A discussion of each factor is presented in the following sections.

7.2.2.1 Potential Supply

The potential supply associated with each water conservation and management element is based on the information presented in **Section 6**. Of the elements evaluated, urban water conservation, desalinated drain water, and desalinated ocean water offer the highest potential supplies. The next highest ranked elements include recycled water and water transfers via lease or purchase. Agricultural and golf course conservation, Canal water loss recovery and Fargo Canyon groundwater offer moderate supply increases. No additional yield is attributed to West Valley recycled water because all available water would be recovered either through expansion of non-potable delivery systems or groundwater percolation. The potential amount of water that could be captured from stormwater recovery is not known and requires additional evaluation.

7.2.2.2 Water Quality

The source water quality of each water supply element is considered based primarily upon its salinity. As shown in **Table 7-5**, the highest quality water sources are local recycled water and stormwater. Transferred water obtained through exchange with Metropolitan has a total dissolved solids (TDS) concentration averaging about 650 mg/L, while Coachella Canal water averages about 750 mg/L. Desalinated drain water quality could be customized depending on its use ranging from 250 – 750 mg/L. Desalinated ocean water has a high quality at its source (~250 mg/L); however, since there is no mechanism for direct conveyance to the Valley, an exchange for Colorado River water would result in TDS of 650-750 mg/L depending on the delivery location (Whitewater or Coachella Canal). Based on limited available information, Fargo Canyon groundwater is believed to have a TDS in excess of 1,000 mg/L which could reduce its potential use without treatment.

As shown in **Table 7-5**, the highest quality water sources are local recycled water and stormwater. Transferred water obtained through exchange with Metropolitan has a TDS averaging about 650 mg/L while Coachella Canal water averages about 750 mg/L. Not shown on the table is the quality of SWP water delivered directly to the Valley. If an SWP extension were constructed to the Valley, the TDS of SWP water would average about 350 mg/L. If desalinated ocean water were exchanged for SWP water delivered directly to the Valley, a comparable quality might be achieved.

Table 7-5
Comparison of Alternative Water Supply Elements

Supply Element	Potential Supply (AFY)		Salinity/Water Quality	Source Cost	Technical Feasibility	Reliability	Environmental	Permitting	Public Acceptance
	2020	2045							
Agricultural Conservation	40,000	23,000	Not applicable	$40-60/AF	Proven technology	High	No significant impacts	None	High
Golf Course Conservation	12,000	12,000	Not applicable	$40-60/AF	Proven technology	High	No significant impacts	None	High
Urban Conservation	33,000	43,000	Not applicable	$200-400/AF	Proven technology	High	No significant impacts	None	High
Additional Urban Conservation	44,000	57,000	Not applicable	$400-800/AF	May require significant re-landscaping	Depends on Participation	No significant impacts	None	Potentially Low
Canal Water Loss Recovery	10,000	10,000	750 mg/L TDS	$200-400/AF	Cause of losses is unknown	High if losses can be reduced	Unknown site-specific impacts	Moderate	High
West Valley Recycled Water	0	0	450 mg/L TDS	$50-400/AF for tertiary treatment only; additional cost for distribution	Essentially all water is being recovered	High but little additional yield	Potential site-specific and water quality impacts	Moderate	High
East Valley Recycled Water-existing flows	16,000	16,000	450 mg/L TDS	$400/AF for tertiary treatment only; additional cost for distribution	Additional treatment and conveyance infrastructure required	High	Reduction in existing CVSC flow	Significant	Moderate
East Valley Recycled Water-growth	6,000	32,000	450 mg/L TDS	$400/AF for tertiary treatment only; additional cost for distribution	Additional treatment and conveyance infrastructure required	High	No significant impacts	Significant	Moderate
Fargo Canyon Area Recycled Water	0	11,000	500-1,000 mg/L TDS	$400/AF for tertiary treatment only; additional cost for distribution	No existing facilities	High	Unknown site-specific and water quality impacts	Significant	Moderate
Fargo Canyon Groundwater	0	9,000	>1,000 mg/L TDS	$150-200/AF; additional cost for distribution	Yield undetermined	Unknown	Unknown	Moderate	High
Stormwater Capture	Unknown	Unknown	300-500 mg/L TDS	Unknown	Diversion, storage and recharge facilities required	Poor – highly variable flow	Unknown site-specific impacts	Unknown	Moderate
Water Transfers – Lease/Purchase	50,000	50,000	650 mg/L TDS	$700-1,400/AF	No significant issues	Depends on the transfer terms	Delta and/or area of origin impacts	DWR Approval	Moderate
SWP Existing Table A with Delta Conveyance	0	33,000	650 mg/L TDS	$400-500/AF	Significant issues with Delta conveyance	50 percent improvement	Impacts mitigated by BDCP	Significant permitting by others	Unknown
Water Transfers – Lease/Purchase with Delta Conveyance	0	25,000	650 mg/L TDS	$1,100-1,900/AF	Significant issues with Delta conveyance	50 percent improvement	Delta and/or area of origin impacts	DWR Approval	Moderate
Desalinated Drain Water	5,000	90,000	250-750 mg/L TDS	$500-1,200/AF	Brine disposal issues	High	Brine disposal; energy use	Significant	Low - Moderate
Desalinated Ocean Water	0	100,000	250-750 mg/L TDS	$1,000-1,500/AF	Exchange agreements	High	Seawater intakes, brine disposal, energy use	Significant	Low - Moderate due to high cost

Cost excludes treatment for potable use and delivery to individual uses

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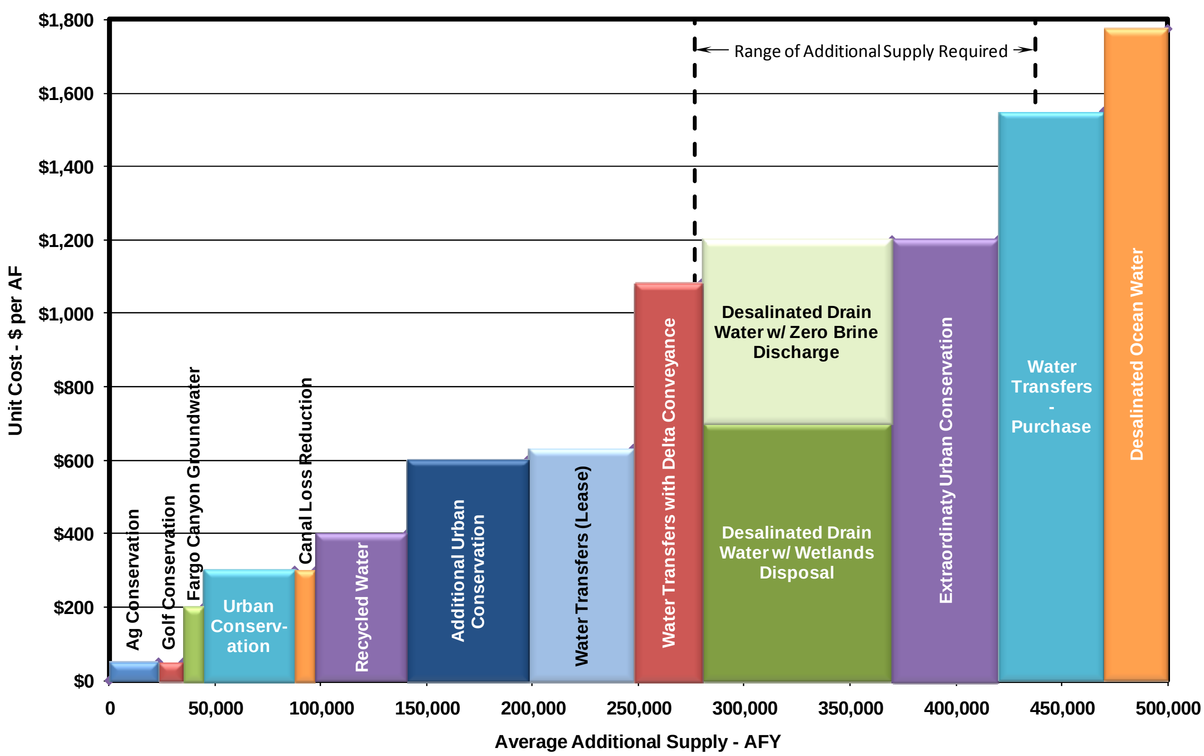
7.2.2.3 Costs

The 2010 WMP Update considered the potential sources of additional water supply and ranked those supplies based on anticipated cost and yield. The results of the cost ranking are shown on **Figure 7-1**. Costs of new supplies range from about $40/AF to nearly $1,800/AF.

Figure 7-1
Cost Rank of Water Sources



As indicated in this figure, the most cost-effective supply augmentation approaches involve water conservation. Additional Canal water loss recovery may potentially be cost-effective, but requires a feasibility study to verify the amount of savings and evaluate the feasibility of recovering the water. Development of recycled water for non-potable uses may also be cost-effective; however, the cost of a separate non-potable distribution system can add significant costs depending on the distance from the source to the user. Additional urban water conservation totaling up to about 100,000 AFY and water transfers acquired through long-term lease are the next most cost-effective options. Leased transfers with the additional yield created by a Delta conveyance facility would be similar in cost to desalinated drain water costs, which are significantly affected by the brine disposal approach. If acceptable to the regulatory agencies, wetlands disposal of brine (and ultimately to the Salton Sea) is more cost-effective than zero liquid discharge approaches which could increase the cost of desalinated drain water by about 70 percent. Under Supply Scenario 1 with Delta conveyance and the QSA, no additional supplies are needed.

Under the less favorable supply scenarios, additional higher cost water would be required to meet demands and provide the desired supply buffer. These higher cost waters include the purchase of additional Table A and extreme urban conservation. Desalination of ocean water would not likely be required given the current demand projections and supply options. It should be noted that for the purpose of determining cost of the 2010 WMP Update implementation, Delta Fix costs are accounted to establish the higher end of the costs.

Because the feasibility of some water supply strategies have not yet been evaluated, additional supplies may be needed to meet the supply targets may be required. For example, the yield and feasibility of developing Fargo Canyon groundwater and Canal water loss reduction require additional study. Should these potential supplies prove infeasible, then additional, more costly supply options must be considered. While additional urban water conservation may be more cost-effective than desalination of drain water, it is uncertain how much additional conservation can be implemented without dramatic life-style and economic changes in the Valley. If the desired level of conservation cannot be achieved, additional high cost supplies might be required. Alternatively, growth restrictions might be needed to reduce future demands.

Similarly, the feasibility of certain options is affected by actions outside the control of Valley water agencies. If the BDCP and Delta conveyance are not successful in increasing the average SWP reliability, options for enhancing the yield from water transfers may not be as viable.

7.2.2.4 Reliability

Supply reliability is evaluated based on the anticipated long-term variability of each supply option. Water recycling and drain water desalination are highly dependable and reliable local sources of water. Water conservation measures can also be reasonably reliable but depend upon the level of participation and the commitment of the customers. Imported supplies that originate from other parts of California are affected by hydrologic variability and regulatory restrictions on exports from the Delta. Some supply options such as Fargo Canyon groundwater and Canal loss recovery require additional study to evaluate their reliability.

7.2.2.5 Technical Feasibility

Many of the water supply options under consideration utilize proven technologies. While recycled water and desalinated drain water require significant treatment infrastructure, the technologies that would be used have been implemented in the Valley and elsewhere in California. Options involving Delta exports may have technical issues if a politically and publically acceptable solution to the Delta conveyance and habitat restoration issues cannot be found. High levels of water conservation can be implemented but may require significant customer investment in re-landscaping.

7.2.2.6 Environmental Impact

Some of the supply options could have potentially significant environmental impacts while others would have no or less than significant impacts. While water conservation measures generally have little environmental impact, higher levels of conservation would reduce the return flow to the groundwater basin, potentially decreasing the groundwater supply. Use of recycled water resulting from growth would have little environmental impact but use of water currently being discharged could reduce flows in the CVSC, affecting riparian vegetation. Water supply options involving desalination are energy intensive, may require additional generation capacity and could generate greenhouse gas emissions. Brine disposal from desalination processes is expected to be an important environmental consideration. Options involving northern California water exports may create additional Delta or area of origin impacts. Significant adverse impacts require mitigation to the extent feasible.

7.2.2.7 Permitting

The level of permitting and regulatory approval varies with the type of supply. Water conservation measures require essentially no regulatory approvals. In comparison, recycled water and desalinated drain water will require regulatory approvals for treatment processes, use of water and disposal of any wastes, especially brine. Because water exports from the Delta are undergoing extreme regulatory oversight, the regulatory feasibility of exporting additional water may be more difficult. However, the transfer of water that has already been moved through the Delta would involve less significant regulatory oversight. Ocean water desalination has been identified as a significant future source for southern California; however, permitting and regulatory approvals for new facilities have proven difficult, costly and time-consuming. Other permit requirements will be site-specific and may include easements, discharge permits, sensitive species take permits, wetland mitigation requirements, air quality permits, dust control permits, and the like.

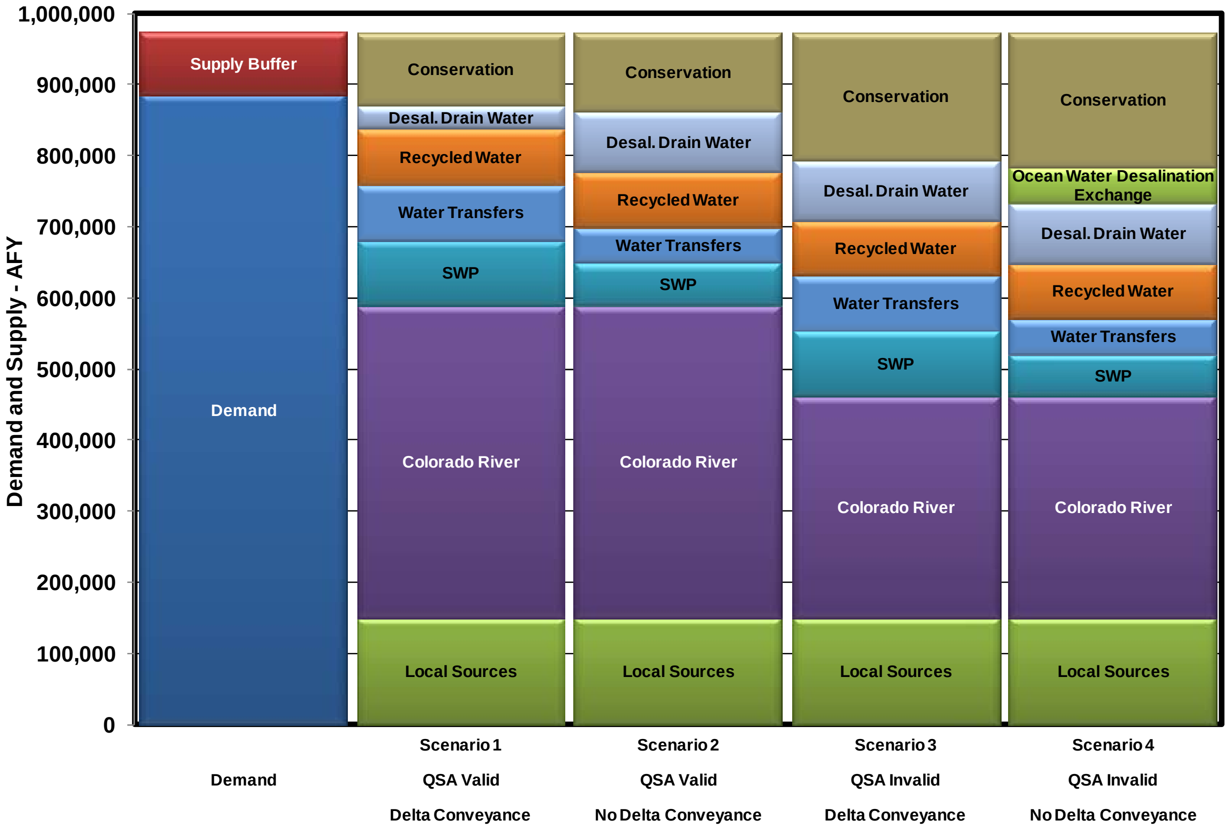
7.2.2.8 Public Acceptance

Public acceptance is evaluated based on input received from meetings with members of the public and the Native American tribes during the preparation of the 2010 WMP Update. In general, water conservation measures are viewed favorably by the public; however, opposition potentially could arise if the public perceives that high levels of conservation are too onerous. Use of recycled water has also been viewed favorably by the public. Desalination of drain water is also expected to be viewed favorably.

7.2.3 Preferred Supply Mix

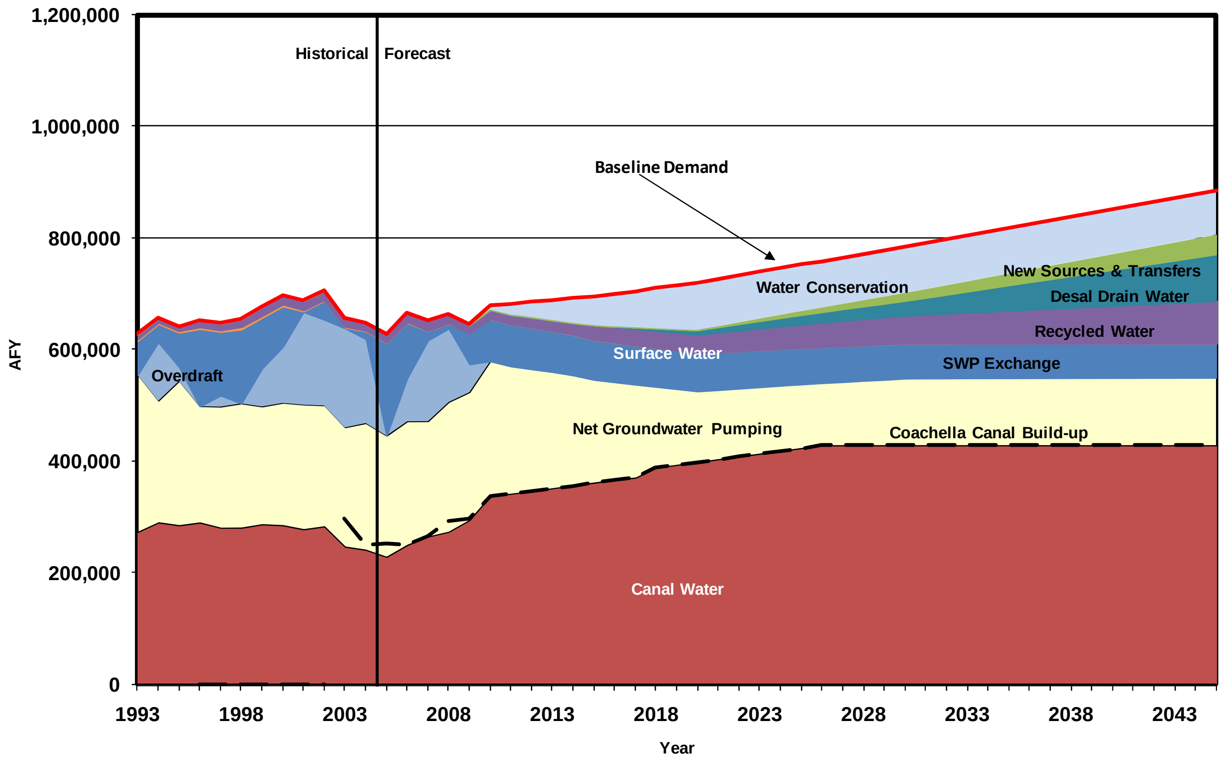
Based on this evaluation, the water supply strategy for the 2010 WMP Update seeks to achieve a balanced portfolio of existing and new supplies while retaining the flexibility to adapt to changing supply conditions. However, if water supply conditions are such that both the QSA is overturned and no Delta Fix can be implemented, then a combination of extreme conservation, desalinated ocean water and growth restrictions may be necessary. **Figure 7-2** presents possible water supply mixes that meet the demands under the four planning scenarios.

Figure 7-2
Comparison of Potential Supply Mixes by Scenario (2045)



Based on the efforts being made to achieve a solution to the Delta environmental issues, it is expected that Scenario 1 is the most likely to occur in the future. However, WMP project planning will proceed based on the possibility that Scenario 2 occurs, until it has been demonstrated that agreement is reached on the Delta. Therefore, the 2010 WMP Update is based on Scenario 2 which assumes that the QSA is valid but that no improvements in Delta conveyance occur, resulting in an SWP reliability of 50 percent. The anticipated water supply mix under Scenario 2 is presented in **Figure 7-3**. With this mix, conservation continues to be implemented, Canal water is fully utilized, SWP supplies are reduced consistent with the conservative Delta planning assumptions, recycled water is developed in the East Valley as growth occurs, additional water transfers are acquired and desalinated drain water is developed. If SWP supplies and water transfers resulting from the BDCP and improved Delta conveyance facilities could be increased (Scenario 1), the amount of desalinated drain water required would be reduced.

Figure 7-3
Water Supply Mix for 2010 WMP Update



7.3 EVALUATION OF SOURCE SUBSTITUTION AND RECHARGE ELEMENTS

The approach to water delivery and use affects the performance of the WMP relative to overdraft reduction and other important factors. **Section 6** described available source substitution and recharge elements. This section evaluates the potential performance of these elements. **Table 7-6** presents a summary of the source substitution and recharge elements and a comparison of their relative costs, merits and issues.

7.3.1 Overdraft Reduction

Source substitution and recharge elements are evaluated based on their ability to offset current or future groundwater pumping. Among the source substitution options, those involving urban potable and non-potable use of Canal water offer the greatest reductions in current and future groundwater pumping. Because agricultural use is expected to decline over time while urban demands increase, initial focus on conversion of agricultural groundwater pumping to Canal water use offers near-term benefits. As urban growth occurs, Canal water delivery facilities can be converted to urban use. Most of the other source substitution options offer moderate pumping offsets. Many of the potential projects are constrained by the available demand for the particular use.

Groundwater recharge programs reduce overdraft by placing water directly into the groundwater basin. The largest recharge program is operated at the Whitewater River Recharge Facility.

Although up to 300,000 AFY of water has been recharged at this location, the amount of recharge is limited only by the available water supply. The Thomas E. Levy Groundwater Replenishment Facility (Levy facility) is expected to recharge 40,000 AFY when complete. Martinez Canyon and Indio facilities are shown with capacities of 20,000-40,000 AFY and 10,000 AFY, respectively. As project planning proceeds, the capacity of these facilities will be refined. Recharge with injection and indirect potable reuse (IPR) need additional investigation to determine their potential recharge contributions.

7.3.2 Unit Cost

The unit water delivery cost consists of the capital costs amortized over 25 yrs and annual operating/maintenance costs need to treat (if needed) and deliver water for the intended use. The total annual cost is divided by the average delivery to provide a cost per AF. In the case of existing facilities, previous capital costs are excluded. In general, the least costly source substitution options are those that deliver relatively larger amounts of untreated water to nearby customers. Recycled water system costs tend to be higher due to more extensive delivery systems to smaller customers. Similarly, delivery of Canal water for non-potable urban irrigation uses has a relatively high cost due to the added infrastructure to convey water to individual homes. Treatment for potable uses generally adds to the cost of water.

In general, the cost of groundwater recharge is lower than for source substitution because the higher water deliveries and larger infrastructure provide economies of scale. Recharge at Whitewater is the least costly recharge option followed by the Levy facility in La Quinta, because these are existing facilities. New recharge facilities in Indio or at Martinez Canyon and construction of additional conveyance capacity at Levy have similar unit costs, which are comparable to the lower cost source substitution projects. Injection of Canal water is expected to be relatively costly due to the need for potable water treatment prior to injection. IPR of municipal wastewater for groundwater recharge is expected to have high costs due to the advanced treatment required to obtain California Department of Public Health and Regional Board approvals.

7.3.3 Water Quality Issues

Water quality issues for source substitution and recharge programs are related to the water source. Because Colorado River water has relatively high salinity, there may be salt tolerance issues when irrigating salt-sensitive plants. This is expected to be a relatively minor issue since Colorado River water has been used for irrigation in the Valley for many years. Concerns have also been expressed about the ongoing use of untreated Colorado River water for groundwater recharge, as discussed in Section 5. Coachella Valley recycled water generally has moderate salinity levels and should not cause problems when used for irrigation. When delivered for potable uses, Colorado River water requires filtration and disinfection as a minimum and may require some level of desalination for customer acceptance. As discussed previously, IPR may have significant water quality issues and requires extensive treatment when used to supplement potable supplies.

7.3.4 Technical Feasibility

Essentially all approaches are similar with regard to technical feasibility with the exception of IPR. The source substitution and groundwater recharge programs are mature technologies that can be readily implemented. While potable water treatment is a proven technology, local water agencies may wish to implement demonstration level programs initially to gain local operating experience. Technical feasibility of groundwater recharge at the Whitewater, Levy and Martinez Canyon has been demonstrated. Although a potential recharge site has been identified in Indio, it may require operation of a demonstration-scale project to verify technical feasibility. Development of other surface recharge sites will depend on the location and the presence of suitable hydrogeologic conditions. Groundwater recharge by injection is a proven technology elsewhere in the southwestern United States. Demonstration-level testing may be required before any significant investment is made in multi-purpose injection-extraction wells.

7.3.5 Reliability

Most of the delivery options are considered to have high reliability in terms of their ability to reduce overdraft. One reliability concern that has been expressed regarding source substitution programs in general is the potential for “demand hardening.” This means that when groundwater users are converted to imported or recycled water supplies, they may have reduced ability to withstand a supply interruption or water shortage. To mitigate for this concern, it will be important that these users continue to maintain their groundwater wells to provide a back-up in the event of a water shortage or other emergency. Delivery of SWP and desalinated drain water to Whitewater may also have reduced reliability because the exchanges and deliveries from the Colorado River Aqueduct (CRA) are at Metropolitan’s operational discretion. Canal water use for groundwater recharge generally has high reliability; however, reductions would occur if supplies are reduced by drought or voluntarily payback of water storage via conjunctive use programs.

7.3.6 Environmental Impacts

The most commonly anticipated environmental impacts of source substitution and recharge projects relate to site-specific construction impacts. However, most of these impacts can be mitigated to a level of less-than-significant. Installation of “purple pipe” non-potable water systems would have slightly more construction impacts that could be minimized by installation in conjunction with other utilities when new development occurs. Desalinated drain water and IPR are expected to have brine disposal and energy usage impacts. Exchange and delivery of desalinated drain water for recharge at Whitewater would have additional energy impacts resulting from increased pumping along Metropolitan’s CRA. New recharge programs at Indio and Martinez Canyon are expected to increase groundwater levels both locally and regionally, which may be beneficial. However, tribal concerns about salinity and other water quality issues with Canal water recharge may continue to be an issue.

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Table 7-6
Comparison of Water Delivery and Use Options

Delivery Option	Potential Overdraft Reduction - AFY		Treatment/ Delivery Cost	Water Quality Concerns	Technical Feasibility	Reliability	Environmental	Permitting	Public Acceptance
	2020	2045							
Source Substitution Programs									
Canal Water - Increased agricultural use	41,000	6,000	$40-60/AF	No significant issues	No technical issues	Use declines as urban growth occurs	No significant impacts	None	Good
Canal Water - Golf course irrigation	29,000	32,000	$500/AF	Salinity - salt tolerance of some plants	No technical issues	High but may be susceptible to delivery interruptions	No significant impacts	None	Good
Canal Water - Urban Non-potable for new development	16,000	90,000	$500/AF	Salinity - salt tolerance of some plants	Requires separate "purple pipe" system	High but may be susceptible to delivery interruptions	No significant impacts if built during development	Comply with RW distribution requirements	Good
Canal Water - New Urban Potable	30,000	90,000	$300-700/AF	Can be treated to desired quality	No technical issues	High but may be susceptible to delivery interruptions	Brine disposal; siting	DPH approval required	Good
Canal Water - Oasis Area	0	23,000 - 28,000	$100-150/AF	Salinity	Extensive infrastructure	High but may be susceptible to delivery interruptions	Construction impacts	Minimal permitting	Good
East Valley Recycled Water - Existing Canal Delivery System	16,000-24,000	32,000-48,000	$150-400/AF	May limit ability to treat Canal water for urban potable use	Requires separate "purple pipe" system	High – recycled water flow is relatively continuous	No significant impacts if built during development	Regional Board permit required	Moderate
East Valley Recycled Water - Separate Delivery System	16,000-24,000	32,000-48,000	$200-700/AF	No significant issues	Requires separate "purple pipe" system	High – recycled water flow is relatively continuous	No significant impacts if built during development	Regional Board permit required	Moderate
Mid-Valley Pipeline - Canal and RW	32,000	45,000	$150-200/AF	Salinity - salt tolerance of some plants	Requires separate "purple pipe" system	High – dual sources improves reliability	Construction impacts in developed urban area	Regional Board permit may be required	Good
West Valley Recycled Water - System Expansions	10,000 [2]	16,000 [2]	$150-200/AF	No significant issues	Requires separate "purple pipe" system	High – recycled water flow is relatively continuous	No net effect on overdraft	Regional Board permit amendment required	Good
Groundwater Recharge									
SWP Exchange - Whitewater	67,000	60,000-100,000	$20/AF	Colorado River supply salinity	Existing facility	Depends on Metropolitan's operations	Existing program	Existing program	Good; tribal concern about salinity
Desalinated Drain Water – Whitewater	0-20,000	0-30,000	$150/AF including CRA delivery	Same as existing Colorado River supply if exchanged	Requires transfer and exchange for Colorado River water with Metropolitan	Depends on Metropolitan's operations	Brine disposal; reduced flow to Salton Sea; CRA pumping	Minimal permitting	Good
Canal Water – LEVY – Existing	32,500	32,500	$55/AF O&M Cost only	Canal water supply salinity	Existing facility	High but may be susceptible to delivery interruptions	Existing program	Existing program	Good; tribal concern about salinity
Canal Water – LEVY – Expansion	7,500	7,500	$150/AF	Canal water supply salinity	Requires additional pumping station and pipeline	High but may be susceptible to delivery interruptions	Expansion of existing program; construction impacts	Minimal permitting	Good; tribal concern about salinity
Canal Water - Indio	10,000	10,000	$120/AF	Canal water supply salinity	Depends on site location; may require demonstration facility	High but may be susceptible to delivery interruptions	Changes in water levels; construction impacts	Minimal permitting	Good

Delivery Option	Potential Overdraft Reduction - AFY		Treatment/ Delivery Cost	Water Quality Concerns	Technical Feasibility	Reliability	Environmental	Permitting	Public Acceptance
	2020	2045							
Canal Water – Martinez	4,000	20,000-40,000	$140/AF	Canal water supply salinity	Existing demonstration facility	High but may be susceptible to delivery interruptions	Changes in water levels; construction impacts	Minimal permitting	Good; tribal concern about salinity
Canal Water – Other Surface Recharge Sites	TBD	TBD	$100-200/AF	Canal water supply salinity	Depends on suitable hydrogeologic conditions	High but may be susceptible to delivery interruptions	Changes in water levels; construction impacts	Minimal permitting	Good; tribal concern about salinity
Canal Water – Injection	TBD [3]	TBD [3]	$400-800/AF including potable treatment	Canal water supply salinity; requires potable water treatment	Proven technology; requires potable water treatment	High but may be susceptible to delivery interruptions	Changes in water levels; construction impacts	May require DPH [4] approval	Good
Recycled Water - Indirect Potable Reuse	TBD [3]	TBD [3]	$900-1,200/AF	High quality water; can be treated to desired quality	Extensive treatment requirements including reverse osmosis	Potentially High – recycled water flow is relatively continuous	Siting; energy use; brine disposal	Extensive Permitting - DPH and Regional Board approval required [4]	May have significant issues

1 Costs shown exclude previous (sunk) capital costs
2 Option offsets pumping but does not reduce overdraft since unused recycled water is percolated.
3 TBD – To be determined. This is a future option that requires additional investigation to evaluate feasibility.
4 DPH - California Department of Public Health

7.3.7 Permitting

Many of the non-potable source substitution programs have few or no local, state or federal permit requirements. Projects involving non-potable water delivery to individual homes and recycled water projects are expected to require permits from health and water quality regulators. Recycled water use permits from the Regional Board are required for all recycled water projects. Waste discharge requirements would likely be required for any project that involves brine disposal. IPR would also have extensive permitting requirements from DPH and the Regional Board.

7.3.8 Public Acceptance

Most source substitution and recharge programs are expected to have high public acceptance. Public input has tended to favor source substitution over recharge approaches primarily due to water quality concerns. It is expected that public opposition to IPR could be significant without a concerted public education program.

7.3.9 Preferred Delivery Approach

Based on the evaluation of the water delivery and use elements, groundwater recharge programs appear to be the least costly approach for overdraft reduction. As discussed in Section 6, surface spreading in the East Valley is limited to areas where the hydrogeologic conditions allow the recharge water to reach the groundwater table. In the absence of additional demonstrated recharge sites, groundwater recharge may be limited to Whitewater, Levy, Martinez Canyon and possibly Indio. This effectively limits groundwater recharge programs to about 170,000 AFY. This amount could increase if additional suitable sites are identified or if injection becomes viable with the availability of treated Canal water. IPR is an emerging technology whose progress should be monitored closely for potential future application in the Coachella Valley if needed.

The remainder of any groundwater pumping reduction would be accomplished through source substitution. The initial focus should be on projects with the lowest unit costs and the highest pumping reductions. This would include completion of the Mid-Valley Pipeline (MVP) distribution system, and connection of additional agricultural and golf course uses to Canal water. Expansion of existing non-potable delivery systems in the West Valley should also continue. As growth occurs and agricultural use declines, it will be important to develop both potable and non-potable Canal water delivery systems for urban uses. To avoid lost opportunities, water agency policies may need to require installation of non-potable water systems by new development.

7.4 EVALUATION OF PLAN PERFORMANCE

Evaluation of potential strategies for the 2010 WMP Update has considered a number of factors. The management approach must be flexible so that it can be adapted for changing conditions for both local development and water demands as well as the statewide water supply situation. A number of alternative water supply strategies have been considered including water conservation, maximizing use of local resources such as recycled water and additional imported supplies. However, new water supplies will be increasingly more costly in the future. There are two primary approaches for reducing groundwater overdraft: source substitution and groundwater recharge. To provide adequate flexibility, both approaches are required. Finally, water quality concerns must be addressed in developing the Update. Based on the evaluation of source and delivery elements, a preferred supply mix and approach for use of those supplies have been identified.

To finalize the preferred approach for the 2010 WMP Update, basin management performance must be evaluated. This is accomplished through the evaluation of groundwater balances and the use of the Coachella Valley groundwater model. The intent of the evaluation is determine whether the water supply and delivery strategies can manage overdraft without creating significant new issues.

There are a number of issues considered in selecting the appropriate approach for water management in the Coachella Valley. These considerations include change in groundwater storage, groundwater balance, changes in drain flows, salt balance and water quality, groundwater levels, liquefaction and subsidence risks, capture and desalination of drain water, and effects on Salton Sea inflows. The preferred approach seeks to achieve a reasonable balance among these considerations while retaining sufficient flexibility to meet unanticipated conditions including changing water demands and supply availability.

7.4.1 Change in Groundwater Storage

Change in groundwater storage is the annual amount of groundwater that is stored or removed from the groundwater basin. The continued reduction in groundwater storage to the point that adverse impacts occur is referred to as overdraft. These adverse impacts can include water quality degradation and land subsidence as well as increased pumping costs. Over the past ten years, a total of 1,000,000 AF has been removed from basin storage. This storage depletion can lead to a variety of adverse impacts, including increased pumping energy/cost, water quality degradation and land subsidence.

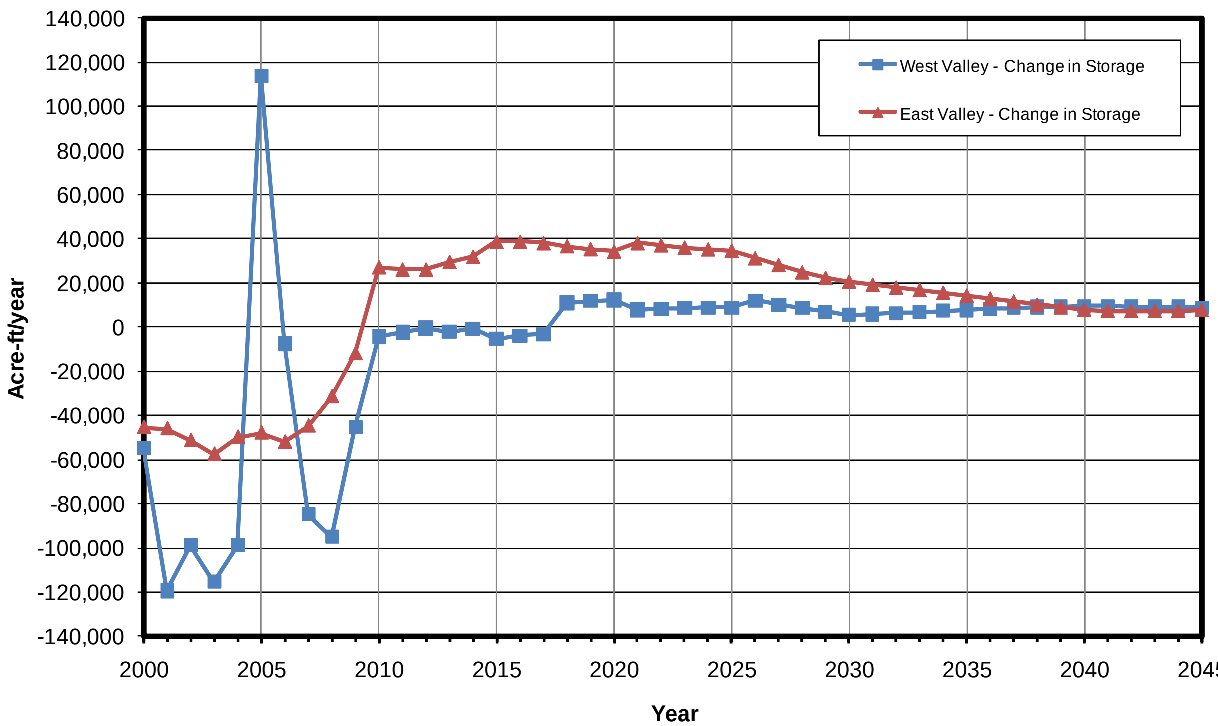
A key objective of the 2002 WMP was to reduce groundwater overdraft and its associated adverse impacts. Under that Plan, overdraft would be eliminated by about 2030. The 2010 WMP Update retains this objective.

Elimination of overdraft not only involves halting the decline in groundwater levels, but also restoring the balance of inflows and outflows to provide long-term supply sustainability and adequate salt export. Since the only mechanism for salt export from the groundwater basin is through the tile drain system, adequate drain flows must exist to export the salt that is contained in the imported water supply and added through use.

Evaluations of alternate management strategies indicate that groundwater overdraft can be controlled through a variety of recharge and source substitution strategies. The approach taken in the 2010 WMP Update involves adjusting the basin inflows and outflows through a combination of conservation, recharge and source substitution strategies to achieve a positive annual change in groundwater storage, as shown on **Figure 7-4**. This results in a gradual increase in basin storage and restoration of groundwater levels, especially in the East Valley. Over time, as storage volumes are restored, the positive change in storage in the East Valley gradually declines to control excessive drain flows and minimize water level increases. In the West Valley, change in storage is maintained at a slightly positive level. This preserves operational storage for buffering SWP supply variations and Metropolitan's periodic needs to store water under the Advanced Delivery Agreement.

One challenge in attaining this increase in storage is the variability of SWP Exchange supplies. During periods when SWP deliveries are reduced, groundwater is removed from storage. When SWP deliveries are relatively high, groundwater storage is gained, as occurred in 2005. The groundwater basin balance and groundwater modeling is performed under long-term average hydrologic conditions. As the WMP is implemented, it is important to recognize these variations when evaluating plan performance.

Figure 7-4
Projected Change in Storage



7.4.1.1 Drain Flows

Throughout much of the East Valley, agricultural tile drains were installed to drain shallow groundwater perched on fine-grained, high-salinity, ancient lakebed soils. Most of the drains empty into the CVSC; however, 25 smaller open channel drains at the southern end of the Coachella Valley discharge directly to the Salton Sea. Adequate drain flows are needed to export salt from the basin and to maintain habitat in the CVSC, drains and Salton Sea.

The quantity of flow in the drains, and therefore in the CVSC, depends upon water levels in the underlying aquifers and the quantities of applied irrigation water. Historically, the highest drain flows occurred from the 1960s to the early 1980s when groundwater levels were at their highest. Groundwater levels in some areas of the confined Lower aquifer were above ground surface or at least above those in the Upper aquifer, creating an upward hydraulic gradient. This upward gradient tended to flush the more saline water in the Upper and Semi-perched aquifers into the drain system.

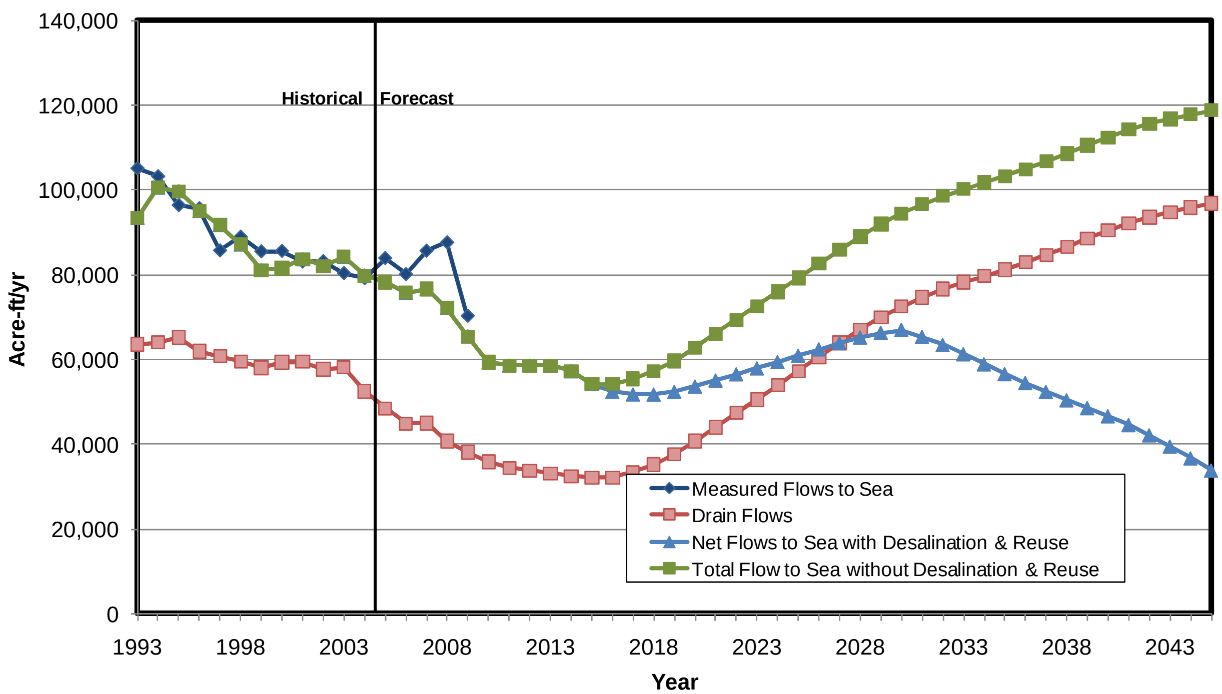
Since that time, both water levels and drain flows have declined. However, as overdraft has increased, deep groundwater levels have declined and a downward vertical gradient has been created. This has allowed more irrigation return flow to recharge the groundwater basin rather than flow to the drains. Because the quality of the return flows is generally poor (~2,000 mg/L TDS), an increasing amount of poor quality water recharges the basin when drain flows are low, leading to water quality degradation. While this degradation may initially occur in the shallower aquifers, it may eventually contribute to degradation in the Lower aquifer. In the absence of higher groundwater levels and drain flows, this recharge of poor quality water will continue.

Increased drain flows are beneficial through the export of salt from the groundwater basin; however, changes in drain flows may potentially have adverse effects on biological resources of the Valley. Some resource agencies view any change in drain flows (increase or decrease) from current conditions as detrimental relative to their effect on endangered species such as desert pupfish. In addition, increased drain flows could be viewed as wasting water because additional water must be put into the basin through recharge activities to offset the amount of water lost to the drains. Although a portion of the higher drain flows could be recovered and reused through treatment, this would require added cost and energy consumption.

Groundwater modeling results indicate that drain flows in 2045 can range from a low of about 66,000 AFY for continued implementation of the 2002 WMP strategies with the revised water demands to a high of about 119,000 AFY with restoration of historical groundwater levels. Consequently, drain flows are sensitive to the management approach. It appears that somewhat lower drain flows can be maintained by reducing recharge near the Oasis area and increasing recharge in the Indio area where there is more pumping. This would allow better use of the basin storage capacity. However, the amount of recharge feasible in the Indio area has not been demonstrated by field testing.

Figure 7-5 shows the projected flows to the drain system with implementation of the 2010 WMP Update. This chart indicates that flows will decline until about 2015 and then increase as water levels in the East Valley recover as a result of management activities. The net amount of flow reaching the Salton Sea is a function of total drain flows (water flowing from subsurface drains), wastewater discharges to the CVSC less any flow recovered through drain water desalination and recycled water use. **Figure 7-5** also shows the potential flow to the Sea in the event that desalination of drain water is maximized and all recycled water generated by new growth is used to meet future demands. The actual flow to the Sea could be higher than shown if alternate sources of water are implemented (such as water transfers) that could offset a portion of the drain water desalination. Consequently, the net flows to the Sea represent a minimum level with implementation of the 2010 WMP Update. Under assumptions of improved Delta exports flows to the Salton Sea would be about 64,000 AFY in 2045, comparable to 2009 conditions.

Figure 7-5
Projected Drain Flows



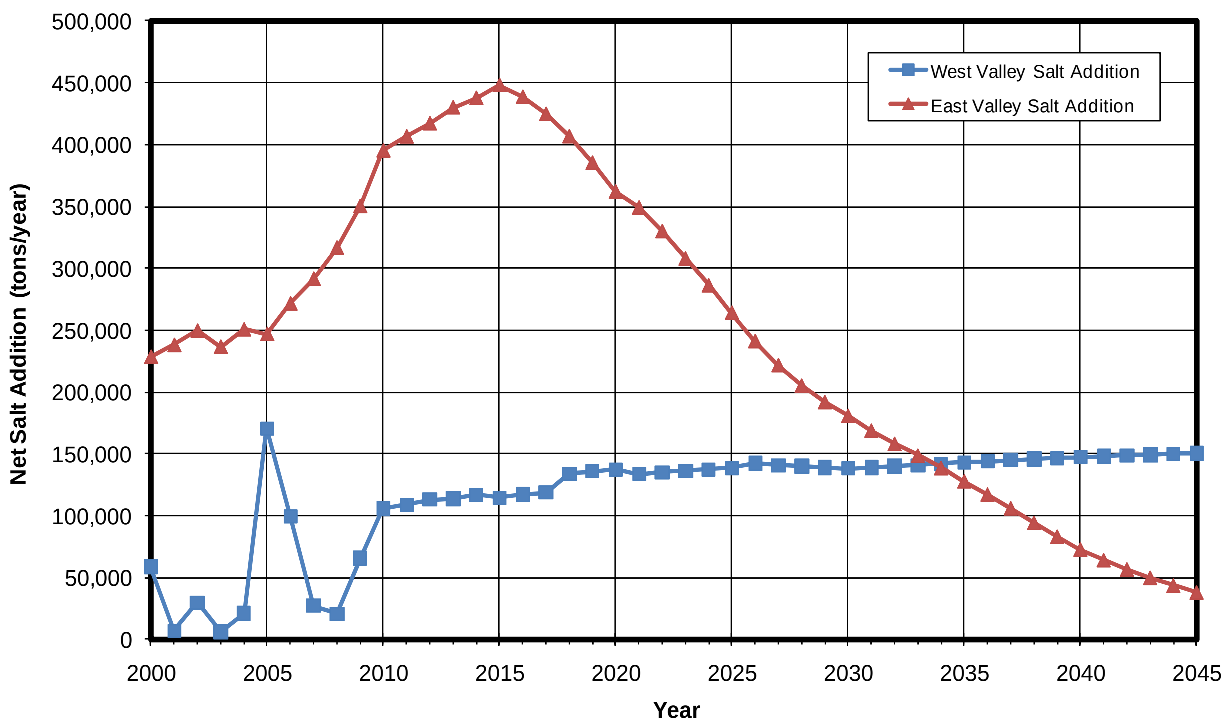
7.4.1.2 Salt Balance

The salt balance of a basin is the mass balance of salt entering and leaving the basin, typically measured in tons per year. Salt is added to the groundwater basin through natural recharge, wastewater percolation, application of fertilizers, imported water use (irrigation or recharge), and intrusion from the Salton Sea. Salt is removed from the basin principally through the agricultural drains, wastewater discharge to the CVSC and subsurface outflow to the Salton Sea. If sufficient salt is not removed from the basin, groundwater quality will gradually deteriorate. Primary source of salt in the Coachella Valley is imported water, which has a salt content of about 1 ton/AF (1 ton/AF = 735 mg/L). Under current average conditions, imported water brings about 350,000 tons of salt into the basin each year. Under the 2002 WMP, imported water and desalinated water deliveries would increase significantly, resulting in about 230,000 tons/yr of additional salt being brought to the basin.

Mechanisms for improving basin salt balance are reduced imported water salt load (new higher quality sources or desalination), increased salt export (increased drain flows or desalination), or managing salt additions (fertilizers, etc. – a minor component). To balance the current salt influx to the basin from imported water through drain flows having a typical salinity of about 2,000 mg/L, the drain flows would need to be about 130,000 AFY. Under future conditions, about 186,000 AFY of drain flows could potentially be required. If the salt concentration of drain water could be increased, the volume required for salt export would decrease. This could be accomplished through increased water conservation, which reduces return flows and increases the salt content of the return water. However, any benefit derived from higher return water salinity may be offset by reduced agricultural production caused by higher soil salinity. Desalination of drain flows could also assist in concentrating the salt discharges from the basin provided there is a suitable method for brine disposal.

Salt balance calculations have been performed for the Whitewater River Subbasin. The results of these calculations, shown on **Figure 7-6**, indicate that the net salt addition in the West Valley area gradually increases from about 100,000 tons/yr to about 150,000 tons per year. This salt originates from SWP Exchange water delivered for recharge and from Canal water delivered to the MVP. The value remains relatively stable because the only outlet for salt in the West Valley is through subsurface outflow to the East Valley.

Figure 7-6
Salt Balance



Salt additions to the East Valley show a significant increase between 2005 and 2015 as Canal water utilization increases for groundwater recharge and source substitution. However, after 2015, drain flows begin to increase in response to increased storage and groundwater levels as shown previously on **Figure 7-5**.

7.4.1.3 Shallow Groundwater

High groundwater levels in shallow perched or semi-perched aquifers can lead to waterlogging of soils. In turn, this can lead to septic system failures, structural flooding (seepage into subterranean parking, etc.), utilities damage (flooded vaults, sewer infiltration, etc.) and saturated root zones resulting in adverse effects on agricultural production and landscaping. In some portions of the United States, shallow groundwater surfaces in low lying depressions creating lakes that flood seasonally when groundwater levels are high, conditions which do not exist in the Coachella Valley.

Currently, extensive agricultural irrigation in the East Valley contributes a significant amount of return flow to the semi-perched aquifer maintaining the shallow groundwater levels. As development occurs, agriculture will be replaced by urban land uses. Water conservation activities are expected to reduce the amount of return flow to the groundwater basin by about 30 percent. This could potentially lower water levels in the semi-perched aquifer and partially reduce the risk of property damage from shallow groundwater. Basin recharge activities coupled with source substitution would reduce groundwater overdraft, creating an upward vertical gradient that could increase semi-perched aquifer water levels. If the amount of overdraft reduction is greater that the reduction in return flows, then increased water levels could occur in the semi-perched aquifer. Torres-Martinez tribal representatives have expressed concern about the potential negative impacts that increased water levels might have on the operation of their septic disposal systems.

Continued use of the drainage system is expected to be necessary to maintain water levels and to export salt resulting from irrigation. If semi-perched water levels cannot be adequately controlled by the drain system to minimize impacts on septic systems, then connection to CVWD's regional wastewater collection system may be required.

Groundwater modeling results for the 2002 WMP indicated that significant areas of shallow groundwater would exist in the East Valley as water management activities are implemented. Most of the affected areas are near existing surface channels like the CVSC or are areas that do not currently have subsurface drains. **Figure 7-7a** shows the areas affected by shallow groundwater. While water conservation could reduce the amount of return flows, modeling for the 2010 WMP Update indicates that shallow groundwater will still exist in central portion of the East Valley primarily along the CVSC. Given the geology of the Valley, shallow groundwater conditions cannot be avoided as long as irrigation (both agricultural and urban/golf) is occurring. As stated above, it will be important that the regional drainage system be maintained and enhanced as development occurs in the Valley.

7.4.1.4 Liquefaction

Liquefaction is a physical process by which sediments below the water table temporarily lose strength and behave as a liquid rather than a solid. In the liquefied condition, soil may deform enough to cause damage to buildings and other structures. Seismic shaking is the most common cause of liquefaction. During an earthquake, the granular structure of the saturated soil particles is compressed increasing the pore water pressure between particles. If the pressure becomes high enough, the soil loses its strength and the particles can move freely causing a loss of bearing strength. This can cause buildings to sink into the ground or tilt, empty buried tanks to rise to the ground surface, slope failures, nearly level ground to shift laterally tens of feet (lateral spreading), surface subsidence, ground cracking and sand blows. Excess water pressure is vented upward through fissures and soil cracks, and a water-soil slurry bubbles onto the ground surface. Site-specific geotechnical studies are the only practical and reliable way of determining the specific liquefaction potential of a site; however, a determination of general risk potential can be provided based on soil type and depth of groundwater.

Liquefaction occurs in well-sorted (similar sized) sands and silts in areas with high groundwater levels. Liquefaction has been most abundant in areas where groundwater occurs within 30 feet of the ground surface; few instances of liquefaction have occurred in areas with groundwater deeper than 60 feet (EERI, 1999). Dense soils, including well-compacted fills, have low susceptibility to liquefaction (EERI, 1999). Liquefaction hazards are noted for the area from Indio southeast to the Salton Sea (Riverside County Integrated Plan, 2003). DWR indicated a liquefaction hazard exists for the majority of the East Valley floor because of perched groundwater and presence of appropriate soils. However, there is no surface indication of any liquefaction occurring in the past (DWR, 1964).

In the 2002 WMP PEIR, the existing risk for liquefaction was recognized in areas having semi-perched groundwater. The PEIR stated that the Proposed Project will not change the potential for liquefaction in most of the East Valley because the subsurface agricultural drains maintain groundwater in the Semi-perched aquifer. In the vicinity of recharge basins, water levels were projected to remain greater than 30 ft below ground surface. Detailed site-specific geotechnical analyses would be required prior to construction of major water resources facilities.

Figure 7-7a shows the areas where shallow groundwater is less than 60 feet below ground surface (green line). This area of liquefaction risk is consistent with mapping presented in the Safety Element (Chapter 6) of the 2003 Riverside County General Plan. Future development in the East Valley will need to address the current risk of seismically-induced liquefaction through proper foundation design and construction techniques. Current groundwater modeling indicates that much of the land underlain by the Semi-perched aquifer could have shallow groundwater ranging from the ground surface in areas without drains to 50 ft below ground. Since the existing drain system is generally at a depth of 10 ft, much of the area has a depth to water in the range of 0 to 10 ft. In these areas, it will be important that detailed geotechnical investigations be conducted prior to foundation design to minimize the risks of differential settlement due to liquefaction. Such steps may include over-excavation and re-compaction and the use of geotextiles to reinforce the soil.

7.4.1.5 Subsidence

Land subsidence is the lowering of the ground surface due to groundwater withdrawal or seismic activity. Seismic-induced movements may cause subsidence on the depressed side of a fault, or relatively small-scale subsidence can also occur when dry soils are saturated with water due to seismic activity.

Groundwater withdrawal is the most likely mechanism or cause for land subsidence in the Coachella Valley. Groundwater withdrawal reduces the groundwater pressure and the support that it provides causing the fine-grained aquifer sediments to compact from the weight of the overlying sediments. The amount of compaction depends upon the thickness and hydrogeologic characteristics of the aquifer, as well as the rate and amount of decrease in the water level. Fine-grained sediments (silts and clays), such as those composing the aquitard that separates the Upper and Lower aquifers, are more susceptible to compaction and subsidence than coarse-grained sediments (sands) when groundwater is removed from them. However, the low permeability and high specific storage of fine-grained sediments cause compaction to occur slowly, over a period of several years, rather than as an instantaneous response to water level decline. Therefore, a short-term impact might be difficult to detect and subsidence may occur years after the water level had declined. However, once the compaction occurs, compaction of fine-grained sediments is permanent, due to a permanent rearrangement of soil particles. This results in a permanent loss of groundwater storage capacity and causes permanent land subsidence.

Uneven depression of the land surface is the major indication of vertical compaction due to surface subsidence. Land subsidence due to vertical compaction usually is not uniform, possibly due to differences in the underlying sediments. The resulting damage can include:

- Visible cracks, fissures, or surface depressions
- Damage to structures, such as canals, utilities, roads, and buildings
- Damage and loss in effectiveness of the subsurface agricultural drainage system
- Disruption of surface drainage and irrigation systems
- Loss of vertical elevation

In addition to vertical compaction, regional and local horizontal movements can occur due to large amounts of localized groundwater extraction or due to changes in aquifer thickness. Changes in aquifer thickness occur at the basin margins or where the depth to bedrock is shallow and non-uniform. The horizontal movements can ultimately result in inelastic failures at the ground surface that appear as surface fissures. Surface fissures can damage structures, interrupt irrigation of agriculture, capture runoff, and can become direct conduits for poor quality water to enter the aquifer. Historically, surface fissures developed in the La Quinta area in the later 1940s, possibly as a result of land subsidence or seismic action.

In 1996, the USGS, in cooperation with CVWD, established a geodetic network of monuments to monitor vertical changes in land surface in the East Coachella Valley. In 2007, USGS published the results of the latest monitoring program (USGS, 2007). The 2007 report identified at least four areas in the Coachella Valley that had experienced land surface elevation changes, indicating that land subsidence occurred in three of the areas (Palm Desert, Indian Wells and La Quinta) and both subsidence and uplift apparently occurred in one of the areas (Indio-Coachella) between February 26, 2003 and September 25, 2005. Other local areas in the Coachella Valley also may have deformed, but the size of these areas and the amount of deformation generally are small compared with the Palm Desert, Indian Wells and La Quinta areas. All the areas where subsidence was detected – Palm Desert, Indian Wells and La Quinta – coincide with or are near areas where groundwater pumping generally caused groundwater levels to decline.

To minimize the future potential effects of land subsidence, it will be important to maintain groundwater levels at or higher than the level of the compressible clays. A more detailed assessment of the location of the compressible clay layers is required to determine the ideal groundwater level. However, for much of the East Valley, this means that water levels should not be allowed to drop below the 2005 levels and levels should be increased to maintain a safety factor. For those areas where inelastic subsidence has occurred, increased water levels will not restore ground elevations to pre-subsidence conditions. Groundwater modeling indicates that water levels for all of the evaluated options will result in increased water levels and consequently should reduce the risk of subsidence.

7.4.1.6 Artesian Groundwater Levels

Historically, artesian groundwater conditions have existed in much of the East Valley. Huberty, et al. (1948) presented a map showing the approximate extent of artesian flow reaching the grounds surface in 1939. In the vicinity of Lincoln Street and Avenue 72, about 30 ft of artesian pressure was noted in 1939. From the mid-1970s through 1994, more than 50 wells in the East Valley exhibited artesian pressure with wells as far north as Coachella and extending to the Oasis area. Pressures as high as 60 ft above ground surface were observed near the Salton Sea in the late 1980s. As overdraft conditions are reduced, groundwater levels in the deep aquifers are expected to return to conditions similar to those of 1970s and 1980s. This finding was indicated in the Program EIR for the 2002 WMP.

Although flowing artesian conditions can reduce the amount of pumping energy required to extract groundwater, most wells are not properly equipped to deal with the available pressure. This can result in loss of water from improperly controlled wells. Water from flowing wells could also cause property damage if not routed to drainage channels. Such nuisance water flows could cause issues with vectors. It should be noted that State law specifies that any artesian well which is not capped or equipped with a mechanical appliance that effectively arrests and prevents the flow of any water from the well is a public nuisance and the landowner allowing such waste is guilty of a misdemeanor (California Water Code §305-307).

Another potential issue with high artesian heads is the potential for leakage from the deeper aquifers into the shallow aquifers through wells that are perforated in both zones. Like flow from improperly controlled artesian wells, flow into the Upper or Semi-perched aquifers could result in loss of high quality water from the basin.

Recent observations indicate that artesian conditions have returned to portions of the East Valley. This occurrence appears to be the result of changed pumping patterns including a significant pumping reduction by aquaculture operations south of Mecca. Groundwater model simulations
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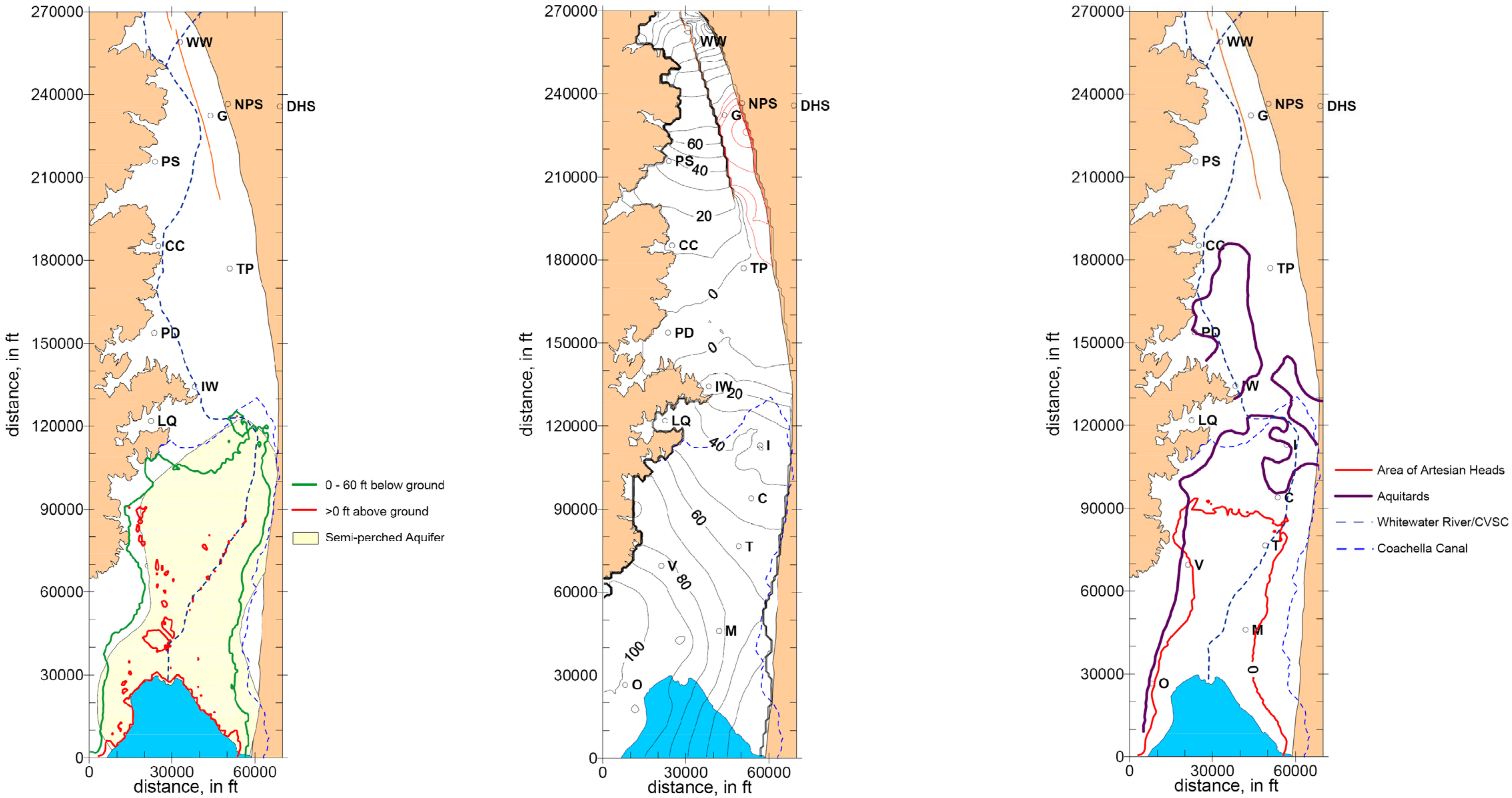
Figure 7-7
Groundwater Levels



A – Areas of Shallow Groundwater **B - Changes in Deep Groundwater Levels 2005-2045** **C – Areas of Artesian Conditions**

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that excluded this pumping reduction indicated that artesian levels in the East Valley could be as much as 60 ft above ground surface near the Salton Sea by 2045. **Figure 7-7c** shows the areas in the East Valley that modeling shows could experience artesian conditions by 2045. Artesian pressures above ground surface begin to appear between 2015 and 2020 with the affected area expanding over time. It should be noted that these high pressures may not be observed in the field as vertical leakage into the Semi-perched aquifer and then into the drains may partially reduce this effect. However, historical data shows that high artesian pressures are possible in some areas of the basin.

7.4.1.7 Achieving Balance between Water Level Increases and Impacts

Although an important WMP objective is to manage basin overdraft, the challenge is to achieve an appropriate balance between the resulting higher groundwater levels and the risks and benefits associated with those levels while meeting fundamental needs of regional water supply and storage. Since a number of these factors conflict with each other, it may not be possible to establish a specific set of criteria that will meet all constraints.

Table 7-7 summarizes the general relationships between depth to groundwater and basin impacts.

Table 7-7
Relationship between Groundwater Depth and Basin Impacts

Factor	Decreasing Depth to GW	Increasing Depth to GW
Waterlogging/Septic Failures	Increased Risk	Decreased Risk
Artesian Water Losses	Increased Risk	Decreased Risk
Land Subsidence	Decreased Risk	Increased Risk
Liquefaction	Increased Risk	Decreased Risk
Drain Flows	Increased Flow	Decreased Flow
Salt Balance/Water Quality	Positive/Improved	Adverse/Degraded
Energy Consumption (pumping)	Reduced energy	Increased Energy
Water Supply (and Storage)	Decreased Risk	Increased Risk

Although an important WMP objective is to manage basin overdraft, the challenge is to achieve an appropriate balance between the resulting higher groundwater levels and the risks and benefits associated with those levels while meeting fundamental needs of regional water supply and storage. Since a number of these factors conflict with each other, it may not be possible to establish a specific set of criteria that will meet all constraints.

For example, maintaining a beneficial or neutral salt balance in the basin will require that drain flows be increased from their current levels. Since the quality of the drain flow is dictated by the source water quality and the water application practices, water conservation and source substitution activities will affect the quality of return flows and drain quality. For agriculture, the return percentage with no conservation is estimated to be about 38 percent of the applied water. If Canal water having a TDS of 750 mg/L is used for agricultural irrigation, the TDS of the return water will be 1,970 mg/L. A conservation level of 14 percent will reduce the return water to about 28 percent of the applied water but will increase the TDS of the returns to 2,680 mg/L. As discussed previously, salt export is more efficient (i.e., requires less water) when the concentration is higher.

Some of the factors cannot be reasonably balanced so as to eliminate future risks. For example, the basic geology of the Coachella Valley is such that shallow groundwater and the risk of seismically induced liquefaction cannot be avoided. Consequently, future development must take appropriate precautions to minimize these risks.

The approach for developing the 2010 WMP Update is to reduce overdraft in the basin by achieving a positive change in storage and raising water levels. When this is achieved, the risk of subsidence is reduced or eliminated. The strategies evaluated for the 2010 WMP Update achieve a reasonable balance between the benefits of overdraft reduction, water level increases and impacts resulting from those increases. As the WMP is implemented, it is important that monitoring results be evaluated on a regular basis to ensure that unanticipated adverse impacts are not occurring. If monitoring shows potential adverse conditions, then appropriate action can be taken to adjust plan implementation.

7.4.2 Development of Preferred Approach

The preferred approach for the 2010 WMP Update recognizes the increased uncertainty associated with growth and the water resources of the Coachella Valley. The 2010 WMP Update builds upon the concepts originally identified in the 2002 WMP but adds flexibility in the form of ranges for implementation rather than specific targets.

7.5 SUMMARY

Implementation flexibility is critical to respond to uncertain future growth as well as water supply conditions. A range of water conservation and water supply elements are evaluated to identify the most cost-effective sources. These conservation and supply elements must be sufficient to meet not only the projected water demands but provide a level of contingency in the event that individual water conservation and supply projects cannot be implemented as currently envisioned or growth is higher than anticipated.

A building block approach is used to implement water conservation and supply development. This approach requires an ongoing evaluation of the effectiveness of each element in reducing demands or generating new supplies. If the identified objectives are not met, then additional measures can be implemented to achieve those objectives. For example, the amount of future water conservation, water transfers and drain water desalination can be adjusted in response to the outcome of long-term solutions in the Delta.

Once water conservation and supplies are defined, the next step is the development of water management strategies to reduce and ultimately eliminate groundwater overdraft. The two primary measures for doing this are source substitution and groundwater recharge. Again, a flexible approach is taken where targets for both source substitution and recharge are established. However, these targets are flexible to allow adjustments in response to changes in development patterns affecting sources substitution and basin groundwater levels. Source substitution programs initially focus on supplying imported and recycled water to existing groundwater users. As growth occurs, these systems can be used to meet the needs of future development without increasing groundwater use. Recharge projects provide flexibility by allowing variable amounts of recharge in the future to either restore storage losses during dry periods and to prevent excessively groundwater levels.

By implementing this flexible approach, the 2010 WMP Update becomes a working planning tool that can adapt to changing conditions in the Coachella Valley. Details of the recommended approach are presented in **Section 8.**

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Section 8
Implementation Plan

The Coachella Valley Water Management Plan (WMP) is a dynamic document. The WMP must be periodically updated to reflect changing conditions in development and water demand, water supply availability, and other internal and external factors affecting the water resources of the Valley. As discussed in the previous sections, the 2010 WMP Update has been prepared to reflect the changes in expected development within the Valley based on conversion of agricultural land to urban land uses and the reductions in water supply reliability estimates that have taken place as a result of environmental and legal restrictions in the California Delta. Additional factors such as climate change, changing water quality requirements and the potential for other emerging issues have also been considered. This section presents the proposed implementation plan for water supply development and control of groundwater overdraft.

8.1 PLAN COMPONENTS

The goal of the Coachella Valley WMP is to reliably meet current and future water demands in a cost-effective and sustainable manner. This will be accomplished by achieving the following objectives:

- Meet current and future water demands with a 10 percent supply buffer
- Manage groundwater overdraft
- Manage water quality
- Comply with state and federal regulations
- Manage future costs
- Minimize adverse environmental impacts

As described in **Section 6**, the principal components of the WMP include water conservation and water supply development to meet water demands coupled with groundwater recharge and source substitution to reduce groundwater overdraft. Water quality improvements incorporated into the plan will ensure that the water delivered for urban use meets State and Federal drinking water requirements.

Key underlying themes of this update are balance and flexibility. Consequently, the approach with the 2010 WMP Update is to maximize flexibility in implementing plan elements while minimizing costs. In addition, the recommended Implementation Plan avoids excessive reliance on any one supply source while meeting projected water demands with a 10 percent supply buffer. In 2011, the supply buffer should ideally be about 68,000 AFY. The supply buffer should gradually increase with demand to about 89,000 AFY by 2045. The supply buffer serves as a contingency in the event that demands are higher than expected or supplies cannot be implemented at the levels expected. This supply buffer is achieved by establishing increased planning targets for urban water conservation, desalinated drain water, recycled water and water transfers and taking the actions to implement these higher targets if and when needed. Currently, due to groundwater overdraft and full use of existing developed supplies, there is no supply buffer. Development of the additional supplies to provide buffer may also provide the opportunity to reduce overdraft earlier and store water in the basin for future use. Development of this buffer should be accomplished of the next ten years such that plans are in place no later than 2020.

8.1.1 Continuation and Expansion of Existing Projects

The 2002 WMP included a number of recommended programs and features to reduce groundwater overdraft. These programs are effective, but with the reduced supply reliability described in this Update, they are not enough. They must be expanded to provide the balance and flexibility needed to reliably reduce the groundwater overdraft. The following describes the expansion of these existing programs.

8.1.1.1 Water Conservation

Water conservation continues to be a cornerstone of the WMP. Specific recommendations for water conservation are presented by user category.

Agricultural Conservation: An agricultural conservation program will be implemented that achieves up to a 14 percent reduction in consumptive use by 2020. The savings would be achieved utilizing a staged approach. Initially, low cost, voluntary programs would be initiated followed by increasingly more expensive and mandatory programs as required. The following building blocks have been identified for implementation as needed:

- Grower Education and Training – Grower meetings and training programs combined with confidential grower audits funded by the District.
- District-provided Services–Scientific irrigation scheduling, scientific salinity management, moisture monitoring and farm distributions uniformity evaluations funded by the District.
- Irrigation System Upgrade/Retrofit – Partial or full funding and/or financial support of growers that convert from flood/sprinkler to micro-sprinkler/drip systems.
- Economic Incentives – As needed to achieve the 14 percent goal, this “building block” will involve adoption of one or more incentive pricing approaches to encourage conservation. Examples include tiered pricing, water budget pricing, or seasonal pricing.
- Regulatory Programs – This could include regulation that support and provide for agriculture conservation. Examples include farm management plans, mandatory drip/micro-spray systems for new permanent crops and conversion of existing crops over time.

These program features will be incrementally expanded until the target reduction is achieved. In order to achieve the maximum return on investment from conservation activities, emphasis will be placed on agricultural operations with the lowest irrigation efficiency.

Initially, the agricultural conservation program will save about 39,500 AFY of water by 2020, decreasing to 23,300 AFY by 2045 as agricultural land transitions to urban uses. CVWD will develop methods for tracking the effectiveness of agricultural water conservation. These methods will include determining average water use per acre of farmed land and average irrigation efficiency. The methods will reflect variations in annual/seasonal evapotranspiration and cropping patterns. Progress toward meeting agricultural conservation goals will be evaluated and reported annually.

Urban Conservation: The urban water conservation program will be expanded and enhanced to meet the State's requirement of a 20 percent reduction in per capita use by 2020 (20 by 2020). This will be accomplished by:

- Continued implementation of the 2009 Valley-wide Landscape Ordinance (Ordinance 1302-2)
- Installation of automated or "smart" water meters
- Extension of the landscape ordinance to include all landscaping regardless of size (current limit is 5,000 square-feet or larger for homeowner furnished landscaping)
- Implementation of water budget-based tiered water rates or other conservation based rates by other water agencies
- Further decreases in the water allocations for landscape irrigation consistent with good irrigation practices and desert landscaping
- Landscape retrofit rebates – i.e., economic incentives for replacing high water use landscaping, also known as "cash for grass"
- Restrictions on the total amount of turf allowed
- Mandated use of smart irrigation controllers by all customers
- Audits of new development to assure continued compliance with the Landscape Ordinance
- Plumbing retrofits for existing properties including mandatory retrofit (ultra low flush toilets, showerhead replacement, etc.) prior to sale of property
- Conservation rebates for high-efficiency clothes washers
  Compliance with California Green Building Code Standards (California Code of Regulations Title 24, Part 11, 2009)
- Water distribution system audits and loss reduction programs

Once 20 percent conservation is achieved, continued implementation of these conservation measures will result in even greater savings per capita as new growth occurs. Projections indicate that continued implementation of these measures in conjunction with the State's 2010 CALGREEN Building Code requirements will result in per capita water use reduction of nearly 40 percent compared to the baseline per capita use defined in SB 7x7. This could potentially result in additional water savings of 43,000 AFY by 2045 if growth occurs as projected. To provide a portion of the water supply buffer, this target is increased to 72,000 AFY by 2045, providing a supply buffer of 31,000 AFY.

Valley water agencies will adopt DWR's method pursuant to SB 7x7 to track the effectiveness of urban water conservation. Progress toward achieving the urban water conservation goals will be reported in urban water management plans prepared on five year intervals.

Golf Course Conservation: Golf course conservation continues to be an important component of water management in the Valley. Valley water agencies will do the following:

- Implement a water conservation program to achieve a ten percent reduction in water use by existing golf courses (built prior to 2007) by 2020. This would be accomplished through golf course irrigation system audits and soil moisture monitoring services.
- Encourage existing golf courses to reduce water use by reducing their acreage of turf.
- Implement the 2009 CVWD/CVAG Landscape Ordinance objectives for all new golf courses (built in 2007 and later). Conduct landscaping and irrigation system plan checks to verify compliance.
- Develop and implement methods to evaluate the effectiveness of golf course water conservation such as measuring water use per irrigated acre.

These measures are expected to achieve a savings of 11,600 AFY by 2045. Progress toward meeting golf course conservation goals will be evaluated and reported annually. Additional golf course conservation could contribute to the supply buffer; however, no specific target is included in the 2010 WMP Update.

8.1.1.2 Supply Development

As described in **Section 6**, the strategy for water supply development consists of a balanced portfolio which retains flexibility to adapt to future changes in supply reliability. Sufficient water supplies will be planned to provide a 10 percent buffer on an average basis to meet unanticipated reductions in existing supplies or difficulties in developing new supplies. The additional supplies needed to provide the buffer would be implemented when required based on an on-going analysis of projected demands and supplies.

Acquisition of Additional Imported Supplies: Additional water supplies will be required to eliminate groundwater overdraft and meet the future demands of the Valley. The 2010 WMP Update retains the 103,000 AFY target for recharge at Whitewater but the MVP will be supplied with 35,000 AFY of SWP water transferred from Metropolitan to CVWD under the QSA. Given the uncertainty in the California water supply picture, the average amount of additional imported supply required is in the range of 45,000 to 80,000 AFY. The lower value assumes successful implementation of the BDCP and Delta conveyance facilities while the upper value is based on reduced future SWP reliability (50 percent). To provide the water supply buffer, additional transfers and acquisitions of up to 20,000 AFY are required.

Additional supplies will be obtained through the following actions:

- Acquire additional imported water supplies through long-term lease or purchase where cost-effective.
- Continue to purchase SWP Turnback Pool, SWP Article 21 (Interruptible) and supplemental SWP water under the Yuba River Accord Dry Year Water Purchase Program as available.
- Work with Metropolitan to define the frequency and magnitude for SWP Table A call-back under the 2003 Water Transfer Agreement.

- Continue to play an active role with U. S. Bureau of Reclamation (Reclamation), California Department of Water Resources (DWR), the State Water Contractors and other agencies in developing the Bay-Delta Conservation Plan and Delta Habitat Conservation and Conveyance Program.

Increased Recycled Water Use: As urban growth occurs, the following activities will be implemented:

- In the West Valley, implement a joint agency goal to increase recycling of all generated wastewater for non-potable irrigation from 60 percent to at least 90 percent by 2020 where feasible.
- In the East Valley, maximize the use of recycled water generated by future growth for urban irrigation as development occurs and customers become available by constructing tertiary treatment and distribution facilities at the CVWD WRP-4, City of Coachella and Valley Sanitary District facilities.
- Evaluate the feasibility of delivering recycled water in the existing Canal water distribution system while avoiding potential conflicts with future urban water treatment and use of Canal water.
- Determine the minimum amount of recycled and other water flow that must be maintained in the CVSC to support riparian and wetland habitat.
- Fully utilize all wastewater generated by development east of the San Andreas fault for irrigation uses to meet demands in that area and reduce the need for additional imported water supplies.

Based on these recommendations, up to 30,000 AFY of recycled water would be utilized in the West Valley, up to 33,000 AFY of recycled water would be utilized in the East Valley and up to 10,000 AFY of recycled water would be utilized in the area east of the San Andreas fault for direct non-potable uses by 2045, for a total of 73,000 AFY. For purposes of establishing the supply buffer, the amount of recycled water use could be increased to as much as 88,000 AFY if all East Valley wastewater were recycled.

Develop Desalinated Drain Water: CVWD will implement programs and projects to validate its water rights application for the Whitewater River. Measures will include:

- Develop a program to recover, treat and distribute desalinated drain water and shallow groundwater for non-potable and potable uses in the East Valley.
- Construct a demonstration facility to gain operational experience in drain water desalination and brine disposal.

The amount of water recovered through drain water desalination will range from 55,000 to 85,000 AFY. The lower end of the range is based on the successful implementation of the BDCP and Delta conveyance facilities. The high end of the range is close to the maximum amount of drain water expected to be generated in the Valley. The program will be phased so that it can be expanded in response to future water supply conditions and needs of the Valley.

8.1.1.3 Groundwater Recharge Programs

The 2002 WMP had a planning target of 103,000 AFY of SWP water at the Whitewater recharge facilities and 80,000 AFY of Canal water recharge at East Valley recharge facilities by 2035. Groundwater recharge will continue to be a significant component of water management in the Coachella Valley. Existing and proposed recharge activities identified in the 2002 WMP will continue with some modifications as identified below.

Whitewater River Recharge

- Continue operation of the Whitewater facilities to recharge SWP Exchange water, at least 100,000 AFY over a long-term (20-yr) average.
- Transfer and exchange any unused desalinated drain water and SWP water from the QSA for Colorado River Aqueduct (CRA) water delivered to Whitewater for recharge (see **Section 6.6.1**).
- Utilize additional acquired water transfers to supplement the existing SWP exchange water.

Thomas E. Levy Groundwater Replenishment Facility

- Continue operation of the Levy facility and recharge 40,000 AFY on a long-term basis as system conveyance capacity allows.
- Monitor groundwater levels in shallow and deep aquifers for signs of rising shallow groundwater. Develop operating criteria to minimize chances for shallow groundwater mounding.
- If the existing conveyance system is not capable of sustaining 40,000 AFY of deliveries for recharge at the Levy facility, construct a second pumping station and pipeline from Lake Cahuilla to provide a supplemental supply.

Martinez Canyon Recharge

- Conduct siting and environmental studies, land acquisition and design for the full-scale Martinez facility with a design capacity of up to 40,000 AFY.
- Complete construction of the Martinez facilities in phases such that the facility can be initially operated at 20,000 AFY with potential future expansion to as much as 40,000 AFY based on groundwater overdraft conditions and implementation of East Valley source substitution projects.
- Coordinate pipeline and pumping station construction with expansion of the Canal distribution system in the Oasis area.

8.1.1.4 Source Substitution Programs

Like groundwater recharge, source substitution continues to be an important element for reducing groundwater overdraft. Due to the expected changes in water use patterns in the Valley as a result of continued development, source substitution will receive increased emphasis in the future. Based on this need, the following actions are recommended.

The 2002 WMP had a goal of using 31,000 AFY of Canal water for urban use. The target for the 2010 WMP Update for urban water treatment is between 58,000 and 90,000 AFY by 2045. The amount to be implemented will depend on the amount of urban development, the amount of dual piping (see **Section 8.1.2.1**) and the availability of Colorado River water supplies. Treatment of Colorado River water may offset the need to treat additional groundwater for arsenic removal (see **Section 6.7.3**).

Mid-Valley Pipeline (see Section 6.5.3)

- Prepare a MVP system master plan to lay out the future pipeline systems.
- Implement near-term project expansions to connect golf courses along the MVP alignment and extensions of the existing non-potable distribution system.
- Complete the construction of the remaining phases of the Mid-Valley Pipeline system by 2020 to provide up to 37,000 AFY of Canal water and 15,000 AFY of WRP-10 recycled water on average to West Valley golf courses.

Conversion of Agricultural and Golf Course Uses to Canal Water

- Work with existing East Valley golf courses to increase Canal water use to 90 percent of demand.
- Work with large agricultural groundwater pumpers to provide access to Canal water and encourage them to reduce their groundwater pumping.
- Revise and update the Oasis distribution system feasibility study considering possible future conversion to urban use. If cost-effective, design and construct the Oasis distribution system to deliver up to 27,000 AFY of Canal and desalinated drain water by 2020.

Treatment of Colorado River Water for Urban Use

- CVWD, the City of Coachella and Indio Water Authority (IWA) will develop coordinated plans to treat Canal water for urban use in the East Valley.
- Conduct a feasibility study to determine the economic tradeoffs between large-scale centralized treatment facilities and small scale satellite treatment facilities including potential delivery from the MVP system.
- Evaluate opportunities for regional water treatment projects between CVWD, the City of Coachella and IWA to capture economies of scale.
- Determine the amount of Canal water desalination needed to minimize taste, odor and corrosion.

8.1.2 New Projects and Programs

In addition to those programs identified in the 2002 WMP which will be continued or expanded, the following new projects and programs will be implemented and are discussed in the following subsections:

- Canal water use for urban irrigation
- Groundwater recharge in Indio area
- Investigation of groundwater storage opportunities with IID
- Additional groundwater treatment for arsenic
- Development of salt/nutrient management plan
- Desalination brine disposal
- Canal water loss reduction
- Drainage control
- Stormwater capture feasibility
- Development of local groundwater supplies for non-potable use

8.1.2.1 Canal Water Use for Urban Irrigation

As development occurs in the East Valley, CVWD and the other Valley water purveyors will require installation of dual piping systems for new development for distribution of non-potable water (Canal or recycled water) for landscape irrigation (also see **Section 6.5.2**).

This program will offset the reduced Canal water use by agriculture as land use transitions to urban development. It will also reduce groundwater pumping for urban use. At least two-thirds to as much as 80 percent of the landscape demand of new development will be connected to non-potable water delivery systems. This will result in the utilization of at least 92,000 AFY of non-potable water by 2045. This program is essential to insure continued full use of the Valley's Colorado River water supplies as agricultural land use declines.

8.1.2.2 Groundwater Recharge in Indio Area

The City of Indio is evaluating the feasibility of constructing a groundwater recharge project within its service area. This project would be used to partially offset the impacts of Indio's pumping. Pursuant to the Indio-CVWD settlement agreement (2009), CVWD will work with the City of Indio to evaluate the feasibility of developing a groundwater recharge project that reduces groundwater overdraft in the Indio area.

For the 2010 WMP Update, it is assumed that an Indio area recharge project could offset pumping by 10,000 AFY. The actual amount will depend on the feasibility study results.

8.1.2.3 Investigation of Groundwater Storage Opportunities with IID

As part of the QSA, CVWD and IID signed an agreement that allows IID to store surplus Colorado River water in the Coachella Valley. Under the agreement, CVWD will store water for IID, subject to available storage space, delivery and recharge capacity and the prior storage rights of CVWD, DWA and Metropolitan. Stored water would incur a 5 percent recharge loss and a 5 percent per year storage loss. IID may also request CVWD to investigate and construct additional locations for direct or in-lieu recharge facilities. CVWD is currently working with IID to identify options for increasing the capacity of currently planned facilities or to construct additional facilities to store water on behalf of IID. Facilities to recover the stored water for use by CVWD Canal water users will also be included if reductions in recharge deliveries are insufficient to replace water foregone when IID calls for its stored water, thus requiring CVWD to replace the foregone water with CVWD Colorado River deliveries.

8.1.2.4 Additional Groundwater Treatment for Arsenic

Elevated arsenic concentrations in groundwater have been a problem for some time in the East Valley (see **Section 6.7.3**). In response to elevated arsenic levels in private wells, CVWD is pursuing federal grants to fund a portion of the cost to extend the potable water system to serve these communities. CVWD is also assisting these communities in connecting to the potable water system to the extent feasible. CVWD is evaluating delivery of treated Coachella Canal water to urban water users. To the extent Canal water is used for urban indoor use, additional arsenic removal will not be needed for those areas. However, as required to meet future demands and provide adequate redundancy, CVWD may need to expand its existing arsenic treatment facilities or construct new facilities to treat water from additional wells.

8.1.2.5 Development of Salt/Nutrient Management Plan

The State Water Resources Control Board (SWRCB) Recycled Water Policy (adopted February 11, 2009) requires every region in the state to develop a salt/nutrient management plan by 2014 (see **Section 5.1.2.3**). The salt/nutrient management plans are intended for management of all sources contributing salt/nutrients on a basin-wide basis to ensure that water quality objectives are achieved. This plan will assess the salt contributions of imported water including that used for recharge. CVWD will take the lead in developing a salt/nutrient management plan that meets the SWRCB requirements and allows cost-effective recycling of municipal wastewater in the Valley.

8.1.2.6 Brine Disposal

As discussed in **Sections 6.4.8** and **8.1.1.2**, desalination of drain water from the CVSC for use in the East Valley is proposed in this Update. Desalination of Canal water may be required for potable water delivery. Treatment at these levels would result in production of large volumes of brine, which would need to be disposed in a cost-effective and environmentally sound manner and in compliance with state and federal regulations. In addition, groundwater treatment for arsenic and nitrate removal requires a salt brine to regenerate the treatment resins, a potential use for the brine. Consequently, a brine disposal system is required to safely convey salts to an acceptable point of disposal. Concepts for brine disposal will be evaluated in conjunction with the salt/nutrient management plan described above.

8.1.2.7 Canal Water Loss Reduction

As indicated in **Section 6.4.1**, allocated losses and unaccounted water in the All-American Canal, the Coachella Canal and the distribution system may be as high as 31,000 AFY. To increase the amount of water delivered to the Coachella Valley, CVWD will:

- Conduct a study to determine the amount of water lost to leakage in the first 49 miles of the Coachella Canal and evaluate the feasibility of corrective actions to capture the lost water. This may require the installation of additional flow metering locations along the Canal. If feasible, implement the recommendations of this study.
- Work with IID to develop a transparent system for allocating losses along the All-American Canal.

8.1.2.8 Drainage Control

As described in **Section 6.8.2**, it will be important for both basin management (shallow groundwater level control and salt export) as well as the prevention of adverse impacts of shallow groundwater that CVWD's existing agricultural drainage system be maintained in some form, or replaced as urban development occurs. Funding is needed to replace, expand, enhance and maintain the system for urban development in the future. CVWD is evaluating alternative methods for funding the drainage system and will undertake a study of the improvements needed to continue system operation in the future.

8.1.2.9 Stormwater Capture

In **Section 6.4.10**, stormwater capture was identified as a viable method for increasing the amount of local water utilized for either groundwater recharge or direct use. The amount of additional stormwater that could be captured and used has not been documented. Based on this, the following measures will be undertaken:

- Conduct a feasibility study to investigate the potential for additional stormwater capture in the East Valley.
- If cost effective, implement stormwater capture projects in conjunction with flood control facilities as development occurs in the East Valley.

Proposals to capture stormwater will only be considered to offset groundwater pumping or provide replenishment if they can clearly demonstrate that the water captured is "new water" that otherwise would have been lost to the Salton Sea or evapotranspiration.

8.1.2.10 Development of local groundwater supplies for non-potable use

Growth in the areas northeast of the San Andreas fault will create additional demands for both potable and non-potable water. An investigation of groundwater development in Fargo Canyon Subarea of the Desert Hot Springs Subbasin should be conducted to determine the available supply and suitability for use in meeting non-potable demands of development east of the San Andreas fault. CVWD will propose that a study be performed jointly with the cities of Coachella and Indio. Preliminary estimates prepared for the 2010 WMP Update indicate that up to 10,000 AFY of local groundwater supply, including returns from use, might be developed, depending upon the ultimate level of development in this area.

8.1.3 Environmental Enhancement and Mitigation Projects

In the 2002 WMP PEIR, CVWD committed to construct several habitat replacement projects as mitigation for impacts of the WMP identified in the 2002 PEIR. The 2008 CVMSHCP incorporated these mitigation measures and added additional mitigation requirements for maintenance of the CVSC and drain system and for operation of the Whitewater River Spreading Facility. The habitat replacement and mitigation commitments included in the CVMSHCP are as follows:

- **Pupfish habitat** - 25 acres of managed replacement habitat to replace the habitat that is periodically altered by maintenance activities in drains and flood control channels that contain pupfish habitat. CVWD will also develop a study to evaluate the potential effect of routine drain maintenance on pupfish occupying the drains and to determine the efficacy of modifying maintenance practices to avoid or minimize potential Take.
- **Rail habitat –** 66 acres of permanent managed marsh habitat for listed California black rail and Yuma clapper rail in the CVSC and Delta Conservation Area to replace habitat that is periodically altered by flood control and drain maintenance activities.
- **Sonoran cottonwood-willow riparian forest habitat –** 44 acres of permanent riparian habitat to replace habitat that is periodically altered by flood control maintenance activities. The habitat will contribute to the conservation of this natural community and the riparian birds covered by the Plan.
- **Mesquite hummock habitat –** In conjunction with its WRP-7 recharge facility, CVWD will remove tamarisk from the site and, if a study undertaken by the Coachella Valley Conservation Commission demonstrates the feasibility of mesquite restoration, CVWD will restore and enhance mesquite and Coachella Valley round-tailed ground squirrel habitat on land it owns in the East Indio Hills Conservation Area to offset impacts to this species from CVWD's O&M activities in the CVSC and Delta Conservation Area.
- **Coachella Valley Fringe-toed Lizard (CVFTL) habitat –** CVWD will conserve the approximately 1,200 acres it owns in the CVFTL Habitat Conservation Plan (HCP) Whitewater Floodplain Preserve (part of the Whitewater Floodplain Conservation Area) in perpetuity as part of the CVMSHCP Reserve System. CVWD will deposit sand removed from the groundwater recharge basins during maintenance operations in the fluvial (water borne) and aeolian (wind-blown) sand transport area on available Reserve Lands in a manner that downwind habitat would receive appreciable inputs of aeolian sand from the deposits.

The habitat to be created in the East Valley is to be supplied with low selenium water, preferably from one of the drains or from the Coachella Canal. Based on the US Fish and Wildlife Service (USFWS) Permit (issued October 1, 2008), the pupfish study proposal and the plans for habitat development are to be submitted by October 1, 2010. The habitat will be established within three years of approval by the Wildlife Agencies of the plans to establish the habitat.

Over the past five years, the Torres-Martinez Tribe has constructed and operated an 85-acre freshwater-salt water habitat complex near the mouth of the CVSC. The complex consists of seven wetland treatment cells that polish (remove nutrients and pollutants from) drain water from the CVSC. The polished water is then blended with Salton Sea water and flows to four habitat ponds. This project has provided significant information regarding the development of engineered habitat near the Salton Sea and offers the potential for additional habitat creation as the Salton Sea recedes. CVWD will identify potential partnership opportunities with the Torres-Martinez Tribe to maximize the regional benefits of habitat enhancement projects.

8.1.4 Potential Future WMP Elements

Several programs and projects have been identified for possible inclusion in future updates to the WMP pending the results of feasibility studies.

8.1.4.1 SWP Extension

In 2007, CVWD and DWA in association with Metropolitan, San Gorgonio Pass Water Agency and Mojave Water Agency commenced an investigation of alternative routes for a Coachella Valley extension of the California Aqueduct (see **Section 5.1.2.1**, **Section 6.4.2**). When this investigation is completed, CVWD and DWA will share the results with other Coachella Valley water suppliers and stakeholders, to make a determination of whether the costs to import SWP directly to the Valley are justified.

8.1.4.2 Desalination of Recharge Water

Under current average conditions, imported water brings about 350,000 tons of salt into the basin each year. Over time, this will lead to a gradual degradation of water in the basin. Desalination of Colorado River water is an approach for reducing the salt load in the recharged water. Significant issues include the necessity and level of treatment, benefits of treatment, cost of treatment, methods and costs of brine disposal and how the costs of treatment would be recovered from basin water users. An evaluation of the potential effects of Colorado River recharge will be conducted in conjunction with the salt/nutrient management plan (**Section 8.1.2.5**). Methods for improving recharge water quality will be considered as part of the IRWMP or a similar approach involving broad stakeholder involvement.

8.1.4.3 Nitrate Remediation/Treatment

High concentrations of nitrate exist in portions of the Coachella Valley groundwater basin. Generally, nitrate occurs in the unsaturated and shallow aquifers and has not been observed in the deeper aquifers. Restoration of groundwater levels as a result of the WMP could mobilize the nitrate in the unsaturated and shallow aquifers, increasing nitrate concentrations in pumped groundwater.

CVWD will continue to monitor and report nitrate concentrations in the groundwater. CVWD will consider evaluating the feasibility of installing nitrate treatment on selected high nitrate wells as a means of removing a potential future source of groundwater contamination. Inclusion of nitrate treatment as a WMP element will be re-evaluated in the next Plan update.

8.1.4.4 Seawater Desalination

Coastal communities in southern California are conducting studies and developing plans for desalinating ocean water as a water supply source. Because of the Coachella Valley's significant distance from the ocean, desalinated seawater would have to be acquired via exchange agreements. Due to the high cost of this supply, consideration of seawater desalination and exchange is being deferred for future WMP updates, should the need arise.

8.2 OTHER PROGRAMS

Other programs related to water management in the Coachella Valley consist of monitoring and data management activities, well management programs and stakeholder input.

8.2.1 Monitoring and Data Management

The need for monitoring and data management is described in **Section 6.8.4**. The following new programs/projects should be implemented to improve monitoring and data management in the Valley:

- Develop water resources database to facilitate data sharing between participating agencies and tribes
- Construct additional monitoring wells in conjunction with new recharge facilities
- Develop a water quality assessment documenting on-going monitoring activities in the basin
- Conduct a joint investigation of the distribution of perchlorate in water supply wells in the Valley
- Update and recalibrate Coachella Valley groundwater model based on current data and conduct a peer review of updated model
- Develop a new planning interface and database that can be linked with land use plans and agricultural activities to better distribute pumping and return flows to the model
- Develop and calibrate a water quality model capable of simulating the changes in salinity and possibly other conservative water quality parameters in conjunction with the salt/nutrient management plan.
- Develop a coordinated approach among the water purveyors and CVAG for calculating urban per capita water usage including methodologies for determining service area population

8.2.2 Well Management Programs

Well management programs that should be implemented by Coachella Valley agencies include (see **Section 6.8.1** for details):

- Construction/destruction/abandonment policies - Well construction, destruction and abandonment policies should be developed in cooperation with Riverside County.
- Artesian well management program - As water management actions in the Valley restore water levels, groundwater levels in the deep aquifers will once again become higher than the ground elevation, resulting in artesian conditions. CVWD will develop a program to educate and work with well owners to properly control artesian wells.
- Well capping program - CVWD will implement a cooperative program to identify and cap wells that are no longer being used for groundwater production.

8.2.3 Stakeholder and Tribal Input

Stakeholder input and concurrence is vital to the implementation of water management programs in the Valley. CVWD and other Valley water agencies have significantly increased their public outreach through water conservation programs, implementation of water management projects, development of the 2010 WMP Update and development of the Coachella Valley Integrated Regional Water Management Plan. It is equally important that tribal concerns regarding water management be discussed and addressed to the extent feasible. It is recommended that CVWD, DWA, water agencies and the Coachella Valley tribes continue their on-going dialogue on water management in the Valley.

8.3 IMPLEMENTATION PLAN

The implementation strategy is a function of water needs and the feasibility of specific programs. CVWD, in conjunction with the tribes and the other valley water districts as appropriate, will implement new plan elements on the following schedule:

Table 8-1
Implementation Plan

Plan Element	Responsible Entity(ies)	Completion Year
Water Conservation Program		
• Adopt 2009 CVWD/CVAG Landscape Ordinance	CVWD, DWA, water purveyors, cities, Riverside County	2010
• Establish urban water conservation baseline	CVWD, other urban water purveyors	2011
• Achieve minimum 10 percent reduction in existing golf course use	CVWD, DWA	2015
• Achieve 14 percent reduction in agricultural water use	CVWD	2020
• Achieve 20 percent reduction in urban use	CVWD, other urban water purveyors	2020
Water Supply Development Program		
• Complete siting studies, environmental impact evaluation and design for CVSC drain water capture and treatment facilities	CVWD	2013
• File for water rights application for change of point of use for wastewater effluent discharges to allow water recycling	CVWD, VSD, Coachella	2015
• Complete construction of initial CVSC drain water capture and treatment facilities	CVWD	2015
• Conduct a feasibility study to investigate the potential for additional stormwater capture in the East Valley	CVWD	2015
• Conduct a study to determine the amount of water lost to leakage or otherwise unaccounted in the first 49 miles of the Coachella Canal and evaluate the feasibility of corrective actions to capture the lost water	CVWD	2015
• Conduct a joint investigation with Indio and Coachella of groundwater development potential in Fargo Canyon Subarea of the Desert Hot Springs Subbasin to determine the available supply and suitability for use in meeting non-potable demands of development east of the San Andreas fault	CVWD, IWA, Coachella	2020
Source Substitution Program		
• Prepare a master plan for Mid-Valley Pipeline completion	CVWD	2011
• Connect four golf course users along the MVP alignment to MVP	CVWD	2011
• Work with existing East Valley golf courses having Canal water access to increase their use to 90 percent of demand	CVWD	2012
• Investigate regional opportunities for Colorado River water treatment facilities	CVWD, IWA, Coachella	2012
• Develop policy requiring the installation of non-potable water systems for new development	CVWD	2012
• Work with large agricultural groundwater pumpers to determine what obstacles exist that prevent them from using additional Canal water and encourage them to reduce their groundwater pumping	CVWD	2012

Table 8-2
Implementation Plan (continued)

Plan Element	Responsible Entity(ies)	Completion Year
• Construct north and east extensions to the MVP system	CVWD	2013
• Complete siting studies, environmental impact evaluation and design for Colorado River water treatment facilities	CVWD	2013
• Complete construction of initial Colorado River water treatment facilities and connect to distribution system	CVWD	2015
• Complete Oasis study update	CVWD	2015
• Prepare a non-potable water distribution master plan	CVWD	2015
• Complete construction of MVP backbone system	CVWD	2020
Groundwater Recharge Program		
• Operate and monitor the Levy replenishment facility with a 40,000 AFY goal	CVWD	2010
• Investigate groundwater storage opportunities with IID	CVWD	2010
• Transfer the unused portion of the 35,000 AFY of SWP water available under the QSA to the Whitewater Recharge Facility	CVWD	2011
• Work with the City of Indio to evaluate the feasibility of developing a groundwater recharge project that reduce groundwater overdraft. If feasible, work with Indio to construct the facility.	CVWD, IWA	2011
• Design and construct an additional pumping station and pipeline from Lake Cahuilla to the Levy facility if the existing pumping station and pipeline cannot provide sufficient water to meet the annual goal	CVWD	2015
• Conduct siting studies, environmental impact evaluation and design for Martinez Canyon Replenishment Facility	CVWD	2018
Monitoring and Data Management		
• Continue to monitor the extent of land subsidence	CVWD, USGS	2010
• Provide additional information in the annual engineers' reports: o Annual precipitation and stream flows o Additional groundwater level data and hydrographs o In-lieu recharge water deliveries from imported and recycled water that offset pumping o Imported water deliveries for direct use	CVWD, DWA	2011
• Obtain DWR designation as groundwater level monitoring and reporting entity for the Coachella Valley	CVWD	2011
• Prepare a comprehensive groundwater monitoring plan	CVWD, DWA, water purveyors, wastewater agencies, tribes	2012
• Enhance the CVSC gauging station at Lincoln Street to provide continuous flow recording	CVWD, USGS	2012
• Develop centralized groundwater database	CVWD, DWA, water agencies, tribes	2012

Table 8-3
Implementation Plan (continued)

Plan Element	Responsible Entity(ies)	Completion Year
Other Programs		
• Continue to operate a groundwater advisory committee regarding groundwater management issues in the East Valley	CVWD, water agencies, pumpers, tribes	2010
• Develop a program to educate and work with well owners to properly control artesian wells	CVWD	2011
• Update and recalibrate the CVWD groundwater model based on the most current information	CVWD	2012
• Develop a water planning interface to the groundwater model	CVWD	2012
• Prepare a plan to maintain and enhance the existing drainage system to allow its future use for urban purposes	CVWD	2012
• Develop well construction, destruction and abandonment policies	CVWD, DWA, water agencies, tribes, Riverside County	2012
• Add groundwater quality simulation capabilities to the model that will allow simulation of salinity (TDS) and nitrogen in the groundwater	CVWD	2013
• Prepare a salt/nutrient management plan for the Valley to meet SWRCB Recycled Water Policy requirements	CVWD, DWA, water purveyors, wastewater agencies, tribes, agricultural and golf communities, and Regional Board	2014
• Extend urban water and sewer service to trailer/RV park communities with deficient infrastructure and poor water quality	CVWD	2015
• Investigate the feasibility of installing nitrate treatment on selected high nitrate wells to avoid redistribution of nitrates.	CVWD	2015
• Undertake a cooperative program to identify and cap wells that are no longer being used for groundwater production	CVWD, DWA	2015
Environmental Enhancement and Mitigation Projects		
• Develop plans for the creation of: • 25 acres of managed pupfish replacement habitat • 66 acres of managed rail replacement habitat • 44 acres of Sonoran cottonwood-willow riparian forest habitat	CVWD	2010
• Remove tamarisk, restore and enhance mesquite and Coachella Valley round-tailed ground squirrel habitat on land CVWD owns in the East Indio Hills Conservation Area	CVWD	Not Specified
• Conserve approximately 1,200 acres of land owned in the CVFTL HCP Whitewater Floodplain Preserve in perpetuity as part of the CVMSHCP Reserve System	CVWD	2010

8.4 IMPLEMENTATION COSTS

The continued implementation of the Coachella Valley WMP will require significant capital and operating investments to achieve the goals defined in this plan. **Table 8-4** presents the estimate of new capital and operating and maintenance (O&M) costs associated with Plan implementation and water production in the Valley. These costs include both the capital and O&M costs of water acquisitions, new water facilities for treatment, source substitution and recharge as well as the on-going costs of water supply and groundwater production in the Valley. The table assumes that the Valley will invest in its share of costs for Delta conveyance. These costs could vary depending on the timing and availability of alternative water sources and the effectiveness of water conservation measures.

Table 8-4
Implementation Costs by Plan Component
2011-2045

Component	Total Capital Cost $millions	Total O&M Cost $millions	Total Cost $millions	Average Annual Cost $millions
Water Conservation	$ 1	$ 230	$ 231	$ 6.6
Recycled Water	161	153	314	9.0
Colorado River Water		409	409	11.7
SWP Water		1,907	1,907	54.5
Delta Conveyance		472	472	13.5
Desalinated Drain Water	462	277	739	21.1
Groundwater Pumping and Treatment	135	1,950	2,085	59.6
Water Transfers	0	282	282	8.1
Other New Water		262	262	7.5
Source Substitution	1,142	782,	1,924	55.0
Recharge	48	181	229	6.5
Total	**$1,949**	**$6,907**	**$8,856**	**$253.0**
Annual Average	$56	$197	$253	

Significant capital investments will be required in the near-term to complete the construction of the MVP, construct urban water treatment facilities and develop a non-potable water delivery system for urban use in the East Valley. The current economic conditions of the Valley may affect the ability to develop the necessary funds to put this plan into operation. These conditions may also affect the rate at which urban development occurs.

In 2010, Valley water agencies expended approximately $414 million on all water and wastewater management activities. This total cost includes approximately $106 million on activities identified in this Water Management Plan associated with eliminating overdraft. During the next five years (2011-2015), it is estimated that Valley water agencies will expend an additional $5.4 million on activities to eliminate overdraft, assuming growth remains slow.

As growth occurs, additional projects to control overdraft will be needed. Capital costs associated with these projects will be paid by future growth, as well as most of the operation and maintenance costs. Ultimately, costs associated with growth to eliminate and control overdraft could approach an additional $100 million per year in capital project and annual operations and maintenance costs.

In developing the 2010 WMP Update, CVWD relies on the latest population projections developed by Riverside County. CVWD does not develop population growth projections for use in water management planning. The 2006 Riverside County projections could not have taken into account the current recession, which has slowed growth and will continue to have negative effects on growth in the near term. Over the long term, growth will continue, however population projections will need to be adjusted in terms of the timing of growth. These realities necessitate adjustment of Plan implementation to meet actual near term needs and continued updates of the Water Management Plan in the future to reflect revised population projections.

Near Term Projects to Meet Water Management Needs

Even with the current recession and lack of growth, continuation of existing projects and a few new projects are needed to reduce overdraft and its adverse affects. Ongoing projects that will be continued include:

- Whitewater Recharge with SWP Exchange Water and SWP purchases
- Implementation of the QSA
- Levy recharge at current levels of 32,000 AFY
- Martinez Recharge at Pilot Level of 3,000 AFY
- Water conservation programs at current levels, including implementation of the Landscape Ordinance
- Recycling in the West Valley
- Increased use of Canal water by golf courses with Canal water connections
- Conversion of East Valley agriculture to Canal water as opportunities arise
- Groundwater level/quality monitoring
- Subsidence monitoring

Assuming that growth remains relative low, during the next five years CVWD will focus on three new or expanded activities to reduce overdraft:

- Increased use of the Mid-Valley Pipeline project to reduce overdraft in the West Valley by connecting golf courses and reducing groundwater pumping by those courses.
- Implementation of additional water conservation measures, including the Landscape Ordinance, to meet the State's requirement of 20% conservation by 2020.
- Preparation of a salt/nutrient management plan for the Valley by 2014 to meet SWRCB Recycled Water Policy requirements

Long Term Projects to Meet Water Management Needs

Projects to eliminate and control overdraft that are likely to be needed as future growth occurs are described in the 2010 WMP Update. These projects include:

- Additional water conservation.
- Desalinated drain water.
- Additional water transfers.
- Additional recycled water.
- Canal water treatment for urban indoor use.
- Canal water treatment for urban outdoor irrigation.
- Recharge in the Indio area.

As growth ramps up, the projects will be implemented based on cost effectiveness and need.

8.5 FINANCING

In order to implement the recommendation of the 2010 WMP Update, a financial plan is required to properly allocation program costs to those who benefit from those programs. This cost allocation is beyond the scope of this Update and will require discussions between CVWD, DWA, the Valley water agencies, Native American tribes, the development community, user groups and the public.

A variety of financing mechanisms are available to provide funding for the WMP. These include:

- Water rates – water purveyor charges to water customers for the purchase of water for urban or agricultural use
- Replenishment assessments – charges for replenishment water to groundwater pumpers based on their annual production
- Developer fees – charges applied to new development on a per-connection basis to cover the capital cost of supply acquisition and water/wastewater system construction
- Assessment districts – charges applied to property tax bills to recover the capital cost of utility construction for new development
- Property taxes – charges applies to property tax bills of land owners to recover bonded indebtedness such as the SWP capital costs and other authorized bonds
- Grants – state or federal money provided for specific water management programs, usually awarded on a competitive basis
- Bonds – voter- authorized (general obligation) or water agency-authorized (revenue) funding for capital facilities

The specific financing mechanisms that will be applied to each WMP element will be determined by the CVWD Board and the governing bodies of participating agencies. A combination of funding sources will likely be used to best meet the needs of the Valley water users.

8.6 SUMMARY

The goal of the Coachella Valley WMP is to reliably meet current and future water demands in a cost-effective and sustainable manner. Implementation of the 2002 WMP has resulted in many successes toward achieving this goal. However, the 2002 WMP recognized the importance of on-going review and update to ensure the plan meets the ever-changing needs of the Coachella

Valley. The 2010 WMP Update endeavors to achieve this goal and presents a number of changes in water management strategy for the Valley that adapt the WMP for these changing conditions. Additional changes in direction and scope will occur in the future as the plan continually adapts to the needs of the Valley.

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Appendix A
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Appendix B
Acronyms, Abbreviations, and Glossary

B.1 ABBREVIATIONS

2002-CVWMP	2002 Coachella Valley Water Management Plan
AB	(California) Assembly Bill
acre-ft/yr	acre-feet per year (1 acre-foot equals 325,851 gallons.)
ADT	Average Daily Trips
AF	acre feet
AFY	acre feet per year
AOP	Annual Operating Plan for Colorado River reservoirs (USBR)
ASR	Aquifer Storage and Recovery
BDCP	Bay Delta Conservation Plan
BIA	(U.S.) Bureau of Indian Affairs
BLM	(U.S.) Bureau of Land Management
BMP	Best Management Practice
BO	Biological Opinion
CALFED	CALFED Bay Delta Program
Canal	Coachella Canal
CCLP	Coachella Canal Lining Project
CCR	California Code of Regulations
CDFG	California Department of Fish and Game
CDPH	California Department of Public Health
CEC	California Energy Commission
CEQA	California Environmental Quality Act
cfs	cubic feet per second
CII	Commercial-Industrial-Institutional
CIMIS	California Irrigation Management Information System
CPUC	California Public Utilities Commission
CRA	Colorado River Aqueduct
CRRWQCB	Colorado River Region Water Quality Control Board
CRW	Colorado River water
CUWCC	California Urban Water Conservation Council
CVAG	Coachella Valley Association of Governments
CVCC	Coachella Valley Conservation Commission
CVMSHCP	Coachella Valley Multiple Species Conservation Plan
CVP	Central Valley Project
CVRWMG	Coachella Valley Regional Water Management Group
CVSC	Coachella Valley Stormwater Channel
CVWD	Coachella Valley Water District

CWA	Clean Water Act
DDT	Dichlorodiphenyltrichloroethane
DHCCP	Delta Habitat Conservation and Conveyance Program
DOE	(United States) Department of Energy
DOF	(California) Department of Finance
DOI	(United States) Department of the Interior
DPH	(California) Department of Public Health
DRMS	Delta Risk Management Service
DRR	(California) State Water Project Delivery Reliability Report
DWA	Desert Water Agency
DWR	(California) Department of Water Resources
EC	Emerging contaminants
EDCs	Endocrine disrupting compounds
EERI	Earthquake Engineering Research Institute
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EPA	(U.S.) Environmental Protection Agency
ESA	Endangered Species Act
ET	Evapotranspiration
ETo	Reference Evapotranspiration
fps	feet per second
ft	Foot (feet)
GAMA	(SWRCB's) Groundwater Ambient Monitoring and Assessment Program
GFDL	Geophysical Fluid Dynamic Lab
GPA	General Plan Amendment
GPS	Global Positioning Satellite
GCMs	Global Climate Models
gpd	gallons per day
gpcd	gallons per capita per day
gpm	gallons per minute
HCP	Habitat Conservation Plan
HOA	Homeowners Association
IBWC	International Boundary and Water Commission
ICS	Intentionally Created Surplus
ID-1	Improvement District No. 1
IID	Imperial Irrigation District
IOPP	Inadvertent Overrun and Payback Policy
IPR	Indirect Potable Reuse
IRWMP	Integrated Regional Water Management Plan
ISG	Interim Surplus Guidelines

ITA	Indian Trust Assets
IWA	Indio Water Authority
KAF	thousand acre-feet
kWh	kilowatt-hour
kWh/yr	kilowatt-hours per year
LCR	Lower Colorado River
LROC	Long range operating criteria
M&I	Municipal and Industrial
MBAS	Methylene Blue Active Substances
MCL	Maximum Contaminant Level
Metropolitan	Metropolitan Water District of Southern California
mgd	million gallons per day
mg/L	milligrams per liter
ml	milliliters
MOU	Memorandum of Understanding
mph	miles per hour
MPN	Most probable number
MSHCP	Multi-Species Habitat Conservation Plan or Program
msl	Mean Sea Level
MSWD	Mission Springs Water District
MTBE	Methyl Tertiary butyl Ether
MVP	Mid-Valley Pipeline
MWD	Metropolitan Water District of Southern California
NCCPA	(California) Natural Communities Conservation Planning Ac
NCDC	National Climatic Data Center
NF	Nanofiltration
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
OEHHA	Office of Environmental Health Hazard Assessment
OSHA	Occupational Safety and Health Administration
O_3	Ozone
PCB	Polychlorinated biphenyl
PCE	Perchloroethylene
PCM	Parallel Climate Model
PEIR	Program Environmental Impact Report
PEIS	Programmatic Environmental Impact Statement
PHG	Public health goal
ppb	Parts per billion
ppm	Parts per million

PPR	Present Perfected Rights
PVID	Palo Verde Irrigation District
QSA	Quantification Settlement Agreement
RAC	Replenishment Assessment Charge
RCCDR	Riverside County Center for Demographic Research
RCIP	Riverside County Integrated Plan
RCP-06	Riverside County Projections 2006
Reclamation	(United States) Bureau of Reclamation
RO	Reverse Osmosis
ROW	right-of-way
RWQCB	California Regional Water Quality Control Board
SANDAG	San Diego Association of Governments
SB	(California) Senate Bill
SCAG	Southern California Association of Governments
SDCWA	San Diego County Water Authority
Se	selenium
SOI	Sphere of Influence
sq ft	square foot or square feet
sq mi	square mile(s)
SSA	Salton Sea Authority
SSAB	Salton Sea Air Basin
SWP	(California) State Water Project
SWRCB	(California) State Water Resources Control Board
TCE	Trichloroethylene
TDS	Total Dissolved Solids
TEL	Thomas E. Levy Groundwater Replenishment Facility
THM	Trihalomethane
TMDL	Total maximum daily load
UBC	Uniform Building Code
ULFT	Ultra-Low-Flush Toilet
USBR	United States Bureau of Reclamation
USDA	United States Department of Agriculture
USDOE	United States Department of Energy
USEPA	United States Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
UWMP	Urban Water Management Plan
VOC	Volatile Organic Compound
VSD	Valley Sanitary District

Water CASA	Water Conservation Alliance of Southern Arizona
WDR	Waste Discharge Requirements
WMP	Water Management Plan
WRCOG	Western Riverside County of Governments
WRP	Water Reclamation Plant
WWTP	Wastewater Treatment Plant
YCWA	Yuba County Water Agency
µg/L	Micrograms per liter

B.2 GLOSSARY

acre-foot – The volume of water that would cover one acre to a depth of one foot; equivalent to 43,560 cubic feet or 325,829 gallons.

adjudication – Court-ordered restrictions imposed through a process in which the water rights are allotted to individual groundwater pumpers.

alkaline – Describes soils or water with a pH higher than 7.0; generally contain high concentrations of dissolved ions.

allocation, allotment – Refers to a distribution of water through which means specific persons or legal entities are assigned individual rights to consume pro rate shares of a specific quantity of water under legal entitlements. For example, a specific quantity of Colorado River water is distributed for use within each Lower Division States through an apportionment. The water available for consumptive use in that state is further distributed among water users in that state through an allocation. An allocation does not establish an entitlement; the entitlement is normally established by a written contract with the Untied States.

alluvial fan – A roughly triangle-shaped deposit of unconsolidated sediments deposited by a stream at a point where there is a sharp decrease in stream gradient (e.g. a mountain front).

alluvium (alluvial deposits) – Unconsolidated sedimentary deposits of clay, silt, sand, and/or gravel deposited by rivers or streams.

annular space – the space between the well casing and the borehole walls.

anticline – Arch-shaped fold in rocks, with the oldest rocks in the center of the arch.

apportionment – Refers to the distribution of water available to each Lower Division state in normal, surplus, or shortage years, as set forth, respectively, in Articles II (B)(1), II (B)(2) and II (B)(3) or the Decree in Arizona v. California.

aquaculture – The propagation, cultivation, maintenance, or harvesting of aquatic plants and animals for human consumption or for use as bait.

aqueduct – A pipe or channel designed to transport water from a remote source, usually by gravity.

aquifer – A permeable geologic unit that will yield a usable quantity of water to a well or spring.

aquitard – Geologic formations or strata with relatively low permeability that retards the flow of water and yields negligible quantities to wells.

arroyo – Flat gully found along valley floor with steep walls and a sandy base formed during times of above average rainfall; stream beds are typically dry.

bajada – Extensive, gently sloping plain at the base of a mountain front formed by coalescing alluvial fans.

basement rocks –Older rocks overlain by relatively undeformed sedimentary cover; typically metamorphic or plutonic (crystalline) rocks with relatively low permeabilities.

biological opinion – Document stating the U.S. Fish and Wildlife Service and the National Marine Fisheries Service opinion as the whether a federal action is likely to jeopardize the continued existence of a threatened or endangered species or result in the destruction of adverse modification of critical habitat.

candidate species – Plant or animal species not yet officially listed as threatened or endangered, but which is undergoing status review by the USFWS.

Colorado River Basin – The drainage basin of the Colorado River in the US.

cone of depression – The drawdown of the water table that happens when a well is pumped.

confined aquifer – A completely saturated aquifer whose upper and lower boundaries are impervious geologic units. Water is held under pressure and the water level in wells stands above the top of the aquifer.

confining unit – See aquitard.

conglomerate – Coarse-grained sedimentary rock composed of (gravel-sized) sediments that are greater than 2 millimeters in diameter.

conjunctive use – The coordinated storage and use of surface and groundwater supplies to improve water supply reliability.

consumptive use – The total water diversions from the Colorado River, less return flows to the river.

critical condition of overdraft – As defined by DWR, water management practices that would probably result in significant adverse overdraft-related environmental, social, or economic effects.

crystalline rock – Refers to igneous or metamorphic rocks; excludes rocks of sedimentary origin.

delta – A roughly triangularly shaped deposit of unconsolidated sediments deposited by a stream or river at the point that the river enters the ocean or other large water body where there is a sharp decrease in stream gradient (roughly the underwater equivalent of an alluvial fan).

desalination – The process of removing salt from water. Typical processes used include distillation, electrodialysis ion exchange and reverse osmosis.

dike – An elongate structure constructed to contain the flow of water especially during times of flooding.

discharge area – The zone in which groundwater leaves the ground, either as a spring or into a water body.

duck clubs – Privately owned, artificial ponds filled during the waterfowl migration season to attract game birds and create hunting opportunities.

endangered species – A species or subspecies whose survival is in danger of extinction throughout all or a significant portion of its range.

entitlement – Refers to an authorization to beneficially consume Colorado River water pursuant to (1) a decreed right, (2) a contract with the United States through the Secretary of the Interior, or (3) a Secretarial reservation of water. Also an authorization to beneficially use water from the California State Water Project through a contract with the State of California.

environmental impact report (EIR) – A California state environmental decision-making report prepared pursuant to the California Environmental Quality Act (CEQA).

environmental impact statement (EIS) – A federal environmental decision-making report prepared pursuant to the National Environmental Policy Act (NEPA).

evaporation – The process of liquid water becoming water vapor, including vaporization from water and land surfaces, but not from plant surfaces.

evapotranspiration – A combination of evaporation from open bodies of water, evaporation from soil surfaces, and transpiration from the soil by plants.

fault – An approximately planar break in a rock body caused by tectonic forces defined by movement of blocks of the earth's crust on either side.

fault block – A rock mass bound on at least two sides by faults, which may be uplifted or down-dropped (depressed) in relation to adjacent blocks.

fault scarp – Caused when a fault displaces the ground surface vertically causing one side of the fault to stand higher relative to the other.

fault zone – A region as much as 50 kilometers or more in width bounded by major faults; internally may consist of additional minor faults.

flow – Volume of water passing a given point per unit of time expressed in cfs.

granite – A light-colored, coarse-grained, silica-rich igneous rock consisting primarily of quartz, feldspar and mica; most commonly associated with continental crust.

groundwater – Water contained within void spaces beneath the earth's surface.

groundwater recharge – Replenishment of groundwater supplies via infiltration of surface water.

habitat – (1) A specific set of physical conditions that surrounds a single species, a group of species, or a large community. In wildlife management, the major components of habitat are considered to be food, water, cover, and living space. (2) The natural home or dwelling place of an organism.

hydrogeology – Science dealing with the occurrence and flow of groundwater.

hydrology – Science dealing with natural runoff and its effect on streamflow.

igneous– One of the three main groups of rock types (in addition to metamorphic and sedimentary) describing rocks that crystallized from magma.

infiltration – The downward migration of water into soil and underlying aquifers.

intensity – A number based on a scale (e.g. Mercalli scale) related to the damage caused to structures by an earthquake.

lacustrine – Associated with a lake. Lacustrine deposits are generally fine-grained silts and clays formed by sediments settling out of a lake.

landslide – A rapid downhill movement of sediment, soils, or rocks.

Law of the River – As applied to the Colorado River, a combination of federal and state statutes, interstate compacts, court decisions and decrees, federal contracts, an international treaty with Mexico, and formally determined operating criteria.

liquefaction – The temporary transformation of soil or sediments to a fluid state caused by the intense shaking experienced in an earthquake.

Lower Basin – The part of the Colorado River watershed below Lee Ferry, Arizona; covers parts of Arizona, California, Nevada, New Mexico, and Utah.

Lower Division – A division of the Colorado River system that includes the states of Arizona, Nevada, and California.

Lower Division States – Arizona, California, and Nevada as defined by Article II of the Colorado River Compact of 1922.

mean sea level – National Geodetic Vertical Datum (NGVD) of 1929.

metamorphic– One of the three main groups of rock types (in addition to igneous and sedimentary) describing rocks that have been recrystallized as a result of a change in pressure and temperature.

monitoring well – A well that monitors hydrologic (water level and/or water quality) information.

overdraft – A groundwater basin condition in which the amount of water extracted exceeds the rate at which water can be withdrawn perennially without producing an undesired result (e.g., water quality degradation, land subsidence, or saltwater intrusion).

peak flow – Maximum instantaneous flow in a specified period of time.

percolation – A qualitative term applying to the downward movement of water through soil, especially the downward flow of water in saturated or nearly saturated soil at hydraulic gradients of one or less.

perchlorate - Perchlorate (ClO_4^-) is a contaminant from the solid salts of ammonium, potassium or sodium perchlorate. Ammonium perchlorate has been used as an oxygen-adding component in solid fuel propellant for rockets, missiles and fireworks.

percolation pond – A constructed basin where treated wastewater effluent is applied to the surface and disposed of by infiltration.

permeability – A measure of a material's (rock, soil, or sediment) ability to transmit water.

pH – A measure of acidity; equal to the negative logarithm of the hydrogen ion concentration.

potable water – water fit for human consumption.

precipitation – The total measurable supply of water to all forms of falling moisture, including dew, rain, mist; snow, hail, and sleet; usually expressed as depth of water on a horizontal surface on a daily, monthly, or yearly basis.

Present Perfected Rights – With respect to the Colorado River, a water right exercised by the actual diversion of a specific quantity of water, prior to June 25, 1929, the effective date of the Boulder Canyon Project Act.

priority – A ranking with respect to diversion of water relative to other water users.

production well – A well used for groundwater extraction.

pumping level – the level at which water stands in a well when pumping is in progress.

Quantification Period – 75-year period that the Implementation Agreement and Quantification Settlement Agreement would be in effect.

reach – A specified segment of a stream, channel, or other water conveyance.

recharge basin – A constructed area of high infiltration capacity where water is applied to the surface in order to replenish groundwater supplies. See Groundwater Recharge.

recycled water – Treated wastewater effluent that is reused, often for direct irrigation purposes.

regulatory water – Water conveyed to the Valley in the Coachella Canal that is not used.

reserved water – Water "reserved" for use on a national property.

return flow- Portion of water previously diverted from a stream and subsequently returned to that stream or to another body of water.

riparian – Flora and fauna associated with stream and river banks.

salinity – A term used to refer to the dissolved minerals in water, also referred to as total dissolved solids.

sediment – Unconsolidated solid material that comes from weathering of rock and is carried by, suspended in, or deposited by water or wind.

seepage – Downward or lateral movement of water from a reservoir, canal, or pipe through a pervious or semipervious bottom.

selenium – Selenium is a non-metallic element that chemically resembles sulfur. It is relatively minor portion of the total dissolved solids (salinity) found in the Colorado River, but it has been found to have a significant impact on wildlife (birds and fish).

semi-perched aquifer – An unconfined groundwater body perched on discontinuous, impermeable or slightly permeable unit(s).

source substitution – Replacement of groundwater supply with other water sources such as imported or recycled water.

storage – The volume of water contained in or released from an aquifer in response to an addition or extraction of groundwater; also refers to the net capacity of a basin to hold surface and groundwater (the difference between inflows and outflows).

strata – layers of deposited rock, soil, etc. that are distinguishable from each other.

stratigraphy – the science of rock strata (layers), their relationships, absolute ages and the relationships between strata. Used to infer past environments; important in hydrology, mining and oil exploration.

subsidence – Sinking or settling of the ground surface due to natural or man-made causes such as removal of groundwater from aquifers (decrease in storage) which causes the aquifer soil to compress from the weight of the ground above.

tailwater – Surface water runoff occurring at the end of an irrigated field when water that had been applied exceeds soil infiltration rates.

tile water – Water collected in the tile drains on irrigated areas.

total dissolved solids (TDS) – A general measure of water quality equal to the concentration of ions dissolved in the water, or its salinity.

transmissivity – The rate at which water moves through an aquifer.

transpiration – The physiological process in which plant tissues give off water vapor to the atmosphere.

tributary – River or stream flowing into a larger river or stream.

unconfined aquifer – an aquifer whose upper boundary is defined by the water table (water is at atmospheric pressure). There is no upper confining layer.

Upper Basin - The part of the Colorado River watershed above Lee Ferry, Arizona; that covers parts of Arizona, Colorado, New Mexico, Utah, and Wyoming.

Upper Division - A division of the Colorado River system that includes the states of Colorado, New Mexico, Utah, and Wyoming.

water conservation – Planned management to prevent or reduce loss or waste of water to enhance beneficial uses.

water table – The depth at groundwater is first encountered; the top of the zone in which all pore spaces are totally filled with water.

watershed – The topographic area from which a surface water body or groundwater system derives its water.

wetlands – Periodically, seasonally, or continuously submerged landscapes populated by species and/or life forms differing from adjacent communities.

xeriscaping – Water efficient landscaping utilizing native, drought-tolerant desert plant species.

GEOLOGIC TIME SCALE

Time	Era	Period	Millions of Years Before Present	Epoch
Phanerozoic	Cenozoic	Quaternary	**0**	Holocene
			0.01	Pleistocene
		Tertiary	**1.6**	Pliocene
			5.3	Miocene
			24	Oligocene
			37	Eocene
			57	Paleocene
	Mesozoic	Cretaceous	**66**	
		Jurassic	**144**	
		Triassic	**208**	
	Paleozoic	Permian	**245**	
		Carboniferous	**286**	
		Devonian	**360**	
		Silurian	**408**	
		Ordovician	**438**	
		Cambrian	**505**	
Precambrian			**570**	

Appendix C
Monitoring and Data Management

The primary objective of the monitoring and data management program is to evaluate the effectiveness of the water management programs and projects identified in the Plan. Although a significant amount of data is currently collected, opportunities exist for improvements in data collection, sharing and evaluation. This section describes the existing program, actions that will be implemented to enhance the existing program and eliminate data gaps. New elements to be added to the monitoring and data management program are identified.

C.1 EXISTING PROGRAM

The hydrologic system of the Coachella Valley has been extensively monitored by a number of agencies for many years. This section provides a general overview of the types of data currently being collected and action items that will be implemented to improve the existing program.

C.1.1 Weather Data

The principal weather data of interest in the Coachella Valley include precipitation, temperature and evapotranspiration as these influence water demands and local water supplies. The National Climate Data Center maintains records for 12 weather cooperative stations of which six are active. In addition, under the California Irrigation Management Information System (CIMIS), DWR maintains six active weather stations in the Valley that report precipitation, temperature, humidity, wind and solar radiation. Four of the CIMIS stations also report daily evapotranspiration (ETo). The District uses the CIMIS station data to calculate ETo for the five ET zones that have been identified and presents this information on their website. The ETo data are used to schedule irrigation times and durations. CVWD also maintains a system of early warning precipitation gauges in the Santa Rosa Mountains to monitor flash flooding. CVWD reports weather data along with the ET information on its website.

ACTION ITEM: Summaries of annual precipitation and ETo should be presented in the annual engineer's reports on water supply and replenishment assessment (see **Section C**.1.8).

C.1.2 Hydrologic Data

Like weather data, stream flow measurements are collected by several agencies. As indicated in **Section 6**, the USGS maintains 16 stream gauging stations in the Valley of which 14 stations collect real time data. The other two gauges are measured periodically. The USGS gauging data are available on the agency's website. CVWD collects flow data for the CVSC and the individual surface drains that flow into the Salton Sea once each month. Currently, the total flow (including storm flows) to the Salton Sea is not measured.

ACTION ITEM: CVWD will work with the USGS to restore the gauging station on the CVSC at Lincoln Street to provide continuous flow recording.

C.1.3 Well Logs

Well completion reports document information about the construction and underground formations at a water well. According to State law, well completion reports must be prepared and filed with DWR within 60 days of the construction, alteration, abandonment, or destruction of any water well, cathodic protection well, groundwater monitoring well, or geothermal heat exchange well. Well completion reports are confidential documents that are not available for public inspection; however, they are available to governmental agencies for studies, to the well owner or anyone who obtains written permission from the well owner and to anyone performing an environmental cleanup study associated with unauthorized releases if the study is conducted under the order of a regulatory agency. CVWD is the DWR designated repository for filing drillers logs of wells drilled in the Coachella Valley area.

ACTION ITEM: To improve the usability of the well completion reports for future investigations, data from all well completion reports will be entered into a centralized GIS database that allows visualization of the well construction data. This will support well survey programs and will provide information concerning pump efficiencies and kilowatt/acre-feet data.

C.1.4 Production

Groundwater production and surface water diversion data are critical to an understanding of the amount of water being extracted from a groundwater basin and for basin management. Division 2 Part 5 of the California Water Code requires each person (i.e., well owner/operator) within the counties of Riverside, San Bernardino, Los Angeles, and Ventura extracting more than 25 acre-feet/year of groundwater to file a "Notice of Extraction and Diversion of Water" with the State Water Resources Control Board. In addition, CVWD's and DWA's enabling legislation require that all production subject to replenishment assessment shall be reported on a monthly basis. The reporting threshold for pumpers (designated minimal producers) within the CVWD boundary is 25 AFY, while the threshold for DWA is 10 AFY. With the exception of wells in the Garnet Hill subbasin, all production wells exceeding these thresholds are required to have a measuring device capable of measuring and registering the amount of water produced. Both CVWD and DWA maintain records of production within their respective areas.

In the East Valley, not all wells are metered. Currently, CVWD notifies pumpers that have not reported their production and determines the amount of production subject to replenishment assessments.

ACTION ITEM: There is a need to maintain up-to-date groundwater production records in East Valley to properly manage the basin and to fairly allocate basin management costs to producers. CVWD will:

- Conduct an updated survey of production wells in the East Valley to determine the owner/operator, location, operational status and production reporting for each well.
- Use power records and pump tests to develop more accurate estimates of pumping by unmetered wells.

- Require installation of meters on wells where necessary to obtain accurate production data.

C.1.5 Water Levels

The depth to groundwater in wells provides a measure of the change in groundwater storage. CVWD monitors water levels for nearly 600 public and private wells in its service area three times per year on a rotating basis (approximately four month interval). These data are stored in a database and are plotted as hydrographs. Other agencies monitor groundwater levels in their own wells but these data are not collated in a central location.

SBx7-6 (part of the 2009 Comprehensive Water Package) adopted by the California Legislature requires local agencies to monitor and publically report groundwater elevations of their groundwater basins to better manage those resources. In the Coachella Valley, this legislation is not expected to significantly impact the existing monitoring programs.

ACTION ITEM: CVWD will need to apply to DWR and be designated as the monitoring and reporting entity for the Valley. DWR will work with CVWD to determine reporting requirements for the groundwater elevation data to DWR.

ACTION ITEM: In response to the public reporting requirements of SBx7-6, additional water level information will be presented in the annual engineer's reports for each groundwater basin. Well hydrographs will reflect the areal distribution of wells in the basin.

ACTION ITEM: Measured water levels will be compared to modeled levels to document progress toward meeting the WMP objectives.

C.1.6 Water Quality

Surface and groundwater quality monitoring is performed by a number of agencies in the Valley. Water purveyors are required by State Law to monitor and report the quality of their water sources. Reporting of delivered water quality is done through annual consumer confidence reports provided to each customer. Water quality results are also reported to the California Department of Public Health (CDPH) and are publicly available on the SWRCB's Groundwater Ambient Monitoring and Assessment Program (GAMA) website. Tribes monitor the quality of their wells and maintain records; however, these data are not publicly available for all tribes. CVWD also monitors the quality of its imported water supplies on a monthly basis and its drains on an annual basis. CVWD conducts monitoring of selenium concentrations in the drains and the CVSC as required by the CVMSHCP.

ACTION ITEM: Maintain monitoring and reporting activities. Monitor for new requirements and adjust as needed.

C.1.7 Subsidence

Land subsidence is the lowering of the ground surface due to groundwater withdrawal or seismic activity. Seismic-induced movements may cause subsidence on the depressed side of a fault, or relatively small-scale subsidence can also occur when dry soils are saturated with water due to seismic activity.

In 1996, the USGS, in cooperation with CVWD, established a geodetic network of monuments to monitor vertical changes in land surface in the East Coachella Valley. In 2007, USGS published the results of the latest monitoring program (USGS, 2007). The 2007 report identified at least four areas in the Coachella Valley that had experienced significant land surface elevation changes, indicating that land subsidence occurred in three of the areas (Palm Desert, Indian Wells and La Quinta) and both subsidence and uplift apparently occurred in one of the areas (Indio-Coachella) between February 26, 2003 and September 25, 2005. Other local areas in the Coachella Valley also may have deformed, but the size of these areas and the amount of deformation generally are small compared with the Palm Desert, Indian Wells and La Quinta areas. All the areas where significant subsidence was detected – Palm Desert, Indian Wells and La Quinta – coincide with or are near areas where groundwater pumping generally caused groundwater levels to decline.

ACTION ITEM: Due to the critical importance of avoiding aquifer compaction and property damage as a result of land subsidence, CVWD will:

- Continue contracting with USGS to monitor the extent of land subsidence
- Implement the WMP with the goal of eliminating overdraft
- Consider construction of extensometers at critical locations to monitor subsidence

C.1.8 Reporting

CVWD and DWA each prepare annual engineer's reports on water supply and replenishment assessment for the groundwater basins within their respective service areas that subject to a groundwater replenishment assessment. These reports describe the groundwater basins, water supply conditions, groundwater production, replenishment program and the annual replenishment assessment charged for production within each basin. Annual reports are currently prepared for the Mission Creek, Upper Whitewater River and Lower Whitewater River subbasins. No reports are prepared for the Desert Hot Springs or Garnet Hill subbasins as production from these basins is not currently subject to a replenishment assessment.

ACTION ITEM: The following recommendations will enhance the informational value of these reports:

- Include data on annual precipitation and stream flows to better document natural inflows to the groundwater basins.
- Document the amounts of in-lieu recharge that takes place through the delivery of recycled or imported water to reduce groundwater production.
- Document the total amounts of imported water delivered to users in each subbasin.
- Provide additional groundwater level hydrographs for wells in each subbasin to better indicate the changes in groundwater levels.
- Provide an accounting of the amounts of water stored in the basin on behalf of other entities including but not limited to Metropolitan and IID.

C.1.9 Data Gaps

Specific data gaps identified in this 2010 WMP Update are:

- Surface water flow data to estimate potential yield from stormwater capture projects.
- Lack of a centralized groundwater database that allows all water agencies to share data.
- Uniform reporting of urban water use by user class to track water conservation efforts.
- Groundwater production data for wells in the East Valley, especially agricultural wells.
- Non-uniform coverage of water quality data especially regarding perchlorate.

ACTION ITEM: Evaluation of data gaps will be performed on an on-going basis to identify areas where insufficient data are being collected in the Valley. The monitoring program will be updated to ensure provision of data needed to manage water resources and the effectiveness of WMP activities.

C.2 NEW MONITORING AND DATA EVALUATION ELEMENTS

To eliminate the data gaps identified above, several new programs/project are considered essential.

C.2.1 Water Resources Database

Currently, each water agency maintains its own water resources database. These databases generally include groundwater production, water level and water quality data. CVWD maintains separate groundwater production, water level and water quality databases for wells that it monitors. Tribes maintain water data for their wells. However, no common database exists that would allow ready access to all data for the basin.

ACTION ITEM: A water resources database will be developed for the Valley which will be used as a mechanism for data sharing among the participating water agencies and tribes. As a minimum, the database will be capable of storing well ownership data, well logs, groundwater production, water level and water quality data. The database will be capable of interfacing with other outside database systems as needed for reporting and utilizing common data. The database will have suitable access control to keep some data, such as well logs, confidential where required by State law. The scope of the database will be developed jointly by CVWD, DWA, the tribes and the water purveyors.

C.2.2 New Monitoring Wells

CVWD has installed a number of monitoring wells over the past 15 years. Two nested monitoring wells were constructed near the Salton Sea to monitor changes in water levels and water quality for potential indications of saline intrusion into the production aquifers. A monitoring well network was constructed in conjunction with the Martinez Canyon Demonstration Recharge projects and the Thomas E. Levy Groundwater Replenishment Facility. CVWD, DWA and USGS installed and operate monitoring wells near the Whitewater Recharge Facility.

ACTION ITEM: Additional monitoring wells will be constructed as needed in conjunction with recharge facilities (Levy, Martinez, and Indio) to monitor recharge effectiveness.

C.2.3 Additional Water Quality Monitoring

Water Quality Assessment and Monitoring Plan

Since there is no comprehensive water quality monitoring program or database for the Valley.

ACTION ITEM: A water quality assessment will be performed. This assessment will document existing water quality monitoring and reporting activities, compare the existing programs to federal and state standards, monitoring, and reporting requirements, identify data gaps, and identify needed revisions to monitoring programs to fill those gaps. This assessment will be performed jointly by the Coachella Valley water agencies and tribes.

ACTION ITEM: Water quality data will be incorporated into the Water Resources Data Base described above.

Perchlorate

Perchlorate has been identified as an important water quality parameter. Historically, Colorado River water has been used for irrigation in the Valley; however, perchlorate concentrations were only detected in the late 1990s. Due to source control measures implemented in Nevada, perchlorate concentrations in Colorado River water are now undetectable. However, seven isolated wells in the basin have detected perchlorate concentrations at or exceeding the State MCL of 6 μg/L. CVWD monitored all of its wells for perchlorate in 2000 and 2001 for the unregulated contaminant rule and then voluntarily using a low detection method in 2003-2004. In 2008-2009, CVWD performed two compliance tests for each well. All wells were below detection limits (<4 μg/L). Future monitoring will consist of one sample every 9 years. CVWD also tests the Canal water annually for perchlorate and the current levels are below the detection limit.

Due to a lack data for private and tribal wells, it is not currently possible to assess the extent of groundwater that contains perchlorate exceeding the MCL and determine whether elevated perchlorate levels exist.

ACTION ITEM: CVWD will work jointly with the water agencies and tribes to investigate the distribution of perchlorate in water supply wells in the Valley.

C.3 GROUNDWATER MODEL UPDATE AND RECALIBRATION

CVWD developed a groundwater flow model of the Whitewater River and Garnet Hill subbasins as part of the 2002 WMP. Calibration of the model was based on data for the period of 1936 through 1996. The original model was peer-reviewed by three eminent hydrogeologists and modelers. Projected pumping and recharge was based on anticipated production patterns in the early 2000s. For this update, the production and recharge data were updated to reflect general historical conditions for 1997 through 2005. Based on current information, the model appears to reasonably reflect groundwater conditions since 1996. As pumping patterns change in the future, modifications of the model may be necessary to allow its continued use as a water management tool.

ACTION ITEM: The following actions will be taken:

- Update and recalibrate the CVWD groundwater model based on the most current information. The update should include current pumping, recharge and return data, recent well log data and new recharge locations. The recalibration should compare the historical groundwater levels and drain flows with the simulated values over the calibration period and adjust model parameters to improve the model results.
- Conduct a peer review of the updated model to ensure that it reasonably reflects current modeling practices and conditions in the groundwater basin.
- Develop a new planning interface and database that can be linked with land use plans and agricultural activities to better distribute pumping and return flows to the model.
- Develop and calibrate a water quality model capable of simulating the changes in salinity and possibly other conservative water quality parameters. This should be done in coordination with preparation of the salt/nutrient management plan.

C.3.1 Water Demand and Conservation Monitoring

Section 6 indicated that significant progress has been made toward reducing urban water demands in the Valley. SBx7-7 requires additional reporting of urban per capita water usage to demonstrate progress toward meeting the State's 20 percent urban water reduction goal. SBx7-7 also requires reporting for agricultural use.

ACTION ITEM: The following measures will be implemented by CVWD:

- Actively participate in DWR's Urban Stakeholder Committee, which is intended to meet some of the public participation process requirements of SBx7-7, to ensure that the adopted technical procedures are appropriate for the Coachella Valley.
- Develop a coordinated approach among the water purveyors for calculating urban per capita water usage including methodologies for determining service area population.
- Determine whether to report per capita consumption on an individual agency or regional basis.
- Of the several options, as spelled out within SBx7-7 for agricultural reporting, determine which is optimal for the District and implement the appropriate option for compliance.

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PREPARED FOR
COACHELLA VALLEY WATER DISTRICT

Coachella Valley Water Management Plan Update

DRAFT REPORT

December 2010

WATER DISTRICT

MWH®
BUILDING A BETTER WORLD

Water Consult
Engineering and Planning Consultants

La Entrada Water Supply Assessment

Appendix A
Water Supply Planning Documents

Part 6
Regional Urban Water Management Plan, November 2010

THE REGIONAL URBAN WATER MANAGEMENT PLAN

NOVEMBER 2010

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

THE METROPOLITAN WATER DISTRICT
OF
SOUTHERN CALIFORNIA

REGIONAL URBAN WATER MANAGEMENT PLAN

Prepared by:

METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA
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Los Angeles, CA 90012

November 2010

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LIST OF ABBREVIATIONS

Abbreviation	Terms
AF	Acre-Feet
TAF	Thousand Acre-Feet
MAF	Million Acre-Feet
cfs	Cubic feet per second
GPCD	Gallon Per Capita per Day
KWH	Kilowatt-hours
µg/L	Micrograms per liter
mg/L	Milligrams per liter
pCi/L	Picocuries per liter
AGWA	Association of Ground Water Agencies
AMPAC	American Pacific Corporation
ARRA	American Recovery and Reinvestment Act
BDCP	Bay Delta Conservation Plan
BIOp	Biological Opinion
BLM	U.S. Department of Interior Bureau of Land Management
BMP	Best Management Practices
CAWCD	Central Arizona Water Conservation District
CBSC	California Building Standards Commission
CCL3	Contaminant Candidate List 3
CCP	Conservation Credits Program
CCWD	Contra Costa Water District
CDPH	California Department of Public Health
CEQA	California Environmental Quality Act
CII	Commercial, Industrial, and Institutional
CIMIS	California Irrigation Management Information System
CPE	Comprehensive Program Evaluation
CRA	California River Aqueduct
CUWCC	California Urban Water Conservation Council
CVP	Central Valley Project
CVWD	Coachella Valley Water District
D/DBP	Disinfectants/Disinfection Byproduct
DBP	Disinfection Byproduct
DFG	Department of Fish & Game
DLR	Detection Level for purposes of Reporting
DOE	U.S. Department of Energy
DPC	Delta Protection Commission
DVL	Diamond Valley Lake
DWCV	Desert Water Agency/Coachella Valley Water District
DWR	Department of Water Resources
EDC	Endocrine Disruptor Chemical
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ELPH	Equivalent Level of Public Health Protection
EMRS	Energy Management & Reliability Study
ESA	Endangered Species Act
FBR	Fluidized Bed Reactors
FWU	Friant Water Users Authority

LIST OF ABBREVIATIONS

Abbreviation	Terms
GRP	Groundwater Recovery Program
HECW	High Efficiency Clothes Washers
IAWP	Interim Agricultural Water Program
ICS	Intentionally Created Surplus
IICP	Incremental Interruption and Conservation Plan
IID	Imperial Irrigation District
IRP	Integrated Water Resources Plan
LAA	Los Angeles Aqueduct
LPP	Local Projects Program
LRP	Local Resources Program
M&I	Municipal & Industrial
MCL	Maximum Contaminant Level
MOU	Memorandum of Understanding
MTBE	Methyl Tertiary-Butyl Ether
NASA	National Aeronautics and Space Administration
NCCPA	Natural Community Conservation Planning Act
NDEP	Nevada Division of Environmental Protection
NDMA	N-nitrosodimethylamine
NMFS	National Marine Fisheries Services
NOAA	National Oceanic and Atmosphere Administration
OEHHA	Office of Environmental Health Hazard Assessment
PG&E	Pacific Gas & Electric
PHG	Public Health Goal
PPCP	Pharmaceutical/Personal Care Product
PPR	Present Perfected Rights
PVID	Palo Verde Irrigation District
QMCP	Quagga Mussel Control Plan
QSA	Quantification Settlement Agreement
RDM	Robust Decision Making
RFP	Request for Proposals
RTS	Readiness-to-Serve
RUWMP	Regional Urban Water Management Plan
RWQCB	Regional Water Quality Control Board
SANDAG	San Diego Association of Governments
SAR	System Access Rate
SARI	Santa Ana Regional Interceptor
SBX7-7	Senate Bill 7, Water Use Reduction Target
SCAG	Southern California Association of Governments
SCCWRRS	Southern California Comprehensive Wastewater Recycling and Reclamation Project
SDCWA	San Diego County Water Authority
SDP	Seawater Desalination Program
SNWA	Southern Nevada Water Agency
SPR	System Power Rate
SWC	State Water Contractors
SWP	State Water Project
SWRCB	State Water Resources Control Board
TDS	Total Dissolved Solids

LIST OF ABBREVIATIONS

Abbreviation	Terms
TOC	Total Organic Carbon
UCMR2	Unregulated Contaminant Monitoring Regulation 2
USBR	U.S. Department of Interior, Bureau of Reclamation
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Services
UWMP	Urban Water Management Plan
VOC	Volatile Organic Compounds
WBIC	Weather-Based Irrigation Controllers
WSAP	Water Supply Allocation Plan
WSDM	Water Surplus and Drought Management
WSR	Water Stewardship Rate
WUCA	Water Utility Climate Alliance
YCWA	Yuba County Water Agency
Act	Urban Water Management Planning Act
Arvin-Edison	Arvin-Edison Water Storage District
Bay-Delta	San Francisco Bay/Sacramento-San Joaquin Delta
Calleguas	Calleguas Municipal Water District
Code	Metropolitan's Administrative Code
Conservancy	Sacramento-San Joaquin Delta Conservancy
Council	Delta Stewardship Council
Forum	Colorado River Basin Salinity Control Forum
Kern Delta	Kern Delta Water District
Metropolitan	The Metropolitan Water District of Southern California
Policy	State Recycled Water Policy
Regional Board	Santa Ana Regional Water Quality Control Board
Science Board	Delta Independent Science Board
Semitropic	Semitropic Water Storage District
Urban MOU	California Urban Water Conservation Council Memorandum of Understanding Regarding Water Conservation in California
Valley District	San Bernardino Valley Municipal Water District

SUMMARY OF METROPOLITAN COMPLIANCE UNDER THE DWR GUIDELINES

In 2005, DWR provided guidance materials to aid water districts in developing their urban water management plans. These materials both helped water districts comply with the law and DWR staff review submitted plans for regulatory compliance. The guidance materials consisted of a series of worksheets detailing acceptable responses to the requirements set forth in the Urban Water Management Planning Act (Act), as per the California Water Code. At that time, DWR also provided 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 Act.

Since the revised guidebook and checklist for the 2010 Urban Water Management Plan will not be released until DWR completes the development of new reporting methodologies for retail agencies, Metropolitan used the 2005 guideline materials in the development of this plan. In addition, Metropolitan also closely monitored changes in the reporting requirements brought about by new legislation and changes to the Act. Presented below is a compliance checklist reflective of these changes. This compliance checklist is organized by Water Code section and summarizes Metropolitan's compliance to the reporting requirements of the Act in the Water Code.

Agency Coordination

Water Code § 10620 (d)(1)(2) Coordination with Appropriate Agencies

Participated in areawide, regional, watershed or basinwide urban water management planning

- See Section 5.

Describe the coordination of the plan preparation and anticipated benefits.

- See Section 5.

Water Code §10620 (f) - Describe resource maximization / import minimization plan

Discuss how water management tools and options are used to maximize resources and minimize the need to import water.

- Metropolitan's planning strategy within the IRP and adaptive implementation approach is discussed in Section 2 and provides an overview of the water management tools and options. See pages 2-1 through 2-11.
- Further details are provided in Sections 3.4 (conservation, pages 3-28 through 3-39) and 3-5 (recycling, groundwater recovery and desalination, pages 3-40 through 3-55.)

Water Code § 10621 (b) - City and County Notification and Participation

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.

- Notification is discussed in Section 5, pages 5-7 thru 5-11.

Water Code § 10631 (a) - Service Area Information

Describe service area of supplier

- Service area is discussed on pages 1-6 through 1-10.

Include current and projected population

- Population analysis is discussed in Appendix A.1, page A.1-2. Projections are on page A.1-8, Table A.1-2.

Population projections were based on data from state, regional or local agency

- See footnote Table A.1-2, page A.1-8.

Describe climate characteristics that affect water management

- See Page I-15 through I-17.

Describe other demographic factors affecting water management

- See Page I-14.

Contents of UWMP

Water Code § 10631 (b) - Water Sources
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 2, and details are provided in Appendix A.3, and particularly in Table A.3-7, pages A.3-43 through A.3-55.

Water Code §10631 (b)(1-4) - If Groundwater identified as existing or planned source

- Metropolitan does not supply groundwater. However, Metropolitan does use groundwater basins for groundwater banking.
- See Section 3.6 and Appendix A.2 (pages A.2-5 through A.2.6) and Appendix A.3 (pages A.3-36 through A.3-42) for discussions of issues related to groundwater basins.

Water Code §10631 (c) (1) - Reliability of Supply
Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage

- Section 2, pages 2-15 though 2-19 and the discussions presented under the CRA and SWP Sections 3-1 and 3-2.

Basis of Water Year data

- Section 2, Tables 2-9 through 2-11, pages 2-17 though 2-19.

Water Code §10631 (c) (2) - Water Sources Not Available on a Consistent Basis
Describe plans to supplement or replace inconsistent sources with alternative sources or water Demand Management Measures (DMMs)

- For a discussion on alternative sources, see adaptive management planning in Section 2 on pages 2-3 through 2-8.
- For a discussion on water demand management measures, see Sections 2 and 3, in particular, pages 2-2, 2-29, and 3-34.

Water Code §10631 (d) - Transfer or Exchange Opportunities
Describe short term and long term exchange or transfer opportunities

- Section 3.1 (pages 3-2 through 3-9) describes plans for banking, exchange and transfer opportunities along the Colorado River and Aqueduct.
- Section 3.2 (pages 3-10 through 3-22) describes plans for banking, exchange and transfer opportunities within the State Water Project.
- Section 3.3 (pages 3-22 through 3-27) describes plans for banking, exchange and transfer opportunities within the Central Valley.
- Section 3.6 (pages 3-56 through 3-60) describes plans for banking, exchange and transfer opportunities within the local region.
- Further details including dry year supply projections are provided in Appendix A.3, particularly Table A.3.7 on pages A.3-43 through A.3-55.

Water Code §10631 (e)(1)(2) - Water Use Provisions
Quantify past water use by sector, current water use by sector, Project future water use by sector

- Past, current, and future water uses are shown in Table A.1-13 on page A.1-12. Water uses by sector and county are shown in Tables A.1-6 through A.1-11 on pages A.1-10 through A.1-12.

Identify and quantify sales to other agencies

- Historic sales are presented in Table A.2-2 on page A.2-4. Metropolitan does not project sales by individual agency. However, total projected sales/demands to other agencies are shown in Section 2.

Water Code §10631 (f) - 2010 Urban Water Management Plan "Review of DMMs for Completeness" Form

- See CUWCC filings in Appendix A.6.

Water Code §10631 (g) - Planned Water Supply Projects and Programs, including non-implemented Demand Management Measures

- See discussion on the conservation credits program and implementation approach, Section 3.4, pages 3-28 through 3-39.

Water Code §10631 (h) - **Planned Water Supply Projects and Programs**

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 3.1 (pages 3-2 through 3-9) describes plans for banking, exchange and transfer opportunities along the Colorado River and Aqueduct.
- Section 3.2 (pages 3-10 through 3-22) describes plans for banking, exchange and transfer opportunities within the State Water Project.
- Section 3.3 (pages 3-23 through 3-27) describes plans for banking, exchange and transfer opportunities within the Central Valley.
- Section 3.6 (pages 3-56 through 3-60) describes plans for banking, exchange and transfer opportunities within the local region.
- Further details including dry year supply projections are provided in Appendix A.3, particularly Table A.3.7 on pages A.3-43 through A.3-55.

Water Code §10631 (i) - Opportunities for development of desalinated water

Describes opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply

- See discussion in Section 3.5 on groundwater recovery and seawater desalination, pages 3-47 through 3-55.
- See Appendix A.5, Table A.5-1 on pages A.5-1 through A.5-3 for a list of existing and conceptual groundwater recovery projects and their ultimate yield/capacity.
- See Appendix A.5, Table A.5-3 on page A.5-10 for a list of conceptual, planned, and under construction seawater desalination projects.

Determination of Demand Management Measures Implementation

Water Code § 10631 (j) - District is a CUWCC signatory

Agency is a CUWCC member
2005-08 annual updates are attached to plan
annual updates are considered completed by CUWCC website

- See Section 3.4 and attached documents in Appendix A.6.

Water Code § 10631 (k) – If supplier receives or projects receiving water from a wholesale supplier

Provided written availability projections, by source, to member agencies

- See Appendix A.3, Table A.3-7.

Water Code § 10631.1 - Projected Water Use for Low-Income Housing

Water use projections for single-family and multi-family residential housing for low-income housing

- This is incorporated with the retail demand forecast, as reflected in the discussions in Section 2.

Water Code § 10631.5 - Implementing water demand management demand measures
Compliance on a regional basis

- In determining its supply reliability, Metropolitan estimates total retail demands for its regional service areas and factors out water savings attributed to conservation, as discussed in section 2.2 (pages 2-9 though 2-14) and shown in tables 2-6 through 2-8.
- Metropolitan has invested over $268 million through a nearly 20-year period in regional conservation programs as discussed in Section 3.4 (pages 3-28 through 3-39).
- Metropolitan's "Water Stewardship Rate" element of its rate structure recovers the cost of providing financial incentives in conservation and water recycling and is identified as a demand management service function of the cost of service process, as discussed in Section 2.7 on page 2-29.
- Metropolitan's Conservation Credits Program provides the basis for financial incentives and funding for urban BMP and other demand management related activities, as discussed in Section 3.4, pages 3-28 though 3-39.
- Metropolitan's conservation related achievements are discussed in Section 3.4 and are shown in Tables 3-7 through 3-10.

Water Shortage Contingency Plan

Water Code § 10632 - Water Shortage Contingency Plan Section
Water Code § 10632 (a) - Stages of Action
Provide stages of action
Provide the water supply conditions for each stage
Includes plan for 50 percent supply shortage

- Documentation of the stages of actions Metropolitan would undertake to address up to 50 percent reduction in its water supplies and a catastrophic interruption in water supplies is included in its Water Surplus and Drought Management and Water Supply Allocation Plans and in the discussion of its Emergency Storage Requirement developed under its catastrophic supply interruption plan. See discussion on Section 2, pages 2-20 through 2-23.

Water Code §10632 (b) - **Three-Year Minimum Water Supply**
Identifies driest 3-year period
Minimum water supply available by source for the next three years

- Metropolitan has projected its supply capabilities for the next three years 2011 through 2013 under a multiple dry year hydrology (based on a repeat of 1990-1992 hydrology, which represents the three years of shortest supplies). See Table 1-6, page 1-24.

Water Code §10632 (c) - **Preparation for catastrophic water supply interruption**
Provided catastrophic supply interruption plan
Regional power outage
Earthquake
Delta levee failure
Aqueduct failure

- See Section 2, pages 2-20 through 2-28.

Water Code § 10632 (d) - **Prohibitions**
List the mandatory prohibitions against specific water use practices during water shortages

- Not applicable.

Water Code § 10632 (e) - Consumption Reduction Methods
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 2, especially page 2-22 and Appendix A.4.

Water Code § 10632 (f) - **Penalties**
List excessive use penalties or charges for excessive use
- See Section 2 and Appendix A.4.

Water Code § 10632 (g) - Revenue and Expenditure Impacts
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 2-7, pages 2-29 through 2-35.

Water Code § 10632 (h) - Water Shortage Contingency Ordinance/Resolution
Attach a copy of the draft water shortage contingency resolution or ordinance.
- Not applicable to Metropolitan. The WSDM and WSAP plans adopted to deal with shortages are discussed in Section 2, pages 2-20 through 2-23. The WSAP is also included as Appendix A.4.

Water Code § 10632 (i) - Reduction Measuring Mechanism
Provided mechanisms for determining actual reductions
- Metropolitan's water sales are metered. See Section 2.

Recycled Water Plan

Water Code § 10633 - Recycling Plan Agency Coordination
Describe the coordination of the recycling plan preparation information to the extent available.
- See Section 3-5, pages 3-40 through 3-55, Table 3-15 on page 3-54, Table 3-16 on page 3-55, and in Appendix A.5, Table A.5-2.

Water Code § 10633 (a) - **Wastewater System Description**
Describe the wastewater collection and treatment systems in the supplier's service area
Quantify the volume of wastewater collected and treated
- See Section 3-5, pages 3-40 through 3-55, Table 3-15 on page 3-54, Table 3-16 on page 3-55, and in Appendix A.5, Table A.5-2.

Water Code § 10633 (a - d) - Wastewater Disposal and Recycled Water Uses
Describes methods of wastewater disposal
- See Section 3-5, page 3-40.

Describe the current type, place and use of recycled water
- See Section 3-5, page 3-42, and Table A.5-2.

Describe and quantify potential uses of recycled water
- See Section 3-5, page 3-42, and Table A.5-2.

Determination of technical and economic feasibility of serving the potential uses
- See Section 3-5, pages 3-42 through 3-47.

Water Code § 10633 (e) - Projected Uses of Recycled Water

Projected use of recycled water, 20 years

- See Section 2, Tables 2-6 through Table 2-8, pages 2-12 through 2-14 and Section 3-5.

Compare UWMP 2005 projections with UWMP 2010 actual

- The 2005 RUWMP, Tables II-4, II-5, and II-6, included the following projections for recycled water use in 2010: 310,000 AF for a single dry year; 300,000 AF for a multiple dry year; and 316,000 AF for an average year. In 2009, actual recycled water use is estimated at 310,000 AF, as discussed in Appendix A.2, page A.2-8 of this 2010 RUWMP.

Water Code § 10633 (f) - Plan to Optimize Use of Recycled Water

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 3-5, pages 3-40 through 3-55, Table 3-15 on page 3-54, Table 3-16 on page 3-55, and in Appendix A.5, Table A.5-2.

Water Quality Impacts on Reliability

Water Code §10634 - Water quality impacts on availability of supply

Discusses water quality impacts (by source) upon water management strategies and supply reliability

- See Section 4, Water Quality, pages 4-1 through 4-17.

Water Service Reliability

Water Code § 10635 (a) - Supply and Demand Comparison to 20 Years

Compare the projected normal water supply to projected normal water use over the next 20 years, in 5-year increments.

- See Section 2, Tables 2-6 to 2-8, pages 2-12 through 2-14, for projected water use and Table A.3-7 in Appendix A.3, pages A.3-43 through A.3-55 for projected water supply.

Water Code § 10635 (a) - Supply and Demand Comparison: Single-dry Year Scenario

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 2, Tables 2-6 to 2-8, pages 2-12 through 2-14, for projected water use and Table A.3-7 in Appendix A.3, pages A.3-43 through A.3-55 for projected water supply.

Water Code § 10635 (a) - Supply and Demand Comparison: Multiple-dry Year Scenario

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

Project a multiple-dry year period occurring between 2026-2030 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 2 for multiple dry years are for an average of three years with this extreme hydrology. See Section 2, Tables 2-6 to 2-8, pages 2-12 through 2-14, for projected water use and Table A.3-7 in Appendix A.3, pages A.3-43 through A.3-55 for projected water supply.

Water Code § 10642 – Does the plan include public participation and plan adoption?

Attach a copy of adoption resolution

- See Section 5, page 5-11.

Encourage involvement of social, cultural & economic community groups

- See Section 5, pages 5-7 through 5-8.

Plan available for public inspection

- See Section 5, pages 5-9 and 5-10.

Provide proof of public hearing

- See Section 5, page 5-10.

Provided meeting notice to local governments

- See Section 5, page 5-9.

Water Code § 10643 – Review of implementation of 2005 uwmp

Reviewed implementation plan and schedule of 2005 UWMP
implemented in accordance with the schedule set forth in the plan

- Metropolitan has conducted a review of its planning progress through the IRP Update, discussed in Section 2.I. In addition, in each section, Metropolitan has included a "Achievement to Date" that discusses progress towards its planning goals, and discussion on current issues and 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 3-4. Individual conservation programs are discussed on pages 3-28 through 3-39.

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EXECUTIVE SUMMARY

Metropolitan's 2010 Regional Urban Water Management Plan (RUWMP) has been prepared in compliance with Water Code Sections 10608.36 and 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 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 Urban Water Management Planning Act (Act) requires urban water suppliers to describe and evaluate sources of water supply, efficient uses of water, demand management measures, implementation strategy and schedule, and other relevant information and programs. Urban water suppliers are required by the Act to update their Urban Water Management Plan (UWMP) and submit a complete plan to California Department of Water Resources (DWR) every five years. An UWMP is required in order for a water supplier to be eligible for DWR administered state grants and loans and drought assistance.

As with Metropolitan's previous plans, the 2010 RUWMP does not explicitly discuss specific activities undertaken by its member agencies unless it relates to one of Metropolitan's water demand or supply management programs. Each member agency will discuss these activities in its UWMP. Information from Metropolitan's 2010 RUWMP may be used by many of the local water suppliers in the preparation of their own plans, although it is not mandatory for local agencies to rely on Metropolitan's plan because participation in any regional planning activity is voluntary (pursuant to Water Code § 10620).

The information included in the 2010 RUWMP represents the most current available planning projections of supply capability and demand developed through a collaborative process with the member agencies. Metropolitan is in the process of completing its 2010 Integrated Water Resources Plan Update (2010 IRP Update), which represents Metropolitan's comprehensive planning process and will serve as Metropolitan's blueprint for long-term water reliability, including key supply development and water use efficiency goals.

Factors of Consideration

The Act requires reporting agencies to describe its water reliability under a single dry-year, multiple dry-year, and average year conditions, with projected information in five-year increments for 20 years. The factors of consideration used to evaluate Metropolitan's supply and demand balance for the 2010 RUWMP are presented below. Some of the considerations and resulting projections may change as Metropolitan's planning process is finalized. These changes may be reflected in future preparations of the RUWMP.

Demand Projections

Within Metropolitan's service area, retail water demands can be met with local supplies or imported supplies. Metropolitan's long-term plan focuses on the future demands for Metropolitan's imported supplies. The expected firm demand on Metropolitan is the difference between total demands, adjusted for conservation, and projected total local supplies. Thus, in order to project the regional need for imported water, Metropolitan starts with a projection of total demand including retail Municipal and Industrial (M&I), retail agricultural, seawater barrier, and replenishment demands, determines the adjustments from total conservation, and subtracts the total local supplies that are available to meet a portion of those demands.

Total Demands

Metropolitan updates its retail M&I projection periodically based on the release of official regional demographic and economic projections. The projections of retail M&I water demands used in the 2010 RUWMP are based on data from the following reports:

- Southern California Association of Governments (SCAG) 2007 Regional Transportation Plan
- San Diego Association of Governments (SANDAG) Series 12: 2050 Regional Growth Forecast Update

The SCAG and SANDAG regional growth forecasts are the core assumptions that drive the estimating equations in Metropolitan's MWD-MAIN demand forecasting model. SCAG and SANDAG's projections undergo extensive local review and incorporate zoning information from city and county general plans and are backed by Environmental Impact Reports.

Retail agricultural demands consist of water use for irrigating crops. Metropolitan's member agencies estimate agricultural water use based on many factors, including farm acreage, crop types, historical water use, and land use conversion. Each member agency estimates its agricultural demands differently, depending on availability of information. Metropolitan relies on member agencies' estimates of agricultural demands for the 2010 RUWMP.

Metropolitan also includes in its assessment of total demands the local groundwater requirements for seawater barrier and basin replenishment. Seawater barrier demands represent the amount of water needed to hold back seawater intrusion into the coastal groundwater basins, and are considered firm demands. Replenishment demands represent the amount of water that member agencies plan to use to replenish the groundwater basins as available. Metropolitan relies on member and groundwater management agencies' projections for these demands. For the 2010 RUWMP, replenishment deliveries are not included as part of firm demands.

Total Conservation

Projected regional water demand is adjusted to account for water conserved by Best Management Practices from active, code-based, and price-effect conservation. Active conservation levels are derived by calculating water savings from all active program device-based savings installed to date. Code-based conservation levels are derived by calculating water savings from devices covered by existing water conservation ordinances and plumbing codes, with replacement and new construction rates driven by demographic growth consistent with those used to derive retail demand. Price-effect conservation is derived by calculating water savings by retail customers attributable to the effect of changes in the real (inflation adjusted) price of water.

Water use reduction under Senate Bill 7 (SBX7-7) is factored into regional local water supplies. This has been done to recognize the fact that one method of compliance with SBX7-7 is the development of recycled water in addition to conservation.

Total Local Supplies

Projections of local supplies are based on information gathered from a number of sources including past urban water management plans, Metropolitan's annual local production surveys, and communications between Metropolitan and member agency staff. The projections include groundwater and surface water production, recycled water and recovery of contaminated or degraded groundwater (funded under the Metropolitan's Local Resources Program as wells as local agency funded programs) and seawater desalination. The local supply projections presented in demand tables for the 2010 RUWMP include existing projects that are currently producing water and projects that are under construction.

The total local supplies presented in the 2010 RUWMP also include Los Angeles Aqueduct deliveries and non-Metropolitan water supplies imported by member agencies from sources outside of Metropolitan service area.

Water Use Reduction Target

On November 10, 2009, the state Legislature passed Senate Bill 7 as part of the Seventh Extraordinary Session, referred to as SBX7-7. This new law is the water conservation component to the historic Delta legislative package, and seeks to achieve a 20 percent statewide reduction in urban per capita water use in California by December 31, 2020. According to Water Code §10608.36, wholesale agencies are required to include in their UWMPs an assessment of present and proposed future measures, programs, and policies that would help achieve the water use reductions required under SBX7-7. Urban wholesale water suppliers are not required to comply with the target-setting and reporting requirements of SBX7-7.

Approximately 380 TAF of the additional conservation and/or recycling would be implemented as a result of full compliance by local water agencies with water reduction targets by 2020 at the retail level. This estimated amount is reflected in the projected demand for imported supply in the 2010 RUWMP and is further described in Section 2.2.

Supply Capabilities

The 2010 RUWMP reports on Metropolitan's water reliability and identifies projected supplies to meet the long-term demand within its service area. Metropolitan's supply capabilities are evaluated using the following assumptions:

Hydrologic Conditions and Reporting Period

The 2010 RUWMP presents Metropolitan's supply capabilities from 2015 through 2035 under the three hydrologic conditions specified in the Act: single dry-year (represented by a repeat of 1977 hydrology), multiple dry-year (represented by a repeat of 1990 to 1992 hydrologies) and average year (represented by the average of 1922 to 2004 hydrologies).

Colorado River Aqueduct Supplies

Colorado River Aqueduct supplies include supplies that would result from existing and committed programs and from implementation of the Quantification Settlement Agreement (QSA) and related agreements. The QSA, which is the subject of current litigation, is a component of the California Plan and establishes the baseline water use for each of the agreement parties and facilitates the transfer of water from agricultural agencies to urban uses. A detailed discussion of the QSA is included in Section 3. Colorado River transactions are potentially available to supply additional water up to the CRA capacity of 1.25 MAF on an as-needed basis.

State Water Project Supplies

State Water Project (SWP) supplies are estimated using the draft 2009 SWP Delivery Reliability Report distributed by DWR in December 2009. The draft 2009 reliability report presents the current DWR estimate of the amount of water deliveries for current

(2009) conditions and conditions 20 years in the future. These estimates incorporate restrictions on SWP and Central Valley Project (CVP) operations in accordance with the biological opinions of the U.S. Fish and Wildlife Service and National Marine Fishery Service issued on December 15, 2008, and June 4, 2009, respectively. Under the 2009 draft reliability report, the delivery estimates for the SWP for current (2009) conditions as percentage of maximum Table A amounts, are 7%, equivalent to 134 TAF, under a single dry-year (1977) condition and 60%, equivalent to 1.15 MAF, under long-term average condition.

In dry, below-normal conditions, Metropolitan has increased the supplies received from the California Aqueduct by developing flexible Central Valley/SWP storage and transfer programs. Over the last two years under the pumping restrictions of the SWP, Metropolitan has worked collaboratively with the other contractors to develop numerous voluntary Central Valley/SWP storage and transfer programs. The goal of this storage/transfer programs is to develop additional dry-year supplies that can be conveyed through the available Banks pumping capacity to maximize deliveries through the California Aqueduct during dry hydrologic conditions and regulatory restrictions.

Delta Improvements

The listing of several fish species as threatened or endangered under the federal or California Endangered Species Acts (ESAs) have adversely impacted operations and limited the flexibility of the SWP. In response to court decisions related to the Biological Opinions for fish species listed under the ESAs, DWR altered the operations of the SWP. This resulted in export restrictions and reduced SWP deliveries. In June 2007, Metropolitan's Board approved a Delta Action Plan that provides a framework for staff to pursue actions with other agencies and stakeholders to build a sustainable Delta and reduce conflicts between water supply conveyance and the environment. The Delta Action Plan aims to prioritize immediate short-term actions to stabilize the Delta while an ultimate solution is selected, and mid-term steps to maintain the Bay-Delta while the long-term solution is implemented.

In the near-term, the physical and operational actions in the Bay-Delta being developed include measures that protect fish species and reduce supply impacts with the goal of reducing conflicts between water supply conveyance and environmental needs. The potential for Increased supply due to these near-term fixes is included in the 2010 RUWMP as a 10 percent increase in water supplies obtained from the SWP allocation for the year. In evaluating the supply capabilities for the 2010 RUWMP, additional supplies from this interim fix are assumed to materialize by 2013. Also included as a possible near-term fix for the Bay-Delta is the proposed Two-Gate System demonstration program, which would provide movable barriers on the Old and Middle Rivers to modify flows and prevent fish from being drawn toward the Bay-Delta pumping plants. The Two-Gate System is anticipated to protect fish and increase SWP supplies.

Operational constraints likely will continue until a long-term solution to the problems in the Bay-Delta is identified and implemented. State and federal resource agencies and various environmental and water user entities are currently engaged in the development of the Bay Delta Conservation Plan (BDCP), which is aimed at addressing the basic elements that include the Delta ecosystem restoration, water supply conveyance, and flood control protection and storage development. In dealing with these basic issues, the ideal solutions sought are the ones that address both the physical changes required as well as the financing and governance. In evaluating the supply capabilities for the 2010 RUWMP, Metropolitan assumed a new Delta conveyance is fully operational by 2022 that would return supply reliability similar to 2005 condition, prior to supply restrictions imposed due to the Biological Opinions. This assumption is consistent with Metropolitan's long-term Delta Action Plan that recognizes the need for a global, comprehensive approach to the fundamental issues and conflicts to result in a sustainable Bay-Delta, sufficient to avoid biological opinion restrictions on planned SWP deliveries to Metropolitan and the other SWP Contractors. Further, recently passed state legislation included pathways for establishing governance structures and financing approaches to implement and manage the identified elements.

Storage

A key component of Metropolitan's water supply capability is the amount of water in Metropolitan's storage facilities. Storage is a major component of Metropolitan's dry-year resource management strategy. Metropolitan's likelihood of having adequate supply capability to meet projected demands, without implementing the Water Supply Allocation plan (WSAP), is dependent on its storage resources.

In developing the supply capabilities for the 2010 RUWMP, Metropolitan assumed a simulated median storage level going into each of five-year increments based on the balances of supplies and demands. Under the median storage condition, there is an estimated 50 percent probability that storage levels would be higher than the assumption used, and a 50 percent probability that storage levels would be lower than the assumption used. All storage capability figures shown in the 2010 RUWMP reflect actual storage program conveyance constraints. It is important to note that under some conditions, Metropolitan may choose to implement the WSAP in order to preserve storage reserves for a future year, instead of using the full supply capability. This can result in impacts at the retail level even under conditions where there may be adequate supply capabilities to meet demands.

Findings of the 2010 Regional Urban Water Management Plan

The 2010 RUWMP provides a comprehensive summary of Metropolitan's demand and supply outlook through 2035. As a reporting document, the RUWMP will be updated every five years to reflect changes in water demand and supply projections.

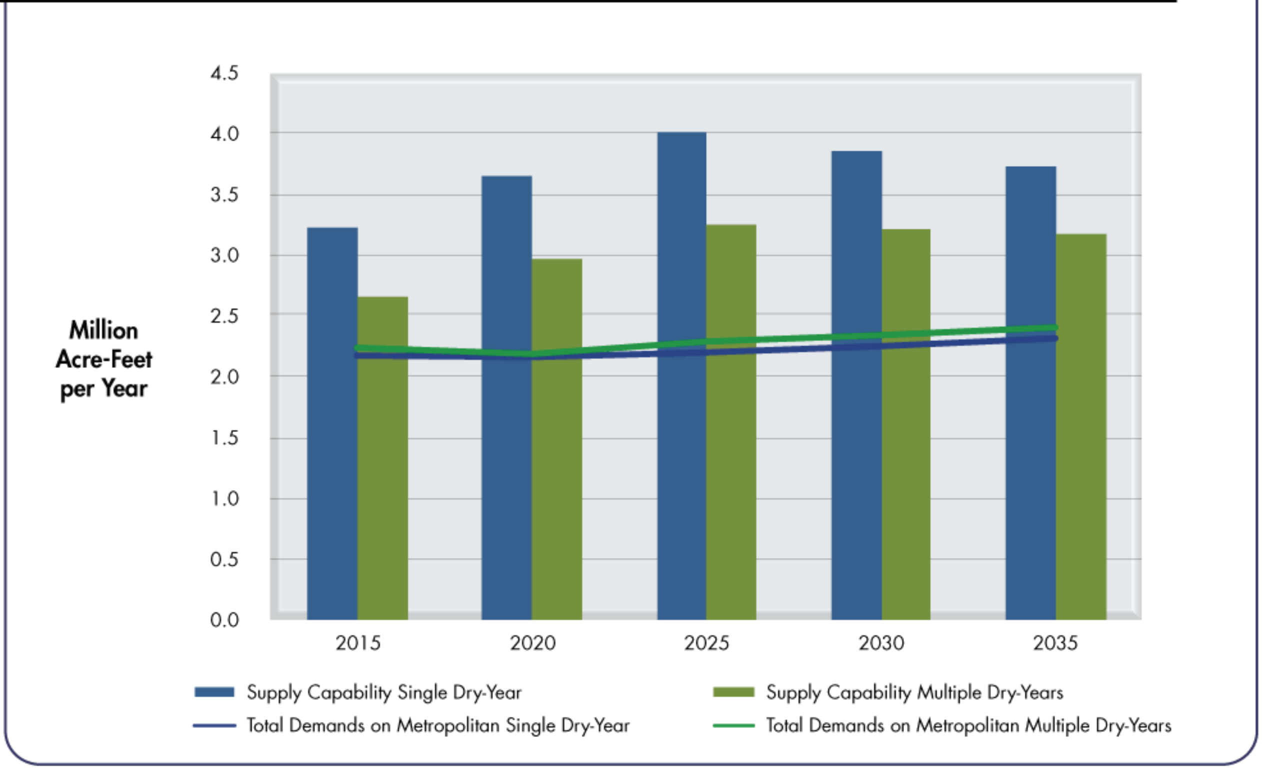
The 2010 RUWMP satisfies all the reporting requirements mandated by the Act. The key reporting points of this report are as follows:

- Metropolitan has supply capabilities that would be sufficient to meet expected demands from 2015 through 2035 under the single dry-year and multiple dry-year conditions, as presented in Figure ES-1.
- Metropolitan has comprehensive plans for stages of actions it would undertake to address up to 50 percent reduction in its water supplies and a catastrophic interruption in water supplies through its Water Surplus and Drought Management and Water Supply Allocation Plans. Metropolitan also developed an Emergency Storage Requirement to mitigate against potential interruption in water supplies resulting from catastrophic occurrences within the Southern California region, including seismic events along the San Andreas fault. In addition, Metropolitan is working with the State to implement a comprehensive improvement plan to address catastrophic occurrences that could occur outside of the Southern California region, such as a maximum probable seismic event in the Delta that would cause levee failure and disruption of SWP deliveries.
- Metropolitan has plans for supply implementation and continued development of a diversified resource

mix including programs in the CRA, SWP, Central Valley transfers, local resource projects, and in-region storage that enables the region to meet its water supply needs.

- Metropolitan has a collaborative process in its planning initiatives, including the preparation of the 2010 RUWMP.

Figure ES-1 Supply Capabilities under Single Dry-Year and Multiple Dry-Year Hydrologies



Note:

1. Supply capabilities are derived using simulated median storage level going into each of five-year increments based on the balances of supplies and demands. Under the median storage condition, there is an estimated 50 percent probability that storage levels would be higher than the assumption used, and a 50 percent probability that storage levels would be lower than the assumption used.
2. Under some conditions, Metropolitan may choose to implement the WSAP in order to preserve storage reserves for a future year, instead of using the full supply capability. This can result in impacts at the retail level even under conditions where there may be adequate supply capabilities to meet firm demands.
3. All storage capability figures shown in the 2010 RUWMP reflect actual storage program conveyance constraints.

Introduction 1

1.1 Introduction to this Document and the Agency

Organization of this Document

This report complies with the Urban Water Management Planning Act of 1984. In addition to complying with the Act, this report details Metropolitan's current situation and how it will meet the challenges of the future. This document contains five sections. The first section is the introduction that defines Metropolitan in terms of governance, structure, and current water supply status. This section also outlines briefly how Metropolitan will meet current and future challenges. The second section describes Metropolitan's planning activities and explains how the agency will manage the region's water resources to ensure a reliable water supply for the region. The third section describes the actions Metropolitan has taken to implement the plans outlined in Section 2 and lists future programs and activities. The fourth section of this report addresses the issue of water quality and steps taken to deliver high-quality water to Metropolitan's service area. The last section details the public outreach component integrated with Metropolitan's planning processes. Appendices that include supporting documents for this report are at the conclusion of this report. The sections are further described in detail below:

Section 1 - Introduction

In addition to demonstrating how this report complies with the Act, the 2010 RUWMP details Metropolitan's current situation and outlines its plan for meeting the challenges of the future. The Introduction section includes:

- Discussion of the Act and Metropolitan's reporting responsibilities under the Act
- Introduction of Metropolitan and description of the formation, purpose, service area, member agencies and governance
- Historical and demographic information on Metropolitan's service area
- Discussion of Metropolitan's current condition, challenges, and resource planning strategies
- Evaluation of Metropolitan's supply capabilities for the next three years under multiple dry-year scenario

Section 2 - Planning for the Future

The Planning for the Future section discusses how Metropolitan plans to meet Southern California's water needs in the future. The section highlights the importance of Integrated Resource Planning by summarizing Metropolitan's planning processes over the years and emphasizes the need for Metropolitan to implement adaptive planning strategies that will prepare the region to deal with uncertainties. This section also includes:

- Evaluation of regional water demand under single dry-year, multiple dry-year, and average year condition for years 2015 through 2035
- Evaluation of supply capabilities under single dry-year, multiple dry-year, and average year condition for years 2015 through 2035
- Discussion of water shortage contingency analysis though the Water Surplus and Drought Management Plan and the Water Supply Allocation Plan

- Discussion of other supply reliability risks including climate change
- Discussion of the different elements of Metropolitan's rate structure and revenue management

Section 3 - Implementation Plan

The Implementation Plan section summarizes Metropolitan's progress in developing a diversified resource mix that enables the region to meet its water supply needs. The investments that Metropolitan has made and its continuing efforts in many different areas coalesce toward its goal of long-term supply reliability for the region. This section includes:

- Discussion of resources and program development within the CRA, SWP, Central Valley transfers programs, conservation, LRP (groundwater recovery, recycling, desalination), and groundwater
- Discussion of Metropolitan's action to meet the water reduction target (20 percent by 2020)

Section 4 - Water Quality

The Water Quality section identifies key regional water quality issues and provides discussion of the protection of the quality of source water and development of water management programs that maintain and enhance water quality. This section also includes:

- Discussion of water quality issues of concern, issues of decreasing concern, and actions that Metropolitan has undertaken to protect its water supplies.

Section 5 - Public Outreach

The Public Outreach section presents the processes undertaken in the development of the 2010 IRP Update, RUWMP, and Groundwater workshops with the stakeholders. It provides a list of all meetings and workshops accomplished to promote and achieve consensus and collaborative planning processes. Also included in this section are the public notification letters and announcements distributed by Metropolitan as required by the Act and a copy of the Metropolitan resolution adopting the 2010 RUWMP and approving it for submittal to DWR. This section also includes description of public processes for:

- IRP Update Process
- Groundwater Process
- 2010 Regional Urban Water Management Plan Process

Appendices

The appendices provided present detailed background on the information presented in the 2010 RUWMP.

- A.1 - Demand Forecasting
- A.2 - Evaluation of existing regional water supplies
- A.3 - Justifications for supply projections
- A.4 - Water Supply Allocation Plan
- A.5 - List of local projects
- A.6 - Recent CUWCC Filings

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 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.[1] The Act's requirements include:

[1] UWMPs prepared by urban wholesale water suppliers are due to DWR by December 31, 2010; plans prepared by urban retail water suppliers were granted a six-month extension and are due to DWR by July 1, 2011.

- Detailed evaluation of the supplies necessary to meet demands over at least a 20-year period in a single year and multi-year droughts and during average year conditions,
- Documentation of the stages of actions it would undertake to address up to 50 percent 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.

In addition, Water Code § 10608.36 requires wholesale agencies to include in their UWMPs an assessment of present and proposed future measures, programs, and policies that would help achieve water use reduction targets.

Changes in the Act Since 2005

Since 2005, several amendments have been added to the Act. Some of the amendments provided for reporting on lower income and affordable household water projections, eligibility for state water management grants or loans, and reporting on the feasibility of serving recycled water demands. The following is a summary of the significant changes in the Act that have occurred from 2005 to the present:

- Clarifies that every urban water supplier preparing a plan must give at least 60 days advance notice to any city or county prior to the public hearing on the UWMP within which the supplier provides water supplies to allow opportunity for consultation on the proposed plan (Water Code § 10621(b)).
- Requires plan by retail water suppliers to include water use projections for single-family and multifamily residential housing needed for lower income and affordable households to assist with compliance with the existing requirement under Section 65589.7 of the Government Code that suppliers grant a priority for the provision of service to housing units affordable to lower income households (Water Code § 10631.1).
- Conditions eligibility for a water management grant or loan made to an urban water supplier and awarded or administered by DWR, the State Water Resources Control Board, or the California Bay-Delta Authority or its successor agency on the implementation of water demand management measures, including consideration of the extent of compliance with the conservation measures described in the California Urban Water Conservation Council's Memorandum of Understanding Regarding Urban Water Conservation in California (MOU) (Water Code § 10631.5).[2]
- Exempts projects funded by the American Recovery and Reinvestment Act of 2009 from the conditions placed on state funding for water management to urban water suppliers (Water Code § 10631.5(a)(2)).
- Requires DWR, in consultation with the State Water Resources Control Board and the California Bay-Delta Authority or its successor agency, to develop eligibility requirements to implement the foregoing grant and loan conditions (Water Code § 10631.5(b)).
- Repeals existing grant funding conditions of state water management grants or loans on July 1, 2016 if the UWMP is not extended or altered prior to this date (Water Code § 10631.5(f)).

[2] Although this section is included in the Act, it does not directly relate to the reporting required under the UWMPs. Instead, it is focused on eligibility for DWR grants and loans. Thus, there is no corresponding reporting section for this portion of the Act in this plan.

- Deems water suppliers that are members of the California Urban Water Conservation Council and comply with the MOU, as it may be amended, to be in compliance with the requirement to describe the supplier's water demand management measures in its urban water management plan (Water Code § 10631(j)).
- Required DWR, in consultation with the California Urban Water Conservation Council, to convene a technical panel, no later than January 1, 2009, to provide information and recommendations to the Department and the Legislature on new demand management measures, technologies, and approaches. The panel and DWR were to report to the Legislature on their findings no later than January 1, 2010 and each five years thereafter (Water Code § 10631.7).[3]
- Clarifies that "indirect potable reuse" of recycled water should be described and quantified in the plan, including a determination with regard to the technical and economic feasibility of serving those uses (Water Code § 10633(d)). Requires DWR to recognize exemplary efforts by water suppliers by obligating DWR to identify and report to the technical panel, described above, any "exemplary elements" of individual water suppliers' plans, meaning any water demand management measures adopted and implemented by specific urban water suppliers that achieve water savings significantly above the levels required to meet the conditions to state grant or loan funding (Water Code § 10644(c)).

[3] Due to subsequent changes in the law (see discussion of Senate Bill 7), DWR has not yet convened this technical panel or submitted a report to the Legislature.

Senate Bill 7 of the Seventh Extraordinary Session of 2009 Water Conservation in the Delta Legislative Package

In addition to changes to the Act, the state Legislature passed Senate Bill 7 as part of the Seventh Extraordinary Session, referred to as SBX7-7, on November 10, 2009, which became effective February 3, 2010. This new law was the water conservation component to the historic Delta legislative package, and seeks to achieve a 20 percent statewide reduction in urban per capita water use in California by December 31, 2020. This implements the governor's similar 2008 water use reduction goals. The law will require each urban retail water supplier to develop urban water use targets to help meet the 20 percent goal by 2020, and an interim urban water reduction target by 2015.

The bill states that the legislative intent is to require all water suppliers to increase the efficiency of use of water resources and to establish a framework to meet the state targets for urban water conservation called for by the governor. The bill establishes methods for urban retail water suppliers to determine targets to help achieve increased water use efficiency by the year 2020. The law is intended to promote urban water conservation standards consistent with the California Urban Water Conservation Council's adopted best management practices.

Additionally, the bill specifically includes reporting requirements in the upcoming UWMPs. Specifically, urban retail water suppliers must include in their 2010 UWMPs the following information from its target-setting process: (1) baseline daily per capita water use; (2) urban water use target; (3) interim water use target; and (4) compliance daily per capita water use, including technical bases and supporting data for those determinations. An urban retail water supplier may update its 2020 urban water use target in its 2015 UWMP (Water Code § 10608.20).

To give retail urban water suppliers time to conduct the additional required analyses, SBX7-7 grants an extension for submission of UWMPs due in 2010 to July 1, 2011. The bill does not expressly provide this same extension for wholesale water agencies such as Metropolitan (Water Code § 10608.20(j)).

Urban *wholesale* water suppliers are not required to perform all of the target-setting and reporting requirements of SBX7-7. However, wholesale agencies must include in UWMPs an assessment of present and proposed future measures, programs, and policies that would help achieve the water use reductions required under this bill (Water Code § 10608.36).

Metropolitan addresses the actions it is taking to help achieve the urban per capita water use reduction pursuant to the goals set forth in SBX7-7 in Section 3.7.

Metropolitan's Responsibilities Under the Urban Water Management Planning Act

As with Metropolitan's previous plans, this plan does not explicitly discuss specific activities undertaken by member agencies unless it relates 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 may 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 § 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

In 2005, DWR provided guidance materials to aid water districts in developing their urban water management plans. These materials both helped water districts comply with the law and DWR staff review submitted plans for regulatory compliance. The guidance materials consisted of a series of worksheets detailing acceptable responses to the requirements set forth in the Act. At that time, DWR also provided 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 Act.

Since the revised guidebook and checklist for the 2010 Urban Water Management Plan will not be released until DWR completes the development of new reporting methodologies for retail agencies, Metropolitan used the 2005 guideline materials in the development of this plan. In addition, Metropolitan also closely monitored changes in the reporting requirements brought about by new legislation and changes to the Act. Included in this plan is a compliance checklist at the beginning of this document, organized by Water Code section, which summarizes response to requirements of the Water Code.

1.2 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 (CRA) to convey water from the Colorado River. Deliveries through the aqueduct began in the early 1940s and supplemented the local water supplies of the 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 DWR. SWP deliveries began in 1972. Metropolitan currently receives imported water from both of these sources: (1) the Colorado River water via the CRA and (2) the SWP via the California Aqueduct.

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 on the south, and it reaches as far as 70 miles inland from the coast (Figure 1-1). 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 1-1 shows that although only 14 percent of the land area of the six 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 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. Metropolitan provided between 45 and 60 percent of the municipal, industrial, and agricultural water used in its service area. The remaining water supply comes from local wells, local surface water, recycling, the city of Los Angeles' aqueduct from the eastern Sierra Nevada, and the San Diego County Water Authority's water transfers from the Imperial Irrigation District delivered through an exchange of water supplies with Metropolitan. Member agencies also implement conservation programs that can be considered part of their supplies.

Some member agencies provide retail water service, while others provide water to the local area as wholesalers. Table 1-2 shows Metropolitan member agencies and the type of service that they provide. As shown in the table, 15 member agencies provide retail service to customers, nine provide only wholesale service, and two provide a combination of both. Throughout Metropolitan's service area, approximately 250 retail water supply agencies directly serve the population.

Metropolitan's member agencies serve residents in 152 cities and 89 unincorporated communities. Table 1-3 shows the member agencies of Metropolitan, as well as the cities and communities served by those member agencies. Figure 1-1 also shows the geographical area served by the member agencies.

Currently, member agencies receive water from Metropolitan at various delivery points, and 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. Metropolitan's pricing and rate structure are described in detail in Section 2.7.

To aid in planning future water needs, member agencies advise Metropolitan in April of each year 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.

Table 1-1
July 1, 2009 Area and Population in the
Six Counties of Metropolitan's Service Area

County	Total County	In Metropolitan Service Area	Percent in Metropolitan
Land Area (Square Miles)			
Los Angeles County	4,061	1,408	35%
Orange County	789	699	89%
Riverside County	7,208	1,057	15%
San Bernardino County	20,052	242	1%
San Diego County	4,200	1,420	34%
Ventura County	1,845	365	20%
Metropolitan's Service Area	**38,155**	**5,191**	**14%**
Population (Persons)			
Los Angeles County	10,409,000	9,500,000	91%
Orange County	3,155,000	3,155,000	100%
Riverside County	2,128,000	1,520,000	71%
San Bernardino County	2,064,000	816,000	40%
San Diego County	3,208,000	3,076,000	96%
Ventura County	841,000	617,000	73%
Metropolitan's Service Area	**21,805,000**	**18,684,000**	**86%**

Table 1-2
Metropolitan's Member Agencies and Type of Water Service Provided

Member Agency	Retail or Wholesale
Los Angeles County	
Beverly Hills, City of	Retail
Burbank, City of	Retail
Central Basin Municipal Water District	Wholesale
Compton, City of	Retail
Foothill Municipal Water District	Wholesale
Glendale, City of	Retail
Las Virgenes Municipal Water District	Retail
Long Beach, City of	Retail
Los Angeles, City of	Retail
Pasadena, City of	Retail
San Fernando, City of	Retail
San Marino, City of	Retail
Santa Monica, City of	Retail
Three Valleys Municipal Water District	Wholesale
Torrance, City of	Retail
Upper San Gabriel Valley Municipal Water District	Wholesale
West Basin Municipal Water District	Wholesale
Orange County	
Anaheim, City of	Retail
Fullerton, City of	Retail
Municipal Water District of Orange County	Wholesale
Santa Ana, City of	Retail
Riverside County	
Eastern Municipal Water District	Retail & Wholesale
Western Municipal Water District	Retail & Wholesale
San Bernardino County	
Inland Empire Utilities Agency	Wholesale
San Diego County	
San Diego County Water Authority	Wholesale
Ventura County	
Calleguas Municipal Water District	Wholesale

Table 1-3
Member Agencies

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Municipal Water Districts (11)		Member Cities (14)			County Water Authorities (1)
Calleguas	Orange County	Anaheim	Glendale	San Marino	San Diego
Central Basin	Three Valleys	Beverly Hills	Long Beach	Santa Ana	
Foothill	Upper San Gabriel Valley	Burbank	Los Angeles	Santa Monica	
Inland Empire	West Basin	Compton	Pasadena	Torrance	
Eastern	Western	Fullerton	San Fernando		
Las Virgenes					

CITIES WITHIN MEMBER AGENCIES

CALLEGUAS MWD
- *Camarillo*
- *Camarillo Heights*
- *Fairview*
- *Lake Sherwood Valley*
- *Las Posas*
- *Moorpark*
- *NAWS Point Mugu*
- *NCBC Port Hueneme*
- *Oak Park*
- *Oxnard*
- *Port Hueneme*
- *Santa Rosa Valley*
- *Simi Valley*
- *Somis*
- *Thousand Oaks*

Central Basin MWD
- *Artesia*
- *Bell*
- *Bellflower*
- *Bell Gardens*
- *Cerritos*
- *Commerce*
- *Cudahy*
- *Downey*
- *East Los Angeles*
- *Florence*
- *Hawaiian Gardens*
- *Huntington Park*
- *La Habra Heights*
- *Lakewood*
- *La Mirada*
- *Lynwood*
- *Maywood*
- *Montebello*
- *Norwalk*
- *Paramount*
- *Pico Rivera*
- *Santa Fe Springs*
- *Signal Hill*
- *South Gate*
- *South Whittier*
- *Vernon*
- *Whittier*

FOOTHILL MWD
- *Altadena*
- *La Cañada Flintridge*
- *La Crescenta*
- *Montrose*

INLAND EMPIRE
- *Chino*
- *Chino Hills*
- *Fontana*
- *Montclair*
- *Ontario*
- *Rancho Cucamonga*
- *Upland*

Eastern MWD
- *Good Hope*
- *Hemet*
- *Homeland*
- *Juniper Flats*
- *Lakeview*
- *Mead Valley*
- *Menifee*
- *Moreno Valley*
- *Murrieta*
- *Murrieta Hot Springs*
- *Nuevo*
- *North Canyon Lake*
- *Perris*
- *Quail Valley*
- *Romoland*
- *San Jacinto*
- *Sun City*
- *Temecula*
- *Valle Vista*
- *Winchester*

LAS VIRGENES MWD
- *Agoura*
- *Agoura Hills*
- *Calabasas*
- *Chatsworth*
- *Hidden Hills*
- *Lake Manor*
- *Malibu Lake*
- *Monte Nido*
- *Westlake Village*
- *West Hills*

MWD OF ORANGE COUNTY
- *Aliso Viejo*
- *Brea*
- *Buena Park*
- *Capistrano Beach*
- *Corona Del Mar*
- *Costa Mesa*
- *Coto De Caza*
- *Cypress*
- *Dana Point*
- *Fountain Valley*
- *Garden Grove*
- *Huntington Beach*
- *Irvine*
- *Laguna Beach*
- *Laguna Hills*
- *Laguna Niguel*
- *Laguna Woods*
- *La Habra*
- *Lake Forest*
- *La Palma*
- *Leisure World*
- *Los Alamitos*
- *Mission Viejo*
- *Monarch Beach*
- *Newport Beach*
- *Orange*
- *Placentia*
- *Rancho Santa Margarita*
- *San Clemente*

MWD OF ORANGE COUNTY (cont.)
- *San Juan Capistrano*
- *Seal Beach*
- *Stanton*
- *Tustin*
- *Tustin Foothills*
- *Villa Park*
- *Westminster*
- *Yorba Linda*

Three Valleys MWD
- *Azusa*
- *Charter Oak*
- *Claremont*
- *Covina*
- *Covina Knolls*
- *Diamond Bar*
- *Glendora*
- *Industry*
- *La Verne*
- *Pomona*
- *Rowland Heights*
- *San Dimas*
- *So. San Jose Hills*
- *Walnut*
- *West Covina*

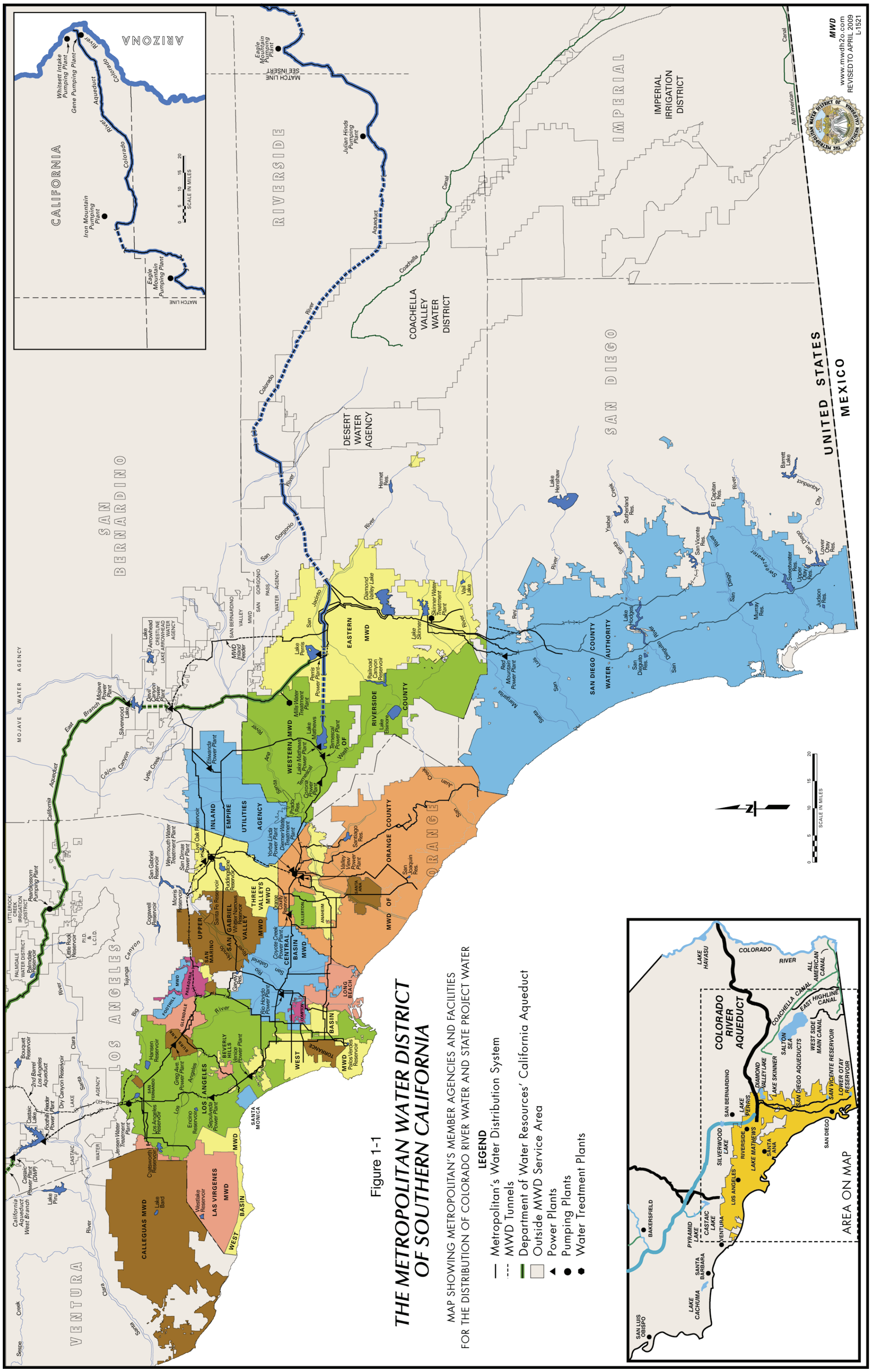
UPPER SAN GABRIEL VALLEY MWD
- *Arcadia*
- *Avocado Heights*
- *Baldwin Park*
- *Bradbury*
- *Citrus*
- *Covina*
- *Duarte*
- *El Monte*
- *Glendora*
- *Hacienda Heights*
- *Industry*
- *Irwindale*
- *La Puente*
- *Mayflower Village*
- *Monrovia*
- *Rosemead*
- *San Gabriel*
- *South El Monte*
- *South Pasadena*
- *South San Gabriel*
- *Temple City*
- *Valinda*
- *West Covina*
- *West Puente Valley*

WEST BASIN MWD
- *Alondra Park*
- *Carson*
- *Culver City*
- *El Segundo*
- *Gardena*
- *Hawthorne*
- *Hermosa Beach*
- *Inglewood*
- *Ladera Heights*
- *Lawndale*
- *Lennox*

WEST BASIN MWD (cont.)
- *Lomita*
- *Malibu*
- *Manhattan Beach*
- *Marina Del Rey*
- *Palos Verdes Estates*
- *Rancho Palos Verdes*
- *Redondo Beach*
- *Rolling Hills*
- *Rolling Hills Estates*
- *Ross-Sexton*
- *Topanga Canyon*
- *West Athens*
- *West Hollywood*

WESTERN MWD OF RIVERSIDE COUNTY
- *Bedford Heights*
- *Canyon Lakes*
- *Corona*
- *Eagle Valley*
- *El Sobrante*
- *Jurupa*
- *Lake Elsinore*
- *Lake Mathews*
- *March AFB*
- *Murrieta*
- *Norco*
- *Riverside*
- *Rubidoux*
- *Temecula*
- *Temescal Canyon*
- *Woodcrest*

SAN DIEGO CWA
- *Alpine*
- *Bonita*
- *Bonsall*
- *Camp Pendleton*
- *Carlsbad*
- *Casa De Oro*
- *Chula Vista*
- *Del Mar*
- *El Cajon*
- *Encinitas*
- *Escondido*
- *Fallbrook*
- *Lakeside*
- *La Mesa*
- *Lemon Grove*
- *Mount Helix*
- *National City*
- *Oceanside*
- *Pauma Valley*
- *Poway*
- *Rainbow*
- *Ramona*
- *Rancho Santa Fe*
- *San Diego*
- *San Marcos*
- *Santee*
- *Solana Beach*
- *Spring Valley*
- *Valley Center*
- *Vista*


THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA
MAP SHOWING METROPOLITAN'S MEMBER AGENCIES AND FACILITIES FOR THE DISTRIBUTION OF COLORADO RIVER WATER AND STATE PROJECT WATER
LEGEND
Metropolitan's Water Distribution System
MWD Tunnels
Department of Water Resources' California Aqueduct
Outside MWD Service Area
Power Plants
Pumping Plants
Water Treatment Plants
AREA ON MAP
COLORADO RIVER AQUEDUCT
CALIFORNIA
ARIZONA
UNITED STATES
MEXICO
MWD
www.mwdh2o.com
REVISED TO APRIL 2009
Figure 1-1

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. Directors can be appointed by the chief executive officer of the member agency or be elected by a majority vote of the governing body of the agency. Metropolitan does not compensate directors for their service. The Board includes business, professional and civic leaders. Board meetings are generally held on the second Tuesday of each month and are open to the public.

Throughout its history, the Board has delegated certain tasks to Metropolitan staff, which are codified in Metropolitan's Administrative Code (Code). In addition, Metropolitan has developed policy principles to help achieve its mission to provide adequate and reliable supplies of high-quality water in an environmentally and economically responsible way. These policies can be found in a variety of documents including: specific policy statements, the Administrative Code, Board-adopted policy principles, and letters submitted to the Board. Policy statements are also imbedded in formal Board meeting discussions and recorded in meeting minutes. The policies established by the Board are subject to all applicable laws and regulations. The management of Metropolitan is under the direction of its General Manager, who serves at the discretion of the Board, as do Metropolitan's General Auditor, General Counsel, and Ethics Officer.

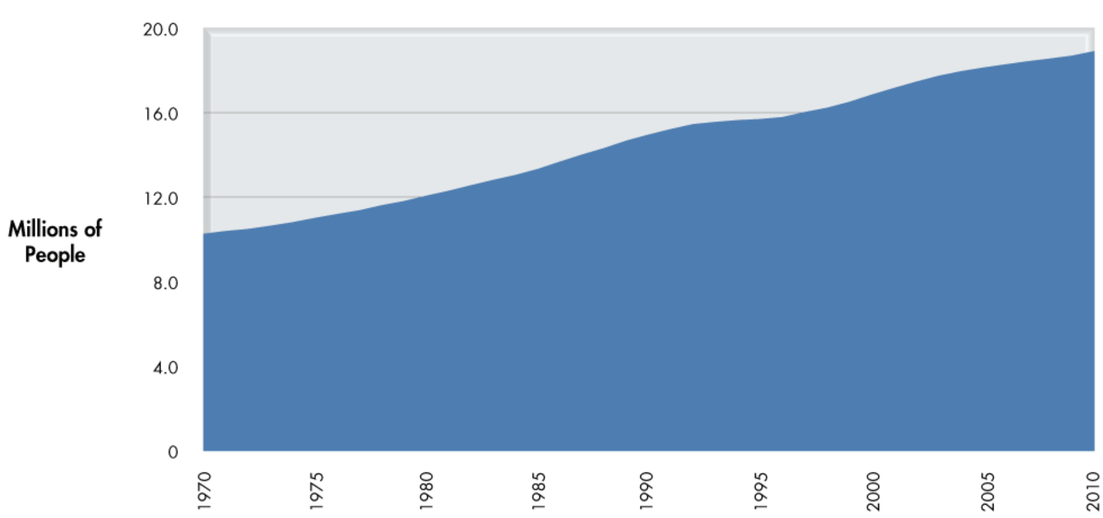
1.3 Metropolitan Service Area Historical Information

Population

In 1990, the population of Metropolitan's service area was approximately 14.8 million people. By 2010, it had reached an estimated 19.1 million, representing 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 generally oscillated around 200,000 persons per year since that time. Figure 1-2 shows the service area population growth from 1970-2010.

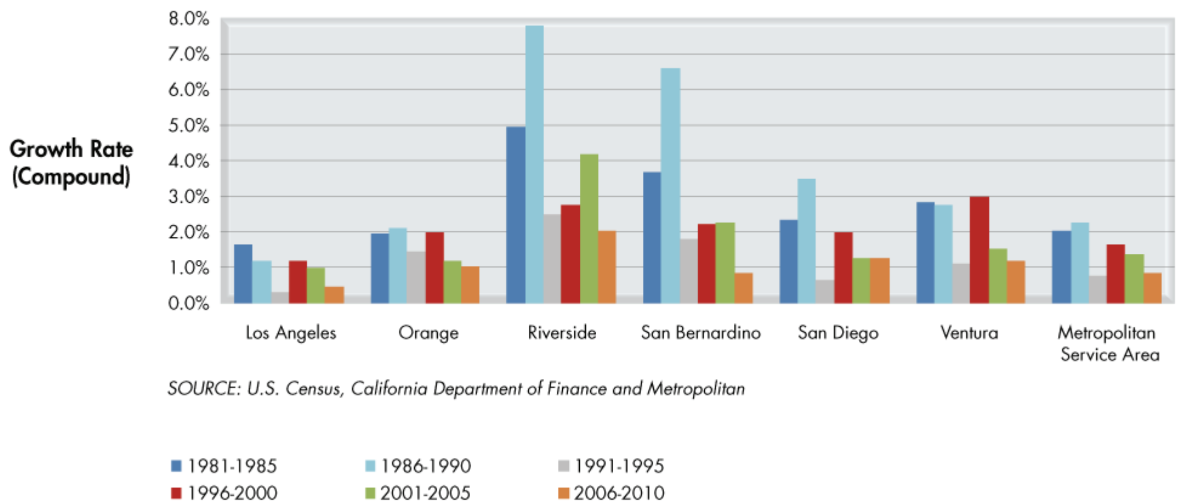
The most populated cities within Metropolitan's service area are Los Angeles (largest city in the state), San Diego (second largest in the state), Long Beach, Anaheim, Santa Ana and Riverside. Between 2006 and 2010 the largest population increases are estimated to have occurred in the city of Los Angeles and in the service area of the San Diego County Water Authority. While these two areas have increased by the largest numbers, Figure 1-3 shows that populations of Riverside and San Bernardino counties have historically increased at the fastest rates. As can also be seen from this figure, however, the rates of increase for Riverside and San Bernardino fell markedly between 2006 and 2010, evidencing the disproportionate effect of the housing "bust" and the economic recession of the late 2000s. Appendix A.1 presents a detailed discussion of the demographic trends in Southern California and their impacts on regional demand forecasts.

Figure 1-2 Service Area Population Growth 1970-2010



SOURCE: U.S. Census, California Department of Finance and Metropolitan

Figure 1-3 Average Annual Population Growth Rates in Metropolitan's Service Area



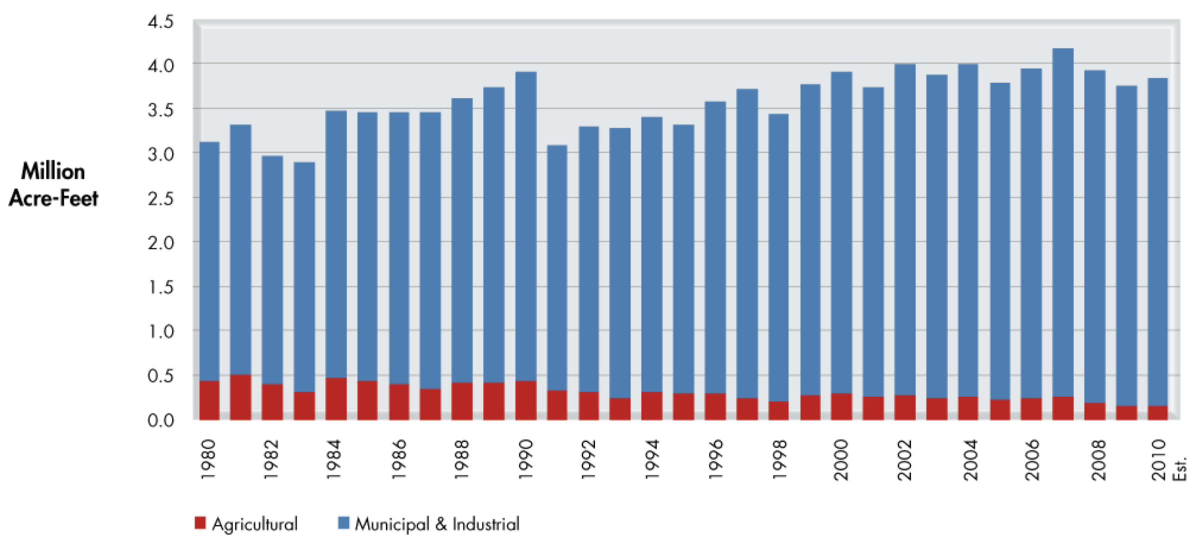
SOURCE: U.S. Census, California Department of Finance and Metropolitan

Historical Retail Water Demands

Figure 1-4 presents historical retail water demands on a calendar year basis in Metropolitan's service area. Since 1980, retail water demands varied from 2.9 million acre-feet (MAF) in 1983 to nearly 4.2 MAF in 2007. Due to the economic recession, drought impacts and conservation, water use declined to 3.1 MAF in 1991. Demand remained below the 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 2000, retail demands reached 3.9 MAF surpassing the early peak level for the first time in a decade. Since 2000, retail demands reached a new peak level in 2007 with nearly 4.2 MAF. Calendar year 2007 was the driest year since 1989, with precipitation measured at 5.66 inches in the Los Angeles Civic Center.

Currently, about 93 percent of the retail demands are used for municipal and industrial purposes (M&I), and 7 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, 16 percent in 1980, 12 percent in 1990 and five percent in 2008. Part of the reduction seen in 2008 was a 30 percent mandatory reduction in Metropolitan's Interim Agricultural Water Program (IAWP) deliveries, which continued into 2009 and is now a 25 percent reduction in 2010.

Figure 1-4 Retail Demand in Metropolitan's Service Area

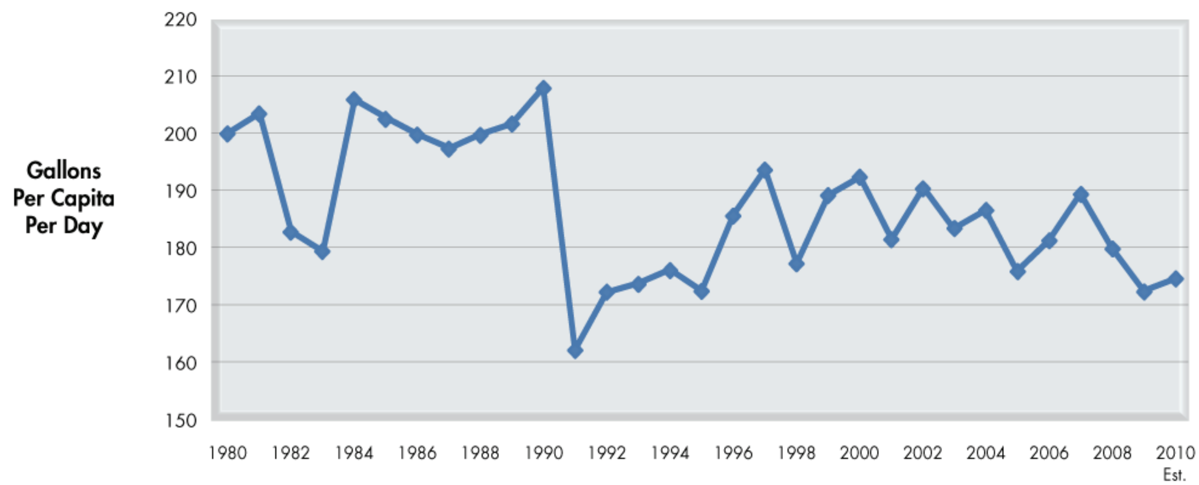


Per Capita Water Use

Per capita water use is defined by law as gross water use divided by population. 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 miscellaneous uses. Generally speaking, per capita water use is not a good measure of water use efficiency. For example, Southern California's per capita water-use may be high because it produces more than two-thirds of California's gross product. However, per capita water use can provide a general indication of how water use within a particular region is changing over time. Figure 1-5 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 around 206 gallons per capita per day (GPCD) in 1990 and 1991 to a low of 162 GPCD as a result of water restrictions accompanying the drought of the late 1980s and early 1990s. Following recovery from that drought, per capita use has shown a general tendency to decrease and has remained noticeably lower than during the pre-1990 era.

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. 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 while the coastal plain counties show lower M&I per capita water use. The historic and projected per capita M&I retail demands for the six counties within Metropolitan's service area are presented in Appendix A.1.

Figure 1-5 Per Capita Water Use in Metropolitan's Service Area



Climate and Rainfall

As Figure 1-6 shows, Metropolitan's service area encompasses three major climate zones. Table 1-4 reports the 30-year (1979-2009) 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 percent from year to year.

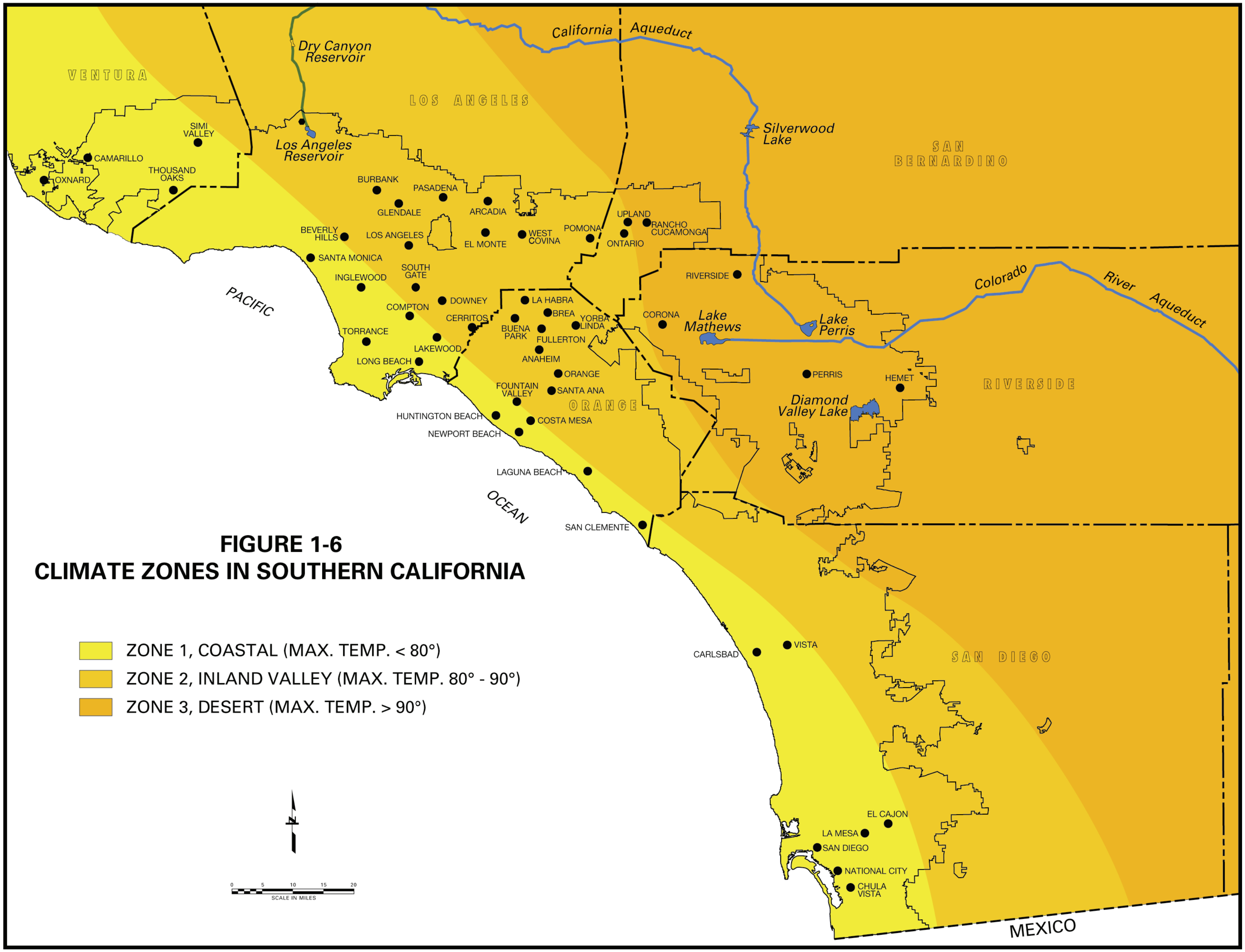


FIGURE 1-6
CLIMATE ZONES IN SOUTHERN CALIFORNIA

Table 1-4
Weather Variables in Three Zones in Metropolitan's Service Area

30-year Average (1979-2009)

Average Temperature	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Los Angeles County[1]	58.99	60.13	61.54	64.32	66.90	70.41	74.47	75.29	74.18	69.67	63.54	58.90	66.53
Riverside County[2]	54.91	56.17	58.44	62.41	67.09	72.09	77.83	78.48	75.37	67.95	59.95	54.67	65.45
San Diego County[3]	57.67	58.54	59.98	62.45	64.60	67.21	70.79	72.29	71.23	67.25	61.79	57.27	64.25

30-year Average (1979-2009)

Average Precipitation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Los Angeles County[1]	3.31	4.05	2.68	0.84	0.26	0.09	0.01	0.04	0.23	0.63	1.00	1.97	15.10
Riverside County[2]	2.35	2.52	1.91	0.62	0.20	0.09	0.04	0.09	0.15	0.40	0.79	1.12	10.26
San Diego County[3]	2.17	2.29	1.93	0.74	0.14	0.07	0.03	0.02	0.14	0.51	0.95	1.33	10.33

Et_o[4]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Los Angeles County	2.2	2.7	3.7	4.7	5.5	5.8	6.2	5.9	5.0	3.9	2.6	1.9	50.1
Riverside County	2.5	2.9	4.2	5.3	5.9	6.6	7.2	6.9	5.4	4.1	2.9	2.6	56.4
San Diego County	2.1	2.4	3.4	4.6	5.1	5.3	5.7	5.6	4.3	3.6	2.4	2.0	46.5

1 Temperature and Precipitation data from Western Regional Climate Center, Los Angeles Civic Center Station (045115). Data last updated April 5, 2010.

2 Temperature and Precipitation from Western Regional Climate Center, Riverside Citrus Experiment Station (047473). Data last updated April 5, 2010.

3 Temperature and Precipitation data from Western Regional Climate Center, San Diego WSO Airport Station (047740). Data last updated April 5, 2010.

4 ETo values from Model Water Efficient Landscape Ordinance (September 10, 2009), Appendix A- Reference Evapotranspiration (Eto) Table.
The ETo values were derived from: 1) California Irrigation Management Information System (CIMIS); 2) Reference EvapoTranspiration Zones Map, UC Dept. of Land, Air & Water Resources and California Dept of Water Resources 1999; and 3) Reference Evapotranspiration for California, University of California, Department of Agriculture and Natural Resources (1987) Bulletin 1922, and 4) Determining Daily Reference Evapotranspiration, Cooperative Extension UC Division of Agriculture and Natural Resources (1987), Publication Leaflet 21426

1.4 Current Conditions

Current Challenges

Metropolitan continues to face ongoing water supply challenges. This section offers a brief discussion of Metropolitan's current challenges, current available resources, short-term supply outlook, and short-term actions to meet these challenges. The dry hydrology experienced during the last three years has resulted in diminished snowmelt and runoff levels and additional environmental restrictions were imposed on water imports from the San Francisco Bay/Sacramento-San Joaquin Delta (Bay-Delta). By the end of 2009, mandatory conservation was in place across much of Metropolitan's service area. The restrictions on water use, however, also generated a record demand for water-saving rebates and refocused efforts to increase development of local water resources.

Delta Issues

The Bay-Delta is the hub of California's water supply and is critically important to the entire state. About 30 percent of Southern California's water supply moves across the Bay-Delta. The Bay-Delta's declining ecosystem, caused by a number of factors that include agricultural runoff and operation of water pumps that can alter flows, has led to historic restrictions in water supply deliveries.

Operational constraints likely will continue until a long-term solution to the problems in the Bay-Delta is identified and implemented. The Delta Vision process, established by Governor Schwarzenegger, is aimed at identifying long-term solutions to the conflicts in the Bay-Delta, including natural resource, infrastructure, land use, and governance issues. In addition, State and federal resource agencies and various environmental and water user entities are currently engaged in the development of the Bay Delta Conservation Plan (BDCP), which is aimed at addressing ecosystem needs and securing long-term operating permits for the SWP.

SWP operational requirements may be further modified under new biological opinions for listed species under the Federal Endangered Species Act (ESA) or by the California Department of Fish and Game's issuance of incidental take authorizations under the California ESA. Biological opinions or incidental take authorizations under the Federal ESA and California ESA might further adversely affect the SWP and Central Valley Project operations. Additionally, new litigation, listings of additional species or new regulatory requirements could further adversely affect SWP operations in the future by requiring additional export reductions, releases of additional water from storage or other operational changes impacting water supply operations. SWP delivery restrictions due to the biological opinions resulted in the loss of about one-third of the available SWP supplies in 2008, reducing the likelihood that regional storage can be refilled in the near-term. Impacts due to the biological opinions for a dry year 2009 were approximately 200,000 AF of SWP supplies.

Water Supply Conditions

The water conditions that the region faced in 2010 were shaped by supply conditions and resource actions that occurred in the preceding years, including several extraordinary events, such as:

- An extended ten year drought in the Colorado River watershed that has decreased storage levels in Lake Mead and Lake Powell below 50 percent of capacity in 2007 and early 2008 and keeping storage below surplus levels despite an ease in drought conditions in 2009;
- Groundwater basins and local reservoirs dropping to very low operating levels due to record-dry hydrology in Southern California;
- Restrictions of SWP deliveries by federal court orders due to endangered Delta smelt and salmon which resulted in the combined loss of approximately 700 TAF

of SWP supplies in 2008 and 2009, reducing the likelihood that regional storage can be refilled in the near term;

- End of year 2008 and 2009 SWP supplies in Lake Oroville were at their lowest and third lowest operating levels respectively since the reservoirs were first filled after consecutive dry years since 2006 and the driest spring of record in 2008;
- Supply availability in the Los Angeles Aqueduct system continues to be affected by environmental issues related to Owens Lake and the Lower Owens River.

These supply conditions, along with increasing firm demands on Metropolitan, have led to significant withdrawals from Metropolitan's storage reserves, including Diamond Valley Lake (DVL) and its groundwater banking and conjunctive use programs to meet scheduled water deliveries. To illustrate this point, an estimated 1.1 MAF of storage reserves were withdrawn to meet about one-quarter of wholesale demands from January 2007 through December 2008. In 2009, an additional 49 TAF were taken from storage reserves to meet firm demands within Metropolitan's service area.

In addition, new challenges such as the detection of the quagga mussel in the Metropolitan's CRA supplies and increasingly stringent water quality regulations to control disinfection byproducts exacerbate the water supply condition and underscore the importance of flexible and adaptive regional planning strategies.

Current Available Resources

Metropolitan's primary purpose is to provide a supplemental supply of water for domestic and municipal uses at wholesale rates to its member public agencies. Metropolitan's principal sources of water are the SWP and the Colorado River. Metropolitan's robust planning strategy continues to balance available local and imported water resources and member agencies demands within Metropolitan's service area.

A. Imported Supplies

Historically, Metropolitan has been responsible for obtaining imported water for the region through its operation of the CRA and its contract with the state for SWP supplies. Metropolitan receives water from the SWP through the California Aqueduct and the Colorado River through the CRA. Figure 1-7 shows the historic annual deliveries from the SWP and the CRA.

Colorado River

The Colorado River was Metropolitan's original source of water after Metropolitan's establishment in 1928. Metropolitan has a legal entitlement to receive water from the Colorado River under a permanent service contract with the Secretary of the Interior. The CRA, which is owned and operated by Metropolitan, transports water from Lake Havasu, at the border of the state of California and Arizona, approximately 242 miles to its terminus at Lake Mathews in Riverside County, with a capacity of 1.25 MAF a year.

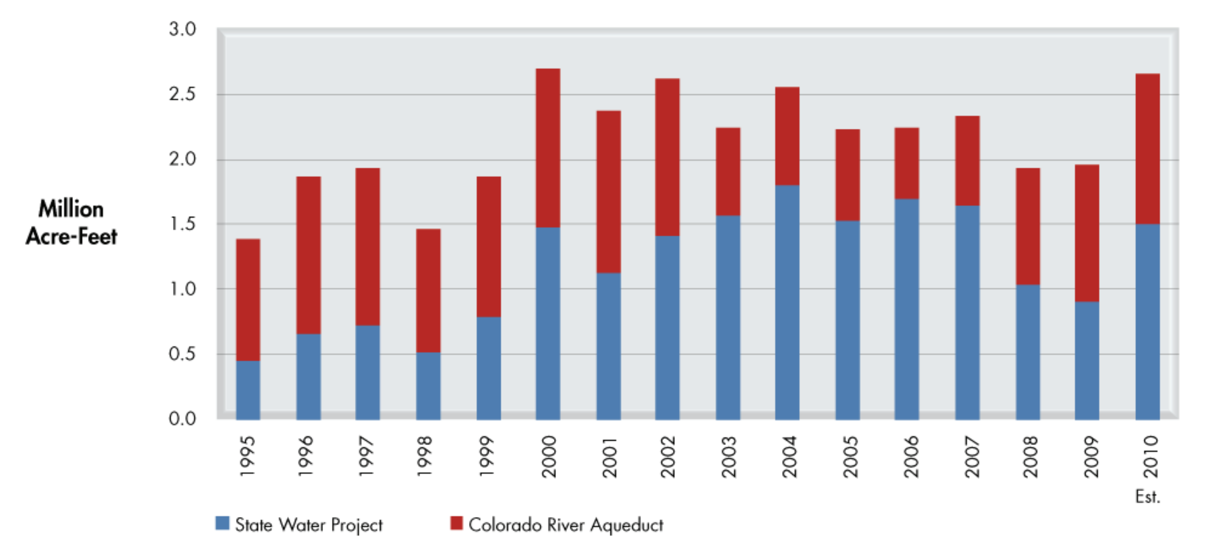
Over the years, Metropolitan increased reliable supply from the CRA through programs that it helped fund and implement including: farm and irrigation district conservation programs, improved reservoir system operations, land management programs, and water transfers and exchanges through arrangements with agricultural water districts in southern California and entities in Arizona and Nevada that use Colorado River water, and the U.S. Department of the Interior, Bureau of Reclamation (USBR). A detailed discussion of availability of Colorado River water for delivery to Metropolitan is described in Section 3.1.

State Water Project

Metropolitan imports water from the SWP, owned by the state of California and operated by the California Department of Water resources (DWR). This project transports Feather River water stored in and released from Oroville Dam and unregulated flows diverted directly from the Bay-Delta south via the California Aqueduct to four delivery points near the northern and eastern boundaries of Metropolitan's service area.

In 1960, Metropolitan signed a contract with DWR. Metropolitan is one of 29 agencies that have long-term contracts for water service from DWR, and is the largest agency in terms of the number of people it serves (19.1 million), the share of SWP water that it has contracted to receive (approximately 46 percent), and the percentage of total annual payments made to DWR by agencies with State water contracts (approximately 60 percent in 2008). A more detailed discussion of the SWP supplies is provided in Section 3.2.

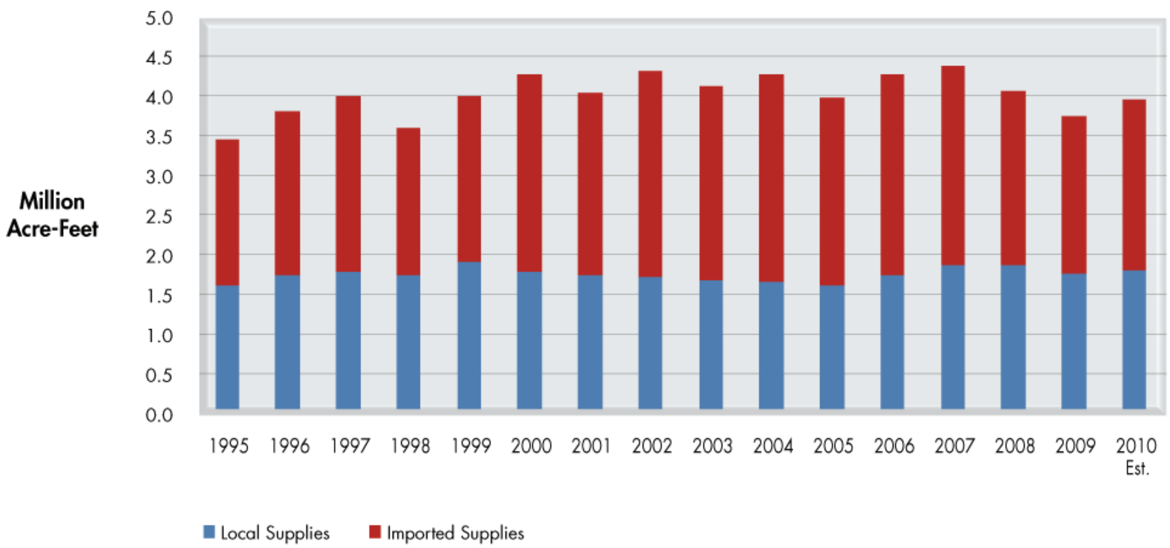
Figure 1-7 Imported Water Supplies in Metropolitan's Service Area



B. Local Supplies

Approximately 50 percent of the region's 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, non-Metropolitan imported water supplied through the Los Angeles Aqueduct, and Colorado River water exchanged for Metropolitan supplies. Figure 1-8 shows the historic annual use of local and imported water suppplies within Metropolitan's service area.

Figure 1-8 Annual Regional Water Supplies in Metropolitan's Service Area



<u>Groundwater</u>

The groundwater basins that underlie the region provide approximately 86 percent of the local water supply in Southern California. The major groundwater basins in the region provide an annual average supply of approximately 1.35 MAF. Most of this water recharges naturally, but approximately 200 thousand acre-feet (TAF) has historically been replenished each year through Metropolitan imported supplies. By 2025, estimates show that groundwater production will increase to 1.65 MAF.

Because the groundwater basins contain a large volume of stored water, it is possible to produce more than the natural recharge of 1.16 MAF and the imported replenishment amount for short periods of time. During a dry year, imported 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.

<u>Recycling and Groundwater Recovery</u>

Recycling and groundwater recovery are regional resources that add balance to Southern California's diverse portfolio of resource options. Water recycling provides extensive treated wastewater for applicable municipal and industrial uses. Common uses of recycled water include landscape irrigation, agricultural irrigation, and commercial and industrial applications. Groundwater recovery employs additional treatment techniques to effectively use degraded groundwater supplies that were previously not considered viable due to high salinity or other contamination.

While water recycling and groundwater recovery projects in the Southern California region are primarily developed by local water agencies, many newer projects have been developed with financial incentives provided through Metropolitan's Local Resources Program (LRP). The LRP is a performance-based program that provides incentives to expand water recycling and support recovery of degraded groundwater. In 2009, the regional water production from water recycling and groundwater recovery totaled 353 TAF, of which 201 TAF was developed with Metropolitan funding assistance. A detailed discussion of recycling and groundwater recovery is presented in Section 3.5.

Seawater Desalination

Seawater desalination represents a significant opportunity to diversify the region's water resource mix with a new, locally-controlled, reliable potable supply. Metropolitan continues to pursue a target for seawater desalination of 150,000 acre-feet (AF) per year by 2025, and several local and retail water agencies have identified seawater desalination as an important component of their future water supply portfolio. The Carlsbad Seawater Desalination Project in San Diego has obtained all of the local, State, and Federal permits for necessary to begin construction, though as of May 2010, there are legal challenges to three of the permits. Project proponents anticipate the project will come on-line as early as 2012, providing the region with an additional 56 TAF of new local supplies.

Surface Water

In addition to the groundwater basins, local agencies maintain surface reservoir capacity to capture local runoff. The average yield captured from local watersheds is estimated at approximately 90 TAF per year. The majority of this supply comes from reservoirs within the service area of the 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 256 TAF per year on average, which may be reduced to approximately 106 TAF during a historical dry period.

Imperial Irrigation District / 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 is transferring water to SDCWA. Since this supply is developed and transferred through an agreement by a local agency (SDCWA), Metropolitan also classifies this water as a local resource. Currently, 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. Under the transfer, 60 TAF was transferred and exchanged with Metropolitan in 2009. The transfer volumes increase in accordance with an annual build-up schedule, reaching 100 TAF annually in 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.

Coachella and All-American Canal Lining Projects

The Coachella Canal Lining Project consists of a 35-mile concrete-lined canal, including siphons, which replaced an earthen canal. The project was completed in December 2006. The project is conserving 30,850 AF 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.

Two reaches of the project were placed in service in 2008 with the third reach placed in service in 2009. This project is conserving 67,700 AF annually beginning in 2010.

Pursuant to the QSA and related agreements, the total 98,550 AF of annual yield from these projects is allocated as follows in 2010: 16,000 AF to Metropolitan, 80,200 AF to SDCWA, and up to 2,350 AF for Coachella Canal Lining Project mitigation, with the amount not needed for mitigation becoming available to SDCWA. The water is made available at Lake Havasu for diversion by Metropolitan, and by exchange, Metropolitan delivers an equal volume of water to SDCWA. Metropolitan classifies the portion of the supply exchanged with SDCWA as local resources and evaluated its availability. Table 1-5 shows the projected local supplies estimate for the average and dry-years for 2015, 2025, and 2035.

Table 1-5
Local Supplies*
(Acre-Feet)

	2015		2025		2035	
	Average Year*	Dry Year	Average Year	Dry Year*	Average Year	Dry Year*
Local Groundwater						
From Natural Recharge	1,251,000	1,214,000	1,242,000	1,202,000	1,240,000	1,206,000
Replenishment	178,000	172,000	187,000	187,000	191,000	190,000
Local Projects						
Groundwater Recovery	*101,000*	100,000	114,000	113,000	126,000	125,000
Recycling	*264,000*	258,000	303,000	299,000	333,000	330,000
Seawater Desalination	*0*	0	0	0	0	0
Local Runoff Stored	103,000	91,000	102,000	91,000	102,000	91,000
Los Angeles Aqueduct	224,000	63,000	226,000	71,000	230,000	78,000
IID/SDCWA Transfer	100,000	100,000	200,000	200,000	200,000	200,000
Coachella & All American Canal Lining	80,000	80,000	80,000	80,000	80,000	80,000
Total	**2,301,000**	**2,078,000**	**2,454,000**	**2,243,000**	**2,502,000**	**2,300,000**

* Dry Year is based on Multiple Dry Years (1990-92)

Short-term Supply Outlook

Metropolitan evaluated the short-term supply outlook during each of the next three years from 2011 through 2013 and determined the minimum water supplies available based on the driest three-year historic sequence of 1990 through 1992. This analysis incorporates the actual storage levels at the beginning of 2010 and the forecasted supplies and demands under a multiple dry-year sequence. This evaluation of supply capabilities also takes into account the actual storage program conveyance constraints. Table 1-6 shows the projected yields of the in-region storage and imported supplies from the SWP and CRA, for both current programs and those under development. Detailed description of the current programs and programs under development are included in Appendix A.3.

For this supply capability evaluation, SWP supplies are estimated using the draft 2009 SWP Delivery Reliability Report distributed by

DWR in December 2009. The draft 2009 reliability report presents the current DWR estimate of the amount of water deliveries for current (2009) conditions and conditions 20 years in the future. These estimates incorporate restrictions on SWP and Central Valley Project (CVP) operations in accordance with the biological opinions of the U.S. Fish and Wildlife Service and National Marine Fishery Service issued on December 15, 2008, and June 4, 2009, respectively.

Metropolitan forecast shows that under a multi-dry year hydrology, Metropolitan could face depleted supply capability during the next three years. This places considerable emphasis on developing robust short-term actions that will increase supply reliability to Metropolitan service area.

Table 1-6

Multiple Dry-Year
Supply Capability[1]
Repeat of 1990-1992 Hydrologies
(acre-feet per year)

Forecast Year	2011	2012	2013
Current Programs			
In-Region Storage	351,000	50,000	17,000
California Aqueduct[2]	582,000	625,000	611,000
Colorado River Aqueduct[3]	998,000	932,000	937,000
Subtotal of Current Programs	***1,931,000***	***1,607,000***	***1,565,000***
Programs Under Development			
In-Region Storage	12,000	12,000	12,000
California Aqueduct	23,000	30,000	374,000
Colorado River Aqueduct	176,000	176,000	176,000
Subtotal of Proposed Programs	***211,000***	***218,000***	***562,000***
Maximum Metropolitan Supply Capability	**2,142,000**	**1,825,000**	**2,127,000**

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 programs, IID-SDCWA transfers and canal linings.

3 Maximum CRA deliveries limited to 1.25 MAF including IID-SDCWA transfers and canal linings.

Metropolitan Actions over the Next 15 Years

Metropolitan endeavored to address the on-going challenges and current water supply condition with recent actions that include: (1) Metropolitan Board approval of a Delta Action Plan that provide a framework to help address Bay-Delta issues, (2) development of a Five-Year Supply Plan to identify specific resource and conservation actions to manage water supplies under drought and court ordered restrictions, (3) adoption of a Water Supply alert resolution in response to the proclamation of statewide drought in California, (4) development of the Water Supply Allocation Plan that will serve as the foundation for the urban water shortage contingency analysis and help the region allocate limited supplies, (5) development of the Quagga Mussel Control Plan to protect regional supplies through enhanced detection, surveillance, and mitigation strategies, and (6) continued improvement of Metropolitan facilities to handle increasing stringent water quality regulations and enhance flexibility to deliver supplies to meet region's growing demands.

A. Delta Strategy

In June 2007, Metropolitan's Board approved a Delta Action Plan that provides a framework for staff to pursue actions with other agencies and stakeholders to build a sustainable Delta and reduce conflicts between water supply conveyance and the environment. Building a sustainable Delta will require significant investment and will take decades. The Delta Action Plan aims to prioritize immediate short-term actions to stabilize the Delta while an ultimate solution is selected, and mid-term steps to maintain the Delta while the long-term solution is implemented. The water supply planning implications for the near- and mid-term are described below while the long-term action plan and the Bay Delta Conservation Plan (BDCP) are described in Section 3.2.

Short-Term Action Plan

While a course of action for the long-term restoration of Delta ecosystem and water supply reliability is being developed, short-term actions must be taken to stabilize the current situation. These actions include the following: securing state and federal Endangered Species Acts take authorization; emergency preparedness steps to prepare for possibility of catastrophic failure in the event of earthquake or flood; actions to enhance habitat for Delta smelt and other pelagic species; completion of the BDCP; and actions to begin work on ecosystem restoration projects that will help species regardless of which ultimate solution is selected (e.g., marsh restoration, island rebuilding.)

Mid-Term Action Plan

Upon selection and enactment of an ultimate Delta solution, it will likely take ten years or more to complete environmental documentation and construct new facilities. During this period, it will be necessary to maintain the stabilization process of the Delta through the following actions: continue implementation of the BDCP projects with selected habitat and fishery improvements to improve Delta native species; begin implementing flood control protections, including bypasses and levee improvements; finalize site selection and environmental documentation for new storage projects; implement new governance structures for managing the Delta; and undertake implementation of the long-term Delta solution.

B. Five-Year Supply Plan

Metropolitan staff prepared a Five-Year Supply Plan (Supply Plan) to identify the specific resource and conservation actions that would be implemented over the next five years to manage water deliveries under continued drought conditions and court ordered restrictions. Since April 2008, staff has been working with the member agencies through a series of meetings and workshops to develop and implement the Supply Plan. The Supply Plan was initiated in response to a number of extraordinary events, such as regulatory actions that reduced water supplies from the SWP to protect Delta smelt, as well as a record-dry hydrology that resulted in over 1.1 MAF of withdrawals from Metropolitan storage from January 2007 through December 2008.

The Supply Plan focuses on six categories of resource options to improve Metropolitan's reliability from 2009 through 2013. The individual projects included as part of the resource options are discussed in further detail in Appendix A.3. These six categories of Supply Plan resource options are as follows:

Water Conservation

The Supply Plan targets water conservation strategies to increase and accelerate conservation savings by increasing the use of water efficient devices, affecting water use practices in Southern California and identifying and reducing prohibited uses of water. Key components of this strategy include (1) increased outreach to heighten the public's awareness of the need to conserve, (2) increased resources and support for water use ordinances and conservation-based rate structures to motivate conservation, and (3) accelerated installation of water efficient devices due to Drought Ordinances discussed in this section.

Colorado River Transactions

Metropolitan is pursuing additional supplies such as the emergency short-term fallowing program within Palo Verde Irrigation District (PVID). Metropolitan's Board authorized participation with the Bureau of Reclamation in the pilot operation of the Yuma Desalting Plant that could yield up to 27 TAF in 2010. New initiatives also include expansion of the 2004 storage and interstate release agreement with Southern Nevada Water Agency (SNWA), an agreement with Coachella Valley water District (CVWD), a water exchange with Arizona, and a fallowing program with California Indian tribes. Metropolitan estimates that these programs on the Colorado River could provide an additional 185 TAF of CRA supply in 2010, with the potential to increase in the following years.

Near-Term Delta Actions

Near-term Delta actions being developed include measures that protect fish species and reduce supply impacts, such as habitat and hatchery projects, and physical and operational actions with the goal of reducing conflicts between water supply conveyance and environmental needs.

The proposed Two-Gate System would provide movable barriers on the Old and Middle Rivers to modify flows and prevent vulnerable fish from being drawn toward the Bay-Delta pumping plants. The Two-Gate System is anticipated to protect fish habitat while allowing up to an estimated additional 150 TAF per year of water supply export from the Bay-Delta in years when the allocation for State Water Project contractors exceeds 35 percent. The proposed Two-Gate System is subject to operational studies, monitoring, environmental documentation and compliance, acquisition of right-of-way and completion of design and construction.

State Water Project Transactions

The Supply Plan includes transfers from willing sellers located upstream of the Bay-Delta to buyers located downstream of the Bay-Delta through the State Water Project and Central Valley Project. Delivery of these transfers is contingent on sufficient capacity for export of this water through the Bay-Delta. Metropolitan took delivery of 29 TAF from the Drought Water Bank, a transfer program facilitated by DWR, in 2009.

The Supply Plan also includes additional transfers with entities within the Bay-Delta and investigations into the feasibility of crop rotation demonstration projects with Kern County agencies, as well as the return of existing transfers stored in Shasta Lake. In addition, Metropolitan may take up to 27.5 TAF of SWP supplies over the next three years available under a water transfer between North Kern Water Storage District and Desert. This water, along with approximately 8.5 TAF of water transferred to Metropolitan in 2008, will be returned to Desert in increments of 1.2 TAF per year over the next 30 years.

Groundwater Recovery

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

Local Resources

Metropolitan is working with its member agencies to determine which local projects could be expanded and/or accelerated with a potential to be on line by 2013. Local projects include recycled water treatment plants, groundwater recovery plants, desalination plants, and new hookups to existing recycled plants. Over 50 potential projects have been identified. The combined annual yield for these efforts has the potential to grow to approximately 60 to 120 TAF by 2014.

Metropolitan's estimate of the dry year yield of the above Supply Plan actions is shown in Table 1-7.

C. Drought Ordinances

In June 2008, following Governor Arnold Schwarzenegger's proclamation of a statewide drought, Metropolitan adopted a Water Supply Alert resolution. Among other provisions, the Alert encouraged cities, counties, and local public water agencies, to adopt and enforce local water conservation ordinances. To facilitate ordinance adoption, Metropolitan compiled a library of available local ordinances, developed a model water conservation ordinance and hosted several workshops. Approximately half of the 19 million residents in Metropolitan's service area are now covered by adopted ordinances, and an additional one-third resides in jurisdictions that have taken action toward adoption of ordinances. Metropolitan is projecting about 235 TAF of water savings in the next few years from adoption and enforcement of local water conservation ordinances.

Table 1-7
Estimated Yield of Five-Year Supply Plan Actions
(in Thousands of Acre-Feet)

	2010	2011	2012	2013	2014
Water Conservation	235	235	235	235	235
Colorado River Transactions	185	176	176	176	176
Near Term Delta Actions[1]	0	0	0	0	0
State Water Project Transactions	36	43	38	33	33
Groundwater Recovery	9	17	28	28	28
Local Resources	0	0	20	40	60
Total	**465**	**471**	**497**	**512**	**532**

[1] It is estimated that the proposed Two-Gate System would provide up to 150 TAF when the State Water Project allocation is greater than about 35 percent. Yield is shown at 0 because of this contingency.

D. Water Supply Allocation

Recent year introduced a number of water supply challenges for Metropolitan and its member agencies. Critically dry conditions in addition to the biological opinions that provided protective measures for the Delta smelt and Chinook salmon in the Sacramento-San Joaquin River Delta brought uncertainty to future supplies from the SWP. This uncertainty, along with the impacts of dry conditions that affected all of Metropolitan's main supply sources, raised the possibility that Metropolitan would not have access to the supplies necessary to meet total firm demands and would have to allocate shortages in supplies to the member agencies.

In preparing for this possibility, Metropolitan staff worked jointly with its member agency managers and staff to develop a Water Supply Allocation Plan (WSAP) that was adopted by the Board in February 2008. The WSAP includes the specific formulas for calculating member agency supply allocations and the key implementation elements needed for administering an allocation, should a shortage be declared. Ultimately, the WSAP will be the foundation for the urban water shortage contingency analysis required under Water Code § 10632.

On April 14, 2009, Metropolitan's Board voted to reduce firm water deliveries to its member agencies for the first time since 1991. In response to expected water supply conditions for the rest of 2009, Metropolitan implemented the WSAP to allocate available water supplies to its member agencies at a WSAP Regional Shortage Level 2. A resolution containing findings describing the water supply conditions in California and Metropolitan's service area and supporting the recommendation to implement the WSAP was also adopted by the Board at that time. On April 13, 2010, Metropolitan's Board approved continuing its member agencies water allocation at Shortage Level 2 for a second year. The unprecedented consecutive year water supply allocation was necessitated by continuing low SWP supplies due to continued environmental restrictions and low storage levels for Metropolitan. The approved allocation offers local water providers the flexibility to choose among various conservation strategies, from tiered pricing to limits on outdoor water use, to help ensure that demands stay in balance with limited supplies. Details of the WSAP are included as Appendix A.4.

E. Quagga Mussels Control

Zebra mussels (Dreissena polymorpha) were introduced into the Great Lakes area of North America in the mid-1980s in the fresh-water ballast of a transoceanic ship traveling from Eastern Europe. Quagga mussels (Dreissena bugensis), a related species to the better-known zebra mussels and indigenous to the Ukraine, were similarly introduced to the Great Lakes in the late 1980s. Although the introduction of these two species into drinking water supplies does not typically result in violation of drinking water standards, invasive mussel infestations can adversely impact aquatic environments. If unmanaged, invasive mussel infestations have been known to severely impact the aquatic ecology of lakes and rivers; clog intakes and raw water conveyance systems; reduce the recreational and aesthetic value of lakes and beaches; alter or destroy fish habitats; and render lakes more susceptible to deleterious algae blooms. These organisms currently infest much of the Great Lakes basin, the St. Lawrence Seaway, and much of the Mississippi River drainage system.

Invasive zebra and quagga mussels spread west of the 100th Meridian in 2007 and 2008. The 100th Meridian has historically been considered as the line of longitude in the United States that represented the boundary between the moist east and the arid west. The term has been adapted by the 100th Meridian Initiative which is a cooperative effort between state, provincial, and federal agencies to prevent the westward spread of zebra mussels and other aquatic nuisance species in North America. Quagga mussels were discovered in January of 2007 in Lake Mead and rapidly spread downstream to the Lower Colorado River. The presence and spawning of quagga mussels in the Lower Colorado River and in reservoirs located in southern California poses an immediate threat to water and power systems serving more than 25 million people in the southwestern United States. The recent spread of zebra mussels into a northern California lake and a Colorado lake further indicates that if these invasive mussels are not controlled, the entire western United States could be impacted.

Although a number of controls for invasive mussels have been reported in the literature, current drinking water and environmental regulations limit the options available for implementation. In 2007, Metropolitan developed a quagga mussel control plan (QMCP) incorporating enhanced detection, surveillance, and mitigation strategies. The QMCP will be conducted in at least three phases. Phase I addressed immediate quagga mussel detection, surveillance, and mitigation strategies for the first seven months of the mussel infestation. Phase I was completed in September of 2007. Phase II consists of infrastructure upgrades and a comprehensive, multi-year approach for mussel management, and Phase III will address long-term needs and cost minimization strategies.

The presence and spawning of quagga mussels in the lower Colorado River from Lake Mead through Lake Havasu poses a threat to Metropolitan and other Colorado River water users due to the potential to continuously seed water conveyance systems with mussel larvae. Chlorination is the most frequently used means to control mussel larvae entering water systems. To date, Metropolitan has appropriated $9.55 million to upgrade chlorination facilities in the aqueduct and at two additional locations in its system, the outlets of Lakes Mathews and Skinner. It is likely that additional upgrade costs will be incurred for these facilities. Chemical control (chlorination) at Copper Basin, Lake Mathews, and the Lake Skinner Outlet costs approximately $3.0-3.2 million per year depending on the amount of CRA moved through the aqueduct.

As part of the QMCP O&M activities, Metropolitan will be evaluating control measures aimed at: (1) Changing environmental conditions in the CRA or in Metropolitan's reservoirs that will promote a suboptimal or antagonistic environment for quagga mussel attachment, growth or proliferation; (2) Identifying physical or mechanical processes to deter attachment or remove quagga mussels from surfaces; (3) Promoting the use of biological controls such as predators, parasites or diseases targeted to suppress or kill larvae or adult quagga; and (4) Applying oxidative chemical controls (i.e., chlorine) or non-oxidative controls (i.e., molluscicides). Limnological and flow pattern studies will be conducted to assess the feasibility of modifying environmental conditions such as oxygen demand, temperature, and pH to control mussels in Metropolitan's reservoirs. In addition, studies of surface treatments which may deter attachment, and of molluscicide use, will be conducted under laboratory and field conditions. The results of these studies will be used to design infrastructure improvements for long-term management of quagga mussels.

F. Facility Improvements

Inland Feeder

The Inland Feeder's origins date to the district-wide Distribution System Overview Study completed in 1988. The study concluded that Southern California needed additional storage and conveyance facilities to reliably meet the region's growing demands and to respond to an emergency such as an earthquake. In response to the identified needs, Metropolitan developed the Diamond Valley Lake and the Inland Feeder.

The completion of the $1.2 billion Inland Feeder in September 2009 further integrated Metropolitan's distribution system, connecting SWP supplies from Northern California with Metropolitan's CRA and allows for delivery of SWP water into Diamond Valley Lake. The Inland Feeder significantly increased Metropolitan's water delivery capacity from the SWP's east branch at the Devil Canyon Power Plant. As the state identifies solutions to problems in the Sacramento-San Joaquin Delta, the operational flexibility offered by the Inland Feeder will ultimately help protect the Delta's fragile environment by allowing Metropolitan to deliver water during wet periods when water is available and then store it in Southern California's reservoirs and groundwater basins. In dry years, the region can rely on these reserves and reduce reliance on imported water sources. The Inland Feeder will also help Southern California deal with future weather uncertainties that may be brought on by climate change, including the possibility of less snowpack but more rain. The Inland Feeder will allow Metropolitan to capture storm related short-duration high-flow water supplies to store for dry times.

<u>Oxidation Retrofit Project</u>

Metropolitan is currently undertaking the Oxidation Retrofit Project for all five water treatment plants in its service area. In January 2002, new U.S. Environmental Protection Agency (USEPA) regulations became effective which balanced the risk of disinfection byproduct (DBP) exposure while more aggressively controlling pathogenic microorganisms. This rule, known as the Stage 1 Disinfectants/ Disinfection Byproducts (D/DBP) Rule, required water systems to comply with new maximum contaminant levels (MCLs) and with a treatment technique to improve control of DBPs. USEPA subsequently promulgated the Stage 2 D/DBP Rule in January 2006 that requires compliance with the MCL at individual distribution system locations, rather than on an averaged, system-wide basis. No further capital facilities are required for Metropolitan to comply with this second stage of the rule.

Prior to completion of its ozonation facilities, Metropolitan operates its treatment plants under interim strategies designed to comply with the regulations. These strategies include adding large amounts of treatment chemicals to reduce DBP precursors, limiting high blends of SWP supplies to reduce DBP formation, and constraining treatment plant flow rates to ensure adequate disinfection. Adverse impacts from these strategies include limited control of taste and odors, production of total dissolved solids (TDS) levels in excess of Metropolitan's goal of 500 mg/L, and potential limitations on plant capacity. In recent years, with less SWP supply available, Metropolitan has not been constrained by these interim strategies.

The addition of ozone as the primary disinfection process at Metropolitan's treatment plants allows treatment of any blend of its source waters and substantially lowers disinfection by-product levels for compliance with both D/DBP Rules. Use of ozone also enhances Metropolitan's ability to treat water with variable source-water quality, and provide critical operational flexibility to meet varying treatment challenges resulting from periodic occurrences such as drought and other source water limitations. Further, ozonation provides the capability to control taste- and odor-causing compounds that periodically affect the source waters. Ozone is also recognized to be effectively removing many pharmaceuticals/personal care products (PPCPs) and endocrine disruptor chemicals (EDCs), some of which have been detected in Metropolitan's raw water supplies.

The ozonation process is currently in use at the Mills, Jensen, and Skinner plants. Construction of ozone-related facilities are underway at the Diemer and Weymouth plants.

<u>Energy Management Initiatives</u>

Metropolitan is currently embarking on energy management initiatives aimed at working toward operating its facilities in the most energy-efficient and cost-effective manner, and enhancing its ability to provide long-term power reliability. To highlight a few recent accomplishments, Metropolitan completed the Energy Management & Reliability Study (EMRS) in December 2009, which is a roadmap to identify future actions and to serve as a blueprint for achieving energy reliability and cost control. Metropolitan also completed the audit and certification of its 2008 carbon footprint with the California Climate Action Registry as a registered member, and submitted emissions data to the Air Resources Board, which is the state agency mandating emissions reporting annually.

In May 2009, Metropolitan completed a 10-acre field of solar panels at the district's Robert A. Skinner Water Treatment Plant in the Temecula Valley of southwestern Riverside County. The 1-megawatt solar installation is designed to generate approximately 2.4 million kilowatt-hours (kWh) of clean, renewable energy a year, equal to the power used by about 250 homes annually. Metropolitan will receive more than $5 million in rebates during the first five years of the facility's operation. Based on projected power costs, the capital expenditure for this project will be recovered in approximately 10-12 years.

Metropolitan also started final design activities for a 2-megawatt solar installation at the Weymouth plant. This planned solar installation would meet up to 20 percent of the Weymouth plant's expected daily power consumption. A total of 10-megawatts of solar power generation is proposed for the Jensen, Weymouth, Mills and Skinner treatment plants, including the existing 1-megawattt at Skinner.

In August 2010, Metropolitan' s Board adopted Energy Management Policies, to provide Metropolitan staff with the necessary guidance in moving forward with cost-effective and environmentally responsible programs, projects, and initiatives. Projects would then be brought to the Board for authorization on a case-by-case basis. These policies recognize the upward pressure on costs caused by the expiration of Metropolitan's Hoover power contract in 2017, by evolving power markets, by increased direct and indirect regulatory pressure to reduce green house gas (GHG) emissions, and by the risk of reduced Colorado River hydropower supplies with climate change. The specific policies are as follows:

- Water/Energy Nexus: Identify collaborative programs and initiatives between the water and energy industries, constructing sustainable partnerships to reduce costs and provide enhanced reliability.
- Regulatory: Track federal and state greenhouse gas regulations and develop strategies to hedge against price and regulatory risks towards Metropolitan.
- Legislation: Pursue legislation to protect or enhance reliability of energy supply and mitigate energy cost risk.
- Contracts: Maintain maximum flexibility on existing and future contracts with Hoover and other energy contracts to hedge against cost and regulatory risks.
- Projects/Partnerships: Pursue cost-effective renewable energy projects and partnerships to hedge against energy price increases and regulatory risks, while reducing Metropolitan' s carbon footprint.

- Revenue Stream: Pursue revenue stream renewable energy facilities on operational lands to assist in cost containment.
- Economic & Environmental Stewardship: Based on projected economic and regulatory conditions, develop cost-effective programs, projects and initiatives to control operational costs and move Metropolitan towards energy independence. Implementation of proposed Energy Management Plan activities would result in substantial reductions in GHG emissions.
- Energy Management Updates: Staff will return to the Board on a regular basis to report on progress on the Energy Management Master Plan and the suitability of these policies, in light of changing regulatory and economic conditions.

Moving forward with these energy management initiatives will enhance Metropolitan's ability to provide long-term power reliability, to protect against energy market price volatility, and to hedge against overall cost risks for operation of Metropolitan's distribution system and the CRA.

1.5 Current Resource Planning

Metropolitan's Long-term Actions

As Metropolitan continues to face various water supply challenges, development of adaptable strategies for managing resources to meet the range of estimated demands into the future and for adjusting to changing resource conditions are on-going.

Resources Planning

Metropolitan's continued progress in developing a diverse resource mix enables the region to meet its water supply needs. The investments that Metropolitan has made and its on-going efforts in many different areas coalesce toward its goal of long-term regional water supply reliability. Metropolitan's actions have been focused on the following:

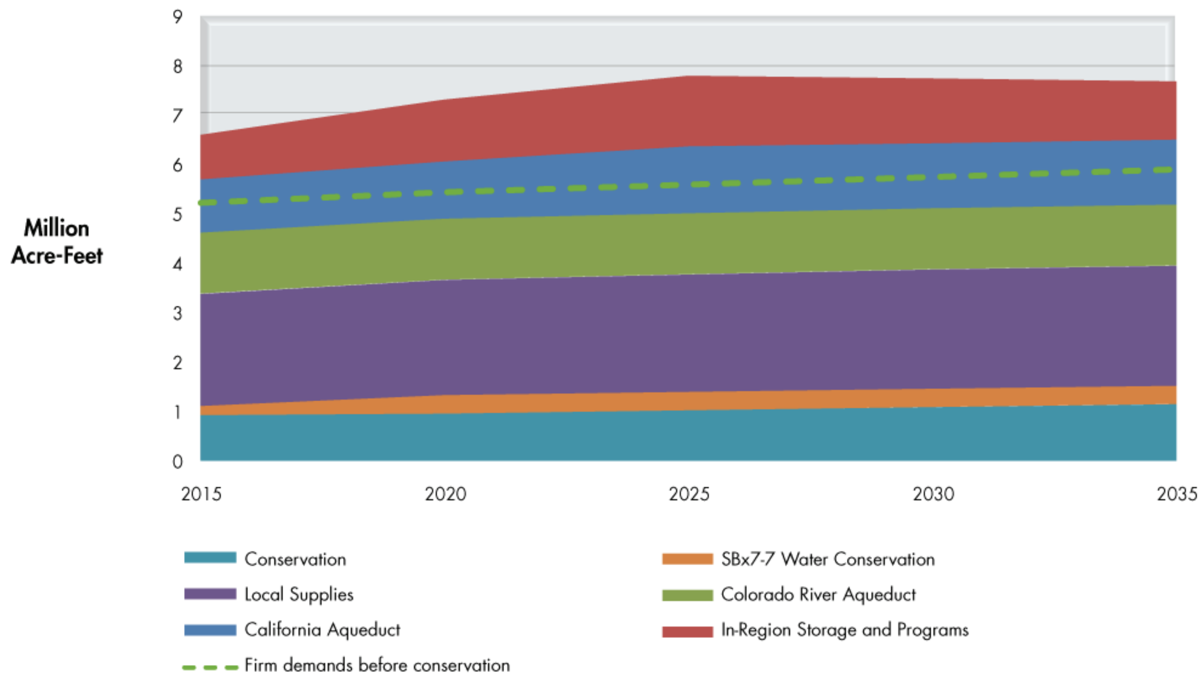
- Pursuing long-term solutions for Delta
- Developing storage programs related to the SWP and the Colorado River
- Developing storage and groundwater management programs within the Southern California region
- Increasing conservation
- Increasing water recycling, groundwater recovery, and seawater desalination
- Developing water supply management programs outside of the region

Many programs have already been successfully implemented through these actions. Others, including institutional and facility changes in the Colorado River region and the SWP, will take more time to execute. Considerations are also in place for emerging integrated supplies, which could augment sources of regional water supply from non-traditional sources. In addition, water demand reductions brought about by legislative mandates could also affect the landscape of future supply planning and implementation.

Metropolitan continues its commitment to regional long-term supply planning, with strategies for implementation discussed in detail in Section 3 of this report.

Figure 1-9 shows the various resources that are expected to be developed to meet the projected demands in Metropolitan service area under a dry-year scenario. The following sections of this report discuss each of these programs, presenting both achievements to date and future expectations for programs that are still under development.

Figure 1-9 Dry-Year Demand and Supplies



Planning for the Future

2

The purpose of this section is to show how Metropolitan plans to meet Southern California's water supply needs in 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 imported water supply availability. At the same time, the Colorado River watershed has experienced a protracted drought since 1999 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 fifteen years. This Regional Urban Water Management Plan summarizes these efforts, which include the Integrated Resources Plan (IRP), two IRP Updates, the Water Surplus and Drought Management Plan, the Water Supply Allocation Plan, and the Long-term Conservation Plan. Collectively, they provide a policy framework with 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 A.5 shows a list of these potential 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.

2.1 Integrated Resource Planning

The 1996 IRP Process

Acknowledging the importance of water to the economic and social well-being of Southern California, Metropolitan has gradually shifted roles from an exclusive supplier of imported water to a regional water planner working in collaboration with its member agencies. After the drought of 1987-1992, Metropolitan recognized the changed conditions and the need to develop a long-term water resources strategy to fulfill the agency's mission of providing a high-quality reliable water supply to its service area. This planning process that was undertaken is now known as the Integrated Resources Plan (IRP). The first IRP was adopted by Metropolitan's Board in 1996 and guided by six objectives established early in the process:

1. Ensuring Reliability
2. Ensuring Affordability
3. Ensuring Water Quality
4. Maintaining Diversity
5. Ensuring Flexibility
6. Acknowledging Environmental and Institutional Constraints.

One of the fundamental outcomes of the IRP was the recognition that regional water supply reliability could be achieved through the implementation of a diverse portfolio of resource investments and conservation measures. The resulting IRP strategy was a balance between demand management and supply augmentation. For example, in its dry year profile, the resource framework counted on almost equal proportion of water conservation and recycled water as withdrawal from storage and water transfers. The IRP also balanced between the use of local resources and imported supplies. In a dry year, about 55 percent of the region's water resources come from local resources and conservation. Additionally, through the IRP process Metropolitan found solutions that offer long-term reliability at the lowest possible cost to the region as a whole.

The 1996 IRP, as a blueprint to resource program implementation, also established the "Preferred Resource Mix that would provide the Metropolitan region with reliable and affordable water supplies through 2020.

The IRP provided details on the Preferred Resource Mix and guidelines to established broad resource targets for each of the major supplies available to the region including:

- Conservation
- Local Resources - Water Recycling, Groundwater Recovery and Desalination
- Colorado River Supplies and Transfers
- State Water Project Improvement
- In-Region Surface Reservoir Storage
- In-Region Groundwater Storage

The 2004 IRP Update

In 2004, the Metropolitan Board adopted an updated IRP. Various legislative issues concerning population growth and water supply called for further planning considerations of these changed conditions. This IRP Update had three objectives:

1. Review the goals and achievements of the 1996 IRP
2. Identify the changed conditions for water resource development
3. Update resource development targets through 2025

The 2004 IRP process fulfilled the new objectives and updated the long-term plan to account for new water planning legislation. The updated plan contained resource development targets through 2025, which reflected changed conditions; particularly increased conservation savings, planned increases in local supplies and uncertainties. The 2004 IRP also explicitly recognized the need to handle uncertainties inherent in any planning process. For the water industry, some of these uncertainties are the level of population and economic growth which directly drive water demands, water quality regulations, new chemicals found to be unhealthful, endangered species affecting sources of supplies, and periodic and new changes in climate and hydrology. As a result, a key component of the Updated Plan was the addition of a 10 percent planning buffer. The planning buffer provided for the identification of additional supplies, both imported and locally developed, that can be implemented to address uncertainty in future supplies and demands.

2010 Integrated Water Resources Plan Update

Metropolitan and its member agencies face increasing uncertainties and challenges as they plan for future water supplies. The 1996 and 2004 IRP resource strategies emphasized the need for a diverse and adaptable water supply strategy to cope with changing circumstances and conditions. Recent history and events have highlighted several emerging trends that need to be addressed in the context of the region's water supply planning and reliability. These trends cover a wide range of considerations including climate change, energy use and greenhouse gas emissions, endangered species protection and conveyance needs in the Sacramento-San Joaquin River Delta system. These trends point strongly to the importance of updating the region's Integrated Resources Plan, and to the need to solidify adaptive strategies to address additional challenges into the long-term future.

The basic objectives of the current IRP process are to:

1. Review the achievements of the 1996 IRP and the 2004 Update
2. Identify changing conditions affecting water resource development
    - Attention will be given to emerging factors and considerations, such as the current drought, climate change, energy use, and changes in Delta pumping operations
3. Update resource development targets through 2030
    - Discussion will focus on adaptation to future uncertainties, and potential alternatives for further diversifying Metropolitan's water resource portfolio and increasing supply reliability in the face of changing circumstances

Public Process

The current IRP Update process has sought input from member agencies, retail water agencies, other water and wastewater managers, environmental, business and community interests. In the fall of 2008, Metropolitan's senior management, Board of directors, member agency managers, elected officials, and community groups collectively discussed strategic direction and regional water solutions at a series of four stakeholder forums; nearly 600 stakeholders participated in the forums.

Similar types of ideas and issues were raised by the participants at all the forums, emphasizing the importance of local resources development and resolving issues with the Delta. Participants suggested that Metropolitan should take a leadership position in several areas including:

- Providing outreach to legislators concerning needs for water supply reliability and quality improvements
- Developing brine lines to enhance recycled water use
- Fostering partnerships with energy utilities
- Building relationships with environmental community
- Participating in research and development of new technologies
- Providing assistance to retail agencies in designing "correct" tiered rate structures

Technical Workgroup Process

Following the stakeholder forums, Metropolitan embarked upon a Technical Workgroup Process to further explore some of the issues and opportunities identified by forum participants. To facilitate the workgroup process, the technical discussions were grouped into six resource areas:

- Conservation
- Graywater
- Groundwater
- Recycled water
- Stormwater / Urban Runoff
- Seawater Desalination

The Technical Workgroup process provided a forum for review of the issues associated with each area, and in-depth discussions with area experts. The workgroups included member agency and retail agency staff, other non-governmental organizations, and staff from wastewater and stormwater management agencies, as well as Metropolitan staff and consultants.

Strategic Policy Review

As part of the current IRP update process, Metropolitan's Board initiated a Strategic Policy Review. This Review examined the ramifications of alternative roles for Metropolitan, member agencies and local retail agencies in future development of water resources. The process explored three alternative policy cases:

1. Current approach – continuation of IRP policies and partnerships with member agencies
2. Imported focus – Metropolitan focuses on addressing Delta issues, imported supplies and water transfers and leaves local supply development entirely to member agencies
3. Enhanced Regional focus – Metropolitan examines new approaches, up to and including development and ownership for implementing large regional scale water recycling, groundwater recharge and seawater desalination

A study of water supply reliability and cost impacts associated with these approaches found that it is in the region's best interest for Metropolitan to continue to explore ways of increasing regional reliability and not limiting itself to singular areas like addressing Delta issues. The study results under this process was a broader view of Metropolitan's role in comprehensive planning and implementation for regional reliability; adopting an adaptive resource development plan for the future may provide the most benefit for the region. In this adaptive approach, Metropolitan may need to take on an enhanced role in local supply development, in order to best adapt and respond to changing regional conditions and lay a solid foundation for future reliability. This role could include the creation of partnership with local agencies or Metropolitan's direct ownership of local projects to ensure regional reliability. The adaptive approach would be incorporated into the 2010 IRP for Board consideration.

Uncertainty Analysis

A major component of the current IRP update effort is to explicitly reflect uncertainty in Metropolitan's future water management environment. This involves evaluating a wider range of water management strategies, and seeking robust and adaptive plans that respond to uncertain conditions as they evolve over time, and that ultimately will perform adequately under a wide range of future conditions. The potential impacts and risks associated with climate change, as well as other major uncertainties and vulnerabilities, will be incorporated in to the update and accounted for. A key evolution from the 2004 IRP will be the identification of vulnerabilities and contingency actions that will extend the concept of a Planning Buffer into tangible actions that will enable construction and implementation of contingency supplies if they are needed.

Adaptive Planning Implementation

Regional water supply reliability largely depends on Metropolitan's preparedness to adapt to supply uncertainties. An adaptive management approach was utilized in developing a strategy that will prepare the region to deal with unforeseen supply shortages. An important step in this approach is identifying where additional water supply will come from. Four local water sources were considered:

- Stormwater
- Recycled Water
- Graywater
- Seawater

The stakeholder groups established during the IRP process evaluated the viability of using one or more of these resources to supplement existing water supply in the region. The stakeholders (e.g., member agencies, retail agencies, and industry experts) gathered important information on each resource such as regional development status, yield potential, and implementation challenges.

Another key aspect of this strategy is determining what actions are required to eliminate or mitigate the implementation challenges in developing these resources. The adaptive approach essentially provides a blueprint on how to address these challenges and develop supply within each resource.

The most important aspect of this strategy is the adaptive management approach used in responding to potential water supply shortage. The implementation elements identified within each blueprint can be executed at varying levels of urgency. Under the adaptive approach, Metropolitan developed three alternative implementation schedules for each resource:

- Status Quo
- Proactive
- Aggressive

Status Quo entails delaying action until a trigger is met. A trigger sets the point in time at which a potential shortage is identified and when deliberate action is taken to mitigate that shortage. The Proactive schedule implements low-risk actions early-on regardless of whether a trigger occurs. Implementing these low-risk actions shortens the overall time required to complete the implementation schedule. The Aggressive option implements both low-risk and medium-to-high risk actions that may require significant investment (e.g. land acquisition). By initiating these actions early-on, the overall implementation time can be shortened significantly. Table 2-1 highlights the differences between each schedule.

Table 2-1
Schedule Options

Schedule Option	Brief Description	Timeframe from Trigger to Production Yield	Financial Risk
Status Quo	Delay action until the adaptive management trigger occurs	Long	Low
Proactive	Begin planning actions (generally lower cost) before the adaptive management trigger occurs	Medium	Medium
Aggressive	Perform project implementation actions, such as land acquisition, before the adaptive management trigger occurs	Short	High

This strategy also utilizes an adaptive approach for determining an optimal project mix, or portfolio, used to meet a supply gap. The portfolio can comprise of projects from any of the four resources. Project drivers such as cost, yield, implementation time, and location of the project will be used to create customized portfolios that could address specific needs. For example, if a water supply shortage is occurring in a specific area, the portfolio could contain projects that serve that area. Another example might entail selecting projects that have the shortest implementation time in order to expedite supply development. Yet another example might involve selecting the most cost-efficient projects ($/AF) regardless of implementation time or location if minimizing costs is of highest priority. Furthermore, the number of projects within a portfolio is scalable based on the level of shortage at hand. This comprehensive approach is illustrated in Figure 2-1.

Metropolitan's adaptive approach is basically organized into four individual sections referred to as Foundational Studies. These individual studies discuss in detail the implementation challenges and recommended action for each resource. The first step in developing planning actions is categorizing the implementation challenges within each resource. In most cases the categories represent common themes such as establishing funding projects (Funding) or garnering legislative support (Legislative). The next step in developing planning actions is identifying implementation elements that mitigate the implementation challenges. This step involves identifying specific actions that are needed to support each implementation element. The last step in this process is developing of timelines and implementation schedules. Three alternative implementation schedules are developed for each resource.

Tables 2-2 through 2-5 summarize the categories and implementation elements for each resource. Detailed actions and schedules can be found in the foundational studies.

Figure 2-1 Comprehensive Approach

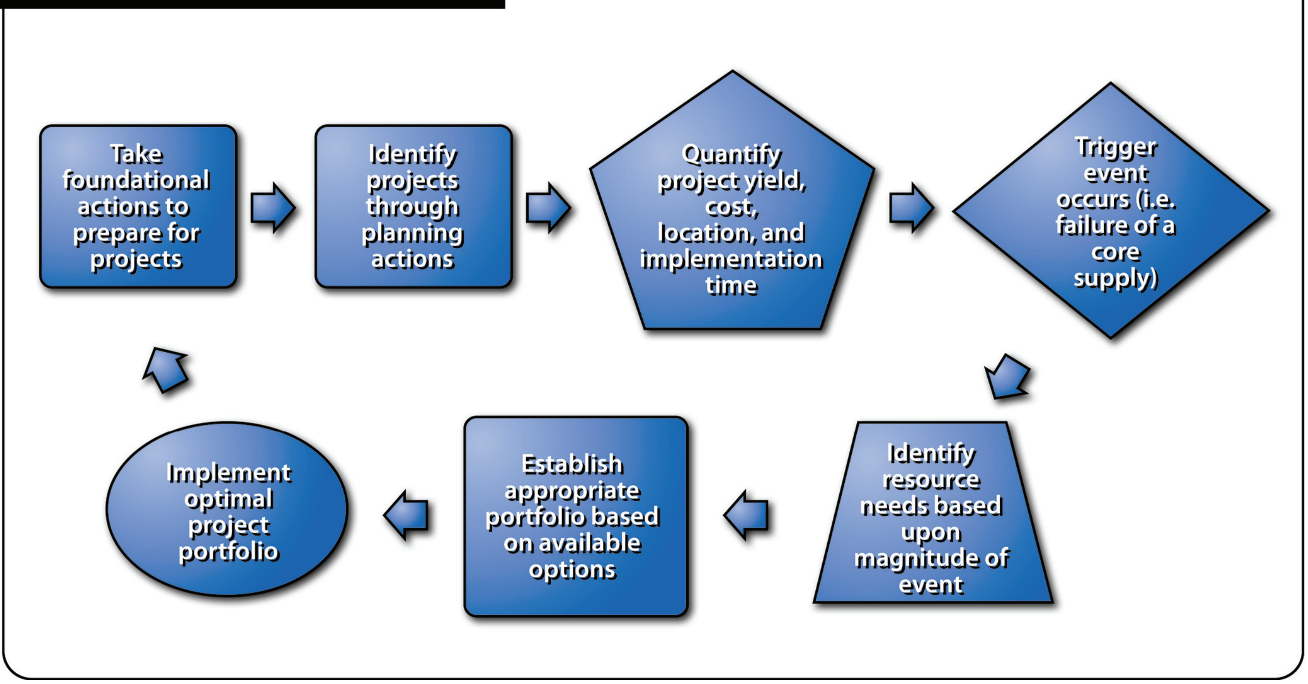


Table 2-2
Stormwater Issue Categories and Implementation Elements

Category	Implementation Element
Data Management	Regional Water Supply Project Database
Legislative/Regulatory/Education	Regional Synergy Task Force
Procedural	Regional Implementation Partnerships
Technical	Regional Feasibility Study
Funding	Funding Strategy Plan
Operational	Local Resource Baseline Plan
Implementation Planning	Alternatives Analysis Plan
Project Implementation	Incentive Programs Land Acquisition Advanced Planning Design Construction
Post Construction	O&M Performance Monitoring

Table 2-3
Recycled Water Issue Categories and Implementation Elements

Category	Implementation Element
Public Perception	Recycled Marketing Campaign Recycled Water Educational Campaign
Legislative	Recycled Water Legislative Task Force
Funding	Regional Recycled Water Finance Committee
Procedural	Regional Recycled Water Permitting and Inspection JPA Regional Recycled Water Policy Task Force
Operational	Regional Salt Management Plan Regional Basin Management Plan Recycled Water Blue Ribbon Panel (SWRCB) Regional Recycled Water Facility Plan
Facility	Regional Project (CIP) Implementation Joint Groundwater Replenishment Project

Table 2-4
Graywater Issue Categories and Implementation Elements

Category	Implementation Element
Public Perception	Graywater Marketing Campaign Graywater Educational Campaign
Legislative	Graywater Legislative Task Force
Technical	Regional Graywater Feasibility Study
Funding	Regional Graywater Finance Committee
Procedural	Regional Graywater Permitting and Inspection Regional Graywater Policy Task Force
Operational	Regional Graywater Management Plan
Construction	Regional Project Implementation

Table 2-5
Desalination Issue Categories and Implementation Elements

Category	Implementation Element
Data Management	Regional Water Supply Project Database
Legislative/Regulatory/Education	Regional Synergy Task Force
Procedural	Regional Implementation Partnerships
Technical	Regional Feasibility Study
Funding	Funding Strategy Plan
Operational	Local Resource Baseline Plan
Project Implementation	Incentive Programs Alternatives Analysis Plan Land Acquisition Advanced Planning Design Construction
Post Construction	O&M Performance Monitoring

Innovative approaches are critical to meeting the water supply needs of Southern California. Maintaining reliable water supplies given regulatory uncertainty, competing uses of groundwater and surface water, and overall variability in water supply is a growing challenge. An adaptive regional approach that develop, promote, and practice integrated regional water management of both traditional and emerging supplies may be the key to continued regional reliability.

2.2 Evaluating Supply Reliability

The Urban Water Management Plan Act requires that three basic planning analyses be conducted to evaluate supply reliability. The first is a water supply reliability assessment requiring development of a detailed evaluation of the supplies necessary to meet projected demands over at least a 20-year period. This analysis is to consider average, single-year and multi-year drought conditions. The second is a water shortage contingency plan which documents the actions that would be implemented in addressing up to a 50 percent reduction in an agency's supplies. Finally, a plan must be developed specifying the steps that would be taken under a catastrophic interruption in water supplies.

To address these three requirements, Metropolitan developed estimates of future demands and supplies from local sources and from Metropolitan. Supply and demand analyses for the single- and multi-year drought cases were based on conditions affecting the SWP. For this supply source, the single driest year was 1977 and the three-year dry period was 1990-1992. The SWP is the appropriate point of reference for these analyses since it is Metropolitan's largest and most variable supply. For the "average" year analysis 83 years of historic hydrology (1922-2004) were used to estimate supply and demand.

Estimating Demands on Metropolitan

Metropolitan developed its demand forecast by first estimating total retail demands for its service area and then factoring out water savings attributed to conservation.[2] Projections of local supplies then were derived using data on current and expected local supply programs and the IRP Local Resource Program Target. The resulting difference between total demands net of conservation and local supplies is the expected regional demands on Metropolitan supplies. These various estimates are shown in Tables 2-6 through 2-8. Major categories used in these tables are defined below.

Total Demands

Total demand is the sum of retail demand for M&I and agricultural, seawater barrier demand, and replenishment demand. Total demand represents the total amount of water needed by the member agencies. Total demands include:

- Retail Municipal and Industrial (M&I) — Retail Municipal and Industrial (M&I) demands represent the full spectrum of urban water use within the region. These include residential, commercial, industrial, institutional and un-metered water uses. To forecast urban water demands Metropolitan used the MWD-MAIN Water Use Forecasting System (MWD-Main), consisting of econometric models that have been adapted for conditions in Southern California. The demographic and economic data used in developing these forecasts were taken from the Southern California Association of Government's (SCAG) 2007 Regional Transportation Plan and from the San Diego County Association of Government's (SANDAG) Series 12: 2050 Regional Growth Forecast (Feb 2010). The SCAG and SANDAG regional growth forecasts are the core assumptions that drive the estimating equations in Metropolitan's MWD-MAIN demand forecasting model. SCAG and SANDAG's projections undergo extensive local review and incorporate zoning information from city and county general plans and are backed by Environmental Impact Reports.

  Impacts of potential annexation are not included in the demand projections for the 2010 RUWMP. However, Metropolitan's Review of Annexation Procedures concluded that the impacts of annexation within the service area beyond 2020 would not exceed 2 percent of overall demands.

[2] Information generated as part of this analysis are contained in Appendix A-1.

- Retail Agricultural Demand — Retail agricultural demands consist of water use for irrigating crops. Member agencies estimate agricultural water use based on many factors, including farm acreage, crop types, historical water use, and land use conversion. Each member agency estimates their agricultural demand differently, depending on the availability of information. Metropolitan relies on member agencies' estimates of agricultural demands for the 2010 RUWMP
- Seawater Barrier Demand — Seawater barrier demands represent the amount of water needed to hold back seawater intrusion into the coastal groundwater basins. Groundwater management agencies determine the barrier requirements based on groundwater levels, injection wells, and regulatory permits.
- Replenishment Demand — Replenishment demands represent the amount of water member agencies plan to use to replenish their groundwater basins. For the 2010 RUWMP, replenishment deliveries are not included as part of firm demands.

Conservation Adjustment

The conservation adjustment subtracts estimated conservation from total retail demand. The conservation estimates consist of three types:

- Code-Based Conservation — Water savings resulting from plumbing codes and other institutionalized water efficiency measures.
- Active Conservation — Water saved as a direct result of programs and practices directly funded by a water utility (e.g., measures outlined by the California Urban Water Conservation Council's "Best Management Practices"). Water savings from active conservation currently completed will decline to zero as the lifetime of those devices is reached. This will be offset by an increase in water savings for those devices that are mandated by law, plumbing codes or other efficiency standards.
- Price Effect Conservation — Reductions in customer use attributable to changes in the real (inflation adjusted) cost of water.

Water Use Reduction Target

On November 10, 2009, the state Legislature passed Senate Bill 7 as part of the Seventh Extraordinary Session, referred to as SBX7-7. This new law is the water conservation component of the historic Delta legislative package, and seeks to achieve a 20 percent statewide reduction in urban per capita water use in California by December 31, 2020. According to Water Code §10608.36, wholesale agencies are required to include in their UWMPs an assessment of present and proposed future measures, programs, and policies that would help achieve the water use reductions required under SBX7-7. Urban wholesale water suppliers are not required to comply with the target-setting and reporting requirements of SBX7-7. Additional discussion of the water reduction target is included in Section 3.7.

Based on Metropolitan' s analysis of population and demand and the methodologies for setting targets described in the legislation, compliance with 20x2020 on an individual agency basis throughout the region would result in reduced potable demand of 380 TAF in 2020 through additional conservation and/or recycling. This estimated amount is reflected in the projected demand tables under 20x2020 Retail Compliance.

Local Supplies

Local supplies represent a spectrum of water produced by the member agencies to meet their total demands. Local supplies are a key component in determining how much Metropolitan supply is needed to supplement member agencies local supplies to meet their total demand. Projections of local supplies relied on information gathered from a number of sources including past urban water management plans, Metropolitan's annual local production surveys, and communications between Metropolitan and member agency staff. Local supplies include:

- Groundwater and Surface Water — Groundwater production consists of extractions from local groundwater basins. Surface water comes from stream diversions and rainwater captured in reservoirs.
- The Los Angeles Aqueduct — A major source of imported water is conveyed from the Owens Valley via the Los Angeles Aqueduct (LAA) by LADWP. Although LADWP imports water from outside of Metropolitan's service area, Metropolitan classifies water provided by the LAA as a local resource because it is developed and controlled by a local agency.
- Seawater desalination — Seawater desalinated for potable use.
- Groundwater Recovery and Recycled Water — Locally developed and operated, groundwater recovery projects treat contaminated groundwater to meet potable use standards. Recycled water projects recycle wastewater for municipal and industrial use.
- Non-Metropolitan Imports — Water supplies imported by member agencies from sources outside of the Metropolitan service area.

The local supply projections presented in demand tables include existing projects that are currently producing water and projects that are under construction. Appendix A.5 contains a complete list of existing, under construction, fully designed with appropriated funds, feasibility, and conceptual projects that are within the service area.

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 principle has been retained in the current update.

This goal allows for intermittent interruptions to non-firm, discounted rate supplies sold under the Replenishment and Interim Agricultural Water Programs. Thus, firm demand on Metropolitan equals Full Service demands (Tier I and Tier II). 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 2-6 through 2-8 show estimates of firm demands on Metropolitan for single dry-year, multiple dry-year, and average year.

Table 2-6
Metropolitan Regional Water Demands
Single Dry Year
(Acre-Feet)

		2015	2020	2025	2030	2035
A.	**Total Demands[1]**	**5,480,000**	**5,662,000**	**5,804,000**	**5,961,000**	**6,101,000**
	Retail Municipal and Industrial	5,000,000	5,194,000	5,354,000	5,515,000	5,653,000
	Retail Agricultural	231,000	213,000	193,000	186,000	186,000
	Seawater Barrier	71,000	72,000	72,000	72,000	72,000
	Groundwater Replenishment	177,000	184,000	186,000	188,000	191,000
B.	**Total Conservation**	**936,000**	**967,000**	**1,033,000**	**1,096,000**	**1,156,000**
	Existing Active (through 2009)[2]	97,000	46,000	16,000	2,000	0
	Code-based and Price-Effect	589,000	671,000	766,000	844,000	906,000
	Pre-1990 Conservation	250,000	250,000	250,000	250,000	250,000
C.	**SBx7-7 Water Conservation**	**190,000**	**380,000**	**380,000**	**380,000**	**380,000**
	20% by 2020 Retail-Level Compliance	190,000	380,000	380,000	380,000	380,000
D.	**Total Local Supplies**	**2,260,000**	**2,322,000**	**2,366,000**	**2,405,000**	**2,419,000**
	Groundwater	1,457,000	1,395,000	1,407,000	1,423,000	1,416,000
	Surface Water	98,000	97,000	97,000	97,000	97,000
	Los Angeles Aqueduct	66,000	66,000	66,000	66,000	66,000
	Groundwater Recovery	101,000	108,000	114,000	120,000	126,000
	Total Recycling	348,000	375,000	394,000	410,000	426,000
	Other Imported Supplies	190,000	281,000	288,000	288,000	288,000
E.	**Total Metropolitan Demands (E=A-B-C-D)**	**2,094,000**	**1,993,000**	**2,025,000**	**2,080,000**	**2,146,000**
	Full Service (Tier I and Tier II)	1,991,000	1,889,000	1,921,000	1,974,000	2,039,000
	Replenishment Service[3]	103,000	103,000	104,000	106,000	107,000
	Interim Agricultural Water Program[4]	0	0	0	0	0
3	**Firm Demands on Metropolitan[5]**	**1,991,000**	**1,889,000**	**1,921,000**	**1,974,000**	**2,039,000**

Notes:
All units are acre-feet unless specified, rounded the nearest thousand.
Totals may not sum due to rounding.
[1] Growth projections are based on SCAG 2007 Regional Transportation Plan and SANDAG Series 12 2050 Regional Growth Forecast (Feb 2010).
[2] Includes code-based, price-effect and existing active savings through 2009; does not include future active conservation savings. 1990 is base year.
[3] Replenishment Service as defined in MWD Administrative Code Section 4114. Replenishment service includes direct and in-lieu replenishment.
[4] IAWP deliveries will be phased out by 2013.
[5] Firm demand on Metropolitan equals Full Service demands plus 70% of the Interim Agricultural Water Program demands.

Table 2-7
Metropolitan Regional Water Demands
Multiple Dry Year
(Acre-Feet)

		2015	2020	2025	2030	2035
A.	**Total Demands[1]**	**5,478,000**	**5,702,000**	**5,862,000**	**6,017,000**	**6,161,000**
	Retail Municipal and Industrial	5,004,000	5,232,000	5,409,000	5,572,000	5,715,000
	Retail Agricultural	231,000	214,000	195,000	185,000	184,000
	Seawater Barrier	71,000	71,000	72,000	72,000	72,000
	Groundwater Replenishment	172,000	184,000	187,000	188,000	190,000
B.	**Total Conservation**	**936,000**	**967,000**	**1,033,000**	**1,096,000**	**1,156,000**
	Existing Active (through 2009)[2]	97,000	46,000	16,000	2,000	0
	Code-based and Price-Effect	589,000	671,000	766,000	844,000	906,000
	Pre-1990 Conservation	250,000	250,000	250,000	250,000	250,000
C.	**SBx7-7 Water Conservation**	**190,000**	**380,000**	**380,000**	**380,000**	**380,000**
	20% by 2020 Retail-Level Compliance	190,000	380,000	380,000	380,000	380,000
D.	**Total Local Supplies**	**2,171,000**	**2,305,000**	**2,343,000**	**2,378,000**	**2,402,000**
	Groundwater	1,386,000	1,389,000	1,389,000	1,397,000	1,396,000
	Surface Water	91,000	91,000	91,000	91,000	91,000
	Los Angeles Aqueduct	63,000	67,000	71,000	75,000	78,000
	Groundwater Recovery	100,000	107,000	113,000	119,000	125,000
	Total Recycling	340,000	370,000	390,000	407,000	423,000
	Other Imported Supplies	191,000	282,000	288,000	288,000	288,000
E.	**Total Metropolitan Demands (E=A-B-C-D)**	**2,154,000**	**2,049,000**	**2,106,000**	**2,163,000**	**2,224,000**
	Full Service (Tier I and Tier II)	2,056,000	1,947,000	2,003,000	2,059,000	2,119,000
	Replenishment Service[3]	97,000	102,000	103,000	104,000	104,000
	Interim Agricultural Water Program[4]	0	0	0	0	0
F.	**Firm Demands on Metropolitan[5]**	**2,056,000**	**1,947,000**	**2,003,000**	**2,059,000**	**2,119,000**

Notes:
All units are acre-feet unless specified, rounded the nearest thousand.
Totals may not sum due to rounding.
[1]Growth projections are based on SCAG 2007 Regional Transportation Plan and SANDAG Series 12 2050 Regional Growth Forecast (Feb 2010).
[2]Includes code-based, price-effect and existing active savings through 2009; does not include future active conservation savings. 1990 is base year.
[3]Replenishment Service as defined in MWD Administrative Code Section 4114. Replenishment service includes direct and in-lieu replenishment.
[4]IAWP deliveries will be phased out by 2013.
[5]Firm demand on Metropolitan equals Full Service demands plus 70% of the Interim Agricultural Water Program demands.

Table 2-8
Metropolitan Regional Water Demands
Average Year
(Acre-Feet)

		2015	2020	2025	2030	2035
A.	**Total Demands**[1]	**5,449,000**	**5,632,000**	**5,774,000**	**5,930,000**	**6,069,000**
	Retail Municipal and Industrial	4,978,000	5,170,000	5,330,000	5,491,000	5,627,000
	Retail Agricultural	222,000	205,000	186,000	179,000	180,000
	Seawater Barrier	71,000	72,000	72,000	72,000	72,000
	Groundwater Replenishment	178,000	185,000	187,000	189,000	191,000
B.	**Total Conservation**	**936,000**	**967,000**	**1,033,000**	**1,096,000**	**1,156,000**
	Existing Active (through 2009)[2]	97,000	46,000	16,000	2,000	0
	Code-based and Price-Effect	589,000	671,000	766,000	844,000	906,000
	Pre-1990 Conservation	250,000	250,000	250,000	250,000	250,000
C.	**SBx7-7 Water Conservation**	**190,000**	**380,000**	**380,000**	**380,000**	**380,000**
	20% by 2020 Retail-Level Compliance	190,000	380,000	380,000	380,000	380,000
D.	**Total Local Supplies**	**2,395,000**	**2,522,000**	**2,553,000**	**2,581,000**	**2,603,000**
	Groundwater	1,429,000	1,430,000	1,429,000	1,431,000	1,431,000
	Surface Water	103,000	102,000	102,000	102,000	102,000
	Los Angeles Aqueduct	224,000	225,000	226,000	229,000	230,000
	Groundwater Recovery	101,000	108,000	114,000	120,000	126,000
	Total Recycling	348,000	375,000	394,000	410,000	426,000
	Other Imported Supplies	190,000	281,000	288,000	288,000	288,000
E.	**Total Metropolitan Demands (E=A-B-C-D)**	**1,928,000**	**1,763,000**	**1,808,000**	**1,874,000**	**1,931,000**
	Full Service (Tier I and Tier II)	1,826,000	1,660,000	1,705,000	1,769,000	1,826,000
	Replenishment Service[3]	102,000	103,000	103,000	104,000	105,000
	Interim Agricultural Water Program[4]	0	0	0	0	0
F.	**Firm Demands on Metropolitan**[5]	**1,826,000**	**1,660,000**	**1,705,000**	**1,769,000**	**1,826,000**

Notes:
All units are acre-feet unless specified, rounded the nearest thousand.
Totals may not sum due to rounding.
[1] Growth projections are based on SCAG 2007 Regional Transportation Plan and SANDAG Series 12 2050 Regional Growth Forecast (Feb 2010).
[2] Includes code-based, price-effect and existing active savings through 2009; does not include future active conservation savings. 1990 is base year.
[3] Replenishment Service as defined in MWD Administrative Code Section 4114. Replenishment service includes direct and in-lieu replenishment.
[4] IAWP deliveries will be phased out by 2013.
[5] Firm demand on Metropolitan equals Full Service demands plus 70% of the Interim Agricultural Water Program demands.

2.3 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 2-9 summarizes the sources of supply for the single dry year (1977 hydrology), while Table 2-10 shows the region's ability to respond in future years under a repeat of the 1990-92 hydrology. Table 2-10 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 2-11 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.

Metropolitan' s supply capabilities are evaluated using the following assumptions:

Colorado River Aqueduct Supplies

Colorado River Aqueduct supplies include supplies that would result from existing and committed programs and from implementation of the Quantification Settlement Agreement (QSA) and related agreements. The QSA, which is the subject of current litigation, is a component of the California Plan and establishes the baseline water use for each of the agreement parties and facilitates the transfer of water from agricultural agencies to urban uses. A detailed discussion of the QSA is included in Section 3. Colorado River transactions are potentially available to supply additional water up to the CRA capacity of 1.25 MAF on an as-needed basis.

State Water Project Supplies

State Water Project (SWP) supplies are estimated using the draft 2009 SWP Delivery Reliability Report distributed by DWR in December 2009. The draft 2009 reliability report presents the current DWR estimate of the amount of water deliveries for current (2009) conditions and conditions 20 years in the future. These estimates incorporate restrictions on SWP and Central Valley Project (CVP) operations in accordance with the biological opinions of the U.S. Fish and Wildlife Service and National Marine Fishery Service issued on December 15, 2008, and June 4, 2009, respectively. Under the 2009 draft reliability report, the delivery estimates for the SWP for current (2009) conditions as percentage of maximum Table A amounts, are seven percent, equivalent to 134 TAF, under a single dry-year (1977) condition and 60%, equivalent to 1.15 MAF, under long-term average condition.

In dry, below-normal conditions, Metropolitan has increased the supplies received from the California Aqueduct by developing flexible Central Valley storage and transfer programs. Over the last two years under the pumping restrictions of the SWP, Metropolitan has worked collaboratively with the other contractors to develop numerous voluntary Central Valley storage and transfer programs. The goal of this storage/transfer programs is to develop additional dry-year supplies that can be conveyed through the available Banks pumping capacity to maximize deliveries through the California Aqueduct during dry hydrologic conditions and regulatory restrictions.

Delta Improvements

The listing of several fish species as threatened or endangered under the federal or California Endangered Species Acts (ESAs) have adversely impacted operations and limited the flexibility of the SWP. In response to court decisions related to the Biological Opinions for fish species listed under the ESAs, DWR altered the operations of the SWP. This resulted in export restrictions and reduced SWP deliveries. In June 2007, Metropolitan's Board approved a Delta Action Plan that provides a framework for staff to pursue actions with other agencies and stakeholders to build a sustainable Delta and reduce conflicts between water supply conveyance and the environment. The Delta Action Plan aims to prioritize immediate short-term actions to stabilize the Delta while an ultimate solution is selected, and mid-term steps to maintain the Bay-Delta while the long-term solution is implemented.

In the near-term, the physical and operational actions in the Bay-Delta being developed include measures that protect fish species and reduce supply impacts with the goal of reducing conflicts between water supply conveyance and environmental needs. The potential for Increased supply due to these near-term fixes is included in the 2010 RUWMP as a 10 percent increase in water supplies obtained from the SWP allocation for the year. In evaluating the supply capabilities for the 2010 RUWMP, additional supplies from this interim fix are assumed to materialize by 2013. Also included as a possible near-term fix for the Bay-Delta is the proposed Two-Gate System demonstration program, which would provide movable barriers on the Old and Middle Rivers to modify flows and prevent fish from being drawn toward the Bay-Delta pumping plants. The Two-Gate System is anticipated to protect fish and increase SWP supplies.

Operational constraints likely will continue until a long-term solution to the problems in the Bay-Delta is identified and implemented. State and federal resource agencies and various environmental and water user entities are currently engaged in the development of the Bay Delta Conservation Plan (BDCP), which is aimed at addressing the basic elements that include the Delta ecosystem restoration, water supply conveyance, and flood control protection and storage development. In dealing with these basic issues, the ideal solutions sought are the ones that address both the physical changes required as well as the financing and governance. In evaluating the supply capabilities for the 2010 RUWMP, Metropolitan assumed a new Delta conveyance is fully operational by 2022 that would return supply reliability similar to 2005 condition, prior to supply restrictions imposed due to the Biological Opinions. This assumption is consistent with Metropolitan's long-term Delta Action Plan that recognizes the need for a global, comprehensive approach to the fundamental issues and conflicts to result in a sustainable Bay-Delta, sufficient to avoid biological opinion restrictions on planned SWP deliveries to Metropolitan and the other SWP Contractors. Further, recently passed state legislation included pathways for establishing governance structures and financing approaches to implement and manage the identified elements.

Storage

A key component of Metropolitan's water supply capability is the amount of water in Metropolitan's storage facilities. Storage is a major component of Metropolitan's dry-year resource management strategy. Metropolitan's likelihood of having adequate supply capability to meet projected demands, without implementing the Water Supply Allocation plan (WSAP), is dependent on its storage resources.

In developing the supply capabilities for the 2010 RUWMP, Metropolitan assumed a simulated median storage level going into each of five-year increments based on the balances of supplies and demands. Under the median storage condition, there is an estimated 50 percent probability that storage levels would be higher than the assumption used, and a 50 percent probability that storage levels would be lower than the assumption used. All storage capability figures shown in the 2010 RUWMP reflect actual storage program conveyance constraints. It is important to note that under some conditions, Metropolitan may choose to implement the WSAP in order to preserve storage reserves for a future year, instead of using the full supply capability. This can result in impacts at the retail level even under conditions where there may be adequate supply capabilities to meet demands.

Table 2-9
Single Dry-Year
Supply Capability[1] and Projected Demands
Repeat of 1977 Hydrology
(acre-feet per year)

Forecast Year	2015	2020	2025	2030	2035
Current Programs					
In-Region Storage and Programs	685,000	931,000	1,076,000	964,000	830,000
California Aqueduct[2]	522,000	601,000	651,000	609,000	610,000
Colorado River Aqueduct					
Colorado River Aqueduct Supply[3]	1,416,000	1,824,000	1,669,000	1,419,000	1,419,000
Aqueduct Capacity Limit[4]	*1,250,000*	*1,250,000*	*1,250,000*	*1,250,000*	*1,250,000*
Colorado River Aqueduct Capability	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000
Capability of Current Programs	**2,457,000**	**2,782,000**	**2,977,000**	**2,823,000**	**2,690,000**
Demands					
Firm Demands of Metropolitan	1,991,000	1,889,000	1,921,000	1,974,000	2,039,000
IID-SDCWA Transfers and Canal Linings	180,000	273,000	280,000	280,000	280,000
Total Demands on Metropolitan[5]	**2,171,000**	**2,162,000**	**2,201,000**	**2,254,000**	**2,319,000**
Surplus	**286,000**	**620,000**	**776,000**	**569,000**	**371,000**
Programs Under Development					
In-Region Storage and Programs	206,000	306,000	336,000	336,000	336,000
California Aqueduct	556,000	556,000	700,000	700,000	700,000
Colorado River Aqueduct					
Colorado River Aqueduct Supply[3]	187,000	187,000	187,000	182,000	182,000
Aqueduct Capacity Limit[4]	*0*	*0*	*0*	*0*	*0*
Colorado River Aqueduct Capability	0	0	0	0	0
Capability of Proposed Programs	**762,000**	**862,000**	**1,036,000**	**1,036,000**	**1,036,000**
Potential Surplus	**1,048,000**	**1,482,000**	**1,812,000**	**1,605,000**	**1,407,000**

[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 programs, IID-SDCWA transfers and canal linings conveyed by the aqueduct.

[4] Maximum CRA deliveries limited to 1.25 MAF including IID-SDCWA transfers and canal linings.

[5] Firm demands are adjusted to include IID-SDCWA transfers and canal linings. These supplies are calculated as local supply, but need to be shown for the purposes of CRA capacity limit calculations without double counting.

Table 2-10
Multiple Dry-Year
Supply Capability[1] and Projected Demands
Repeat of 1990-1992 Hydrology
(acre-feet per year)

Forecast Year	2015	2020	2025	2030	2035
Current Programs					
In-Region Storage and Programs	246,000	373,000	435,000	398,000	353,000
California Aqueduct[2]	752,000	794,000	835,000	811,000	812,000
Colorado River Aqueduct					
Colorado River Aqueduct Supply[3]	1,318,000	1,600,000	1,417,000	1,416,000	1,416,000
Aqueduct Capacity Limit[4]	*1,250,000*	*1,250,000*	*1,250,000*	*1,250,000*	*1,250,000*
Colorado River Aqueduct Capability	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000
Capability of Current Programs	**2,248,000**	**2,417,000**	**2,520,000**	**2,459,000**	**2,415,000**
Demands					
Firm Demands of Metropolitan	2,056,000	1,947,000	2,003,000	2,059,000	2,119,000
IID-SDCWA Transfers and Canal Linings	180,000	241,000	280,000	280,000	280,000
Total Demands on Metropolitan[5]	**2,236,000**	**2,188,000**	**2,283,000**	**2,339,000**	**2,399,000**
Surplus	**12,000**	**229,000**	**237,000**	**120,000**	**16,000**
Programs Under Development					
In-Region Storage and Programs	162,000	280,000	314,000	336,000	336,000
California Aqueduct	242,000	273,000	419,000	419,000	419,000
Colorado River Aqueduct					
Colorado River Aqueduct Supply[3]	187,000	187,000	187,000	182,000	182,000
Aqueduct Capacity Limit[4]	*0*	*0*	*0*	*0*	*0*
Colorado River Aqueduct Capability	0	0	0	0	0
Capability of Proposed Programs	**404,000**	**553,000**	**733,000**	**755,000**	**755,000**
Potential Surplus	**416,000**	**782,000**	**970,000**	**875,000**	**771,000**

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 programs, IID-SDCWA transfers and canal linings conveyed by the aqueduct.

4 Maximum CRA deliveries limited to 1.25 MAF including IID-SDCWA transfers and canal linings.

5 Firm demands are adjusted to include IID-SDCWA transfers and canal linings. These supplies are calculated as local supply, but need to be shown for the purposes of CRA capacity limit calculations without double counting.

Table 2-11
AverageYear
Supply Capability[1] and Projected Demands
Average of 1922-2004 Hydrologies
(acre-feet per year)

Forecast Year	2015	2020	2025	2030	2035
Current Programs					
In-Region Storage and Programs	685,000	931,000	1,076,000	964,000	830,000
California Aqueduct[2]	1,550,000	1,629,000	1,763,000	1,733,000	1,734,000
Colorado River Aqueduct					
Colorado River Aqueduct Supply[3]	1,507,000	1,529,000	1,472,000	1,432,000	1,429,000
Aqueduct Capacity Limit[4]	*1,250,000*	*1,250,000*	*1,250,000*	*1,250,000*	*1,250,000*
Colorado River Aqueduct Capability	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000
Capability of Current Programs	**3,485,000**	**3,810,000**	**4,089,000**	**3,947,000**	**3,814,000**
Demands					
Firm Demands of Metropolitan	1,826,000	1,660,000	1,705,000	1,769,000	1,826,000
IID-SDCWA Transfers and Canal Linings	180,000	273,000	280,000	280,000	280,000
Total Demands on Metropolitan[5]	**2,006,000**	**1,933,000**	**1,985,000**	**2,049,000**	**2,106,000**
Surplus	**1,479,000**	**1,877,000**	**2,104,000**	**1,898,000**	**1,708,000**
Programs Under Development					
In-Region Storage and Programs	206,000	306,000	336,000	336,000	336,000
California Aqueduct	382,000	383,000	715,000	715,000	715,000
Colorado River Aqueduct					
Colorado River Aqueduct Supply[3]	187,000	187,000	187,000	182,000	182,000
Aqueduct Capacity Limit[4]	*0*	*0*	*0*	*0*	*0*
Colorado River Aqueduct Capability	0	0	0	0	0
Capability of Proposed Programs	**588,000**	**689,000**	**1,051,000**	**1,051,000**	**1,051,000**
Potential Surplus	**2,067,000**	**2,566,000**	**3,155,000**	**2,949,000**	**2,759,000**

[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 programs, IID-SDCWA transfers and canal linings conveyed by the aqueduct.

[4] Maximum CRA deliveries limited to 1.25 MAF including IID-SDCWA transfers and canal linings.

[5] Firm demands are adjusted to include IID-SDCWA transfers and canal linings. These supplies are calculated as local supply, but need to be shown for the purposes of CRA capacity limit calculations without double counting.

2.4 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 percent 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. Furthermore, Metropolitan developed the WSAP which provides a standardized methodology for allocating supplies during times of shortage.

Water Surplus and Drought Management Plan

In April 1999, Metropolitan's Board adopted the Water Surplus and Drought Management Plan (WSDM Plan) [3], included in Appendix A.4. It provides policy guidance for managing regional water supplies to achieve the reliability goals of the IRP and identifies the expected sequence of resource management actions that Metropolitan will execute during surpluses and shortages to minimize the probability of severe shortages and reduce 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.

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:

- 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 become 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

WSDM Plan Implementation

Each year, Metropolitan evaluates the level of supplies available and existing levels of water in storage to determine the appropriate management stage. Each stage is associated with specific resource

[3] Metropolitan Water District of Southern California. *Water Surplus and Drought Management Plan,* Report No. 1150, August, 1999.

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. The WSDM Plan further defines five surplus management stages that guide the storage of surplus supplies in Metropolitan's storage portfolio. Deliveries for storage in the DVL and in the SWP terminal reservoirs continue through each surplus stage provided there is available storage capacity. Withdrawals from DVL for regulatory purposes or to meet seasonal demands may occur in any stage. Deliveries to other storage facilities may be interrupted, depending on the amount of the surplus.

Shortage Stages
The WSDM Plan distinguishes between Shortages, Severe Shortages, and Extreme Shortages. Within the WSDM Plan, these terms have specific meaning relating to Metropolitan's ability to deliver water to its customers.

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 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.

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, exercising water transfer options, or purchasing water on the open market.

Figure 2-2 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.

At shortage stage 7 Metropolitan will implement its Water Supply Allocation Plan[4] (WSAP) to allocate available supply fairly and efficiently to full-service customers.

Water Supply Allocation Plan

In February 2008 Metropolitan's Board adopted the WSAP. The WSAP includes the specific formula for calculating member agency supply allocations and the key implementation elements needed for administering an allocation.

The WSAP was developed in consideration of the principles and guidelines described in the

[4] Metropolitan Water District of Southern California, Water Supply Allocation Plan, June 2009.

WSDM Plan, with the objective of creating an equitable needs-based allocation. The WSAP formula seeks to balance the impacts of a shortage at the retail level while maintaining equity on the wholesale level for shortages of Metropolitan supplies of up to 50 percent. The formula takes into account growth, local investments, changes in supply conditions and the demand hardening aspects of non-potable recycled water use and the implementation of conservation savings programs.

Water Supply Allocation Plan Development

Between July 2007 and February 2008, Metropolitan staff worked jointly with Metropolitan's member agencies to develop the WSAP. Throughout the development process Metropolitan's Board was provided with regular progress reports on the status of the WSAP The WSAP was adopted at the February 12, 2008 Board meeting.

<u>The WSAP Formula</u>
The WSAP formula is calculated in three steps: base period calculations, allocation year calculations, and supply allocation calculations. The first two steps involve standard computations, while the third step contains specific methodology developed for the WSAP.

Step 1: Base Period Calculations

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

Step 2: Allocation Year Calculations

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

Step 3: Supply Allocation Calculations

The final step is calculating the water supply allocation for each member agency based on the allocation year water needs identified in Step 2. Each element and its application in the allocation formula is discussed in detail in Metropolitan's Water Supply Allocation Plan.[5]

<u>Annual Reporting Schedule on Supply/ Demand Conditions</u>
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, and for making resource allocation decisions. Table 2-12 shows this schedule.

[5] Metropolitan Water District of Southern California, Water Supply Allocation Plan, June 2009.

Figure 2-2 Resource Stages, Anticipated Actions, And Supply Declarations

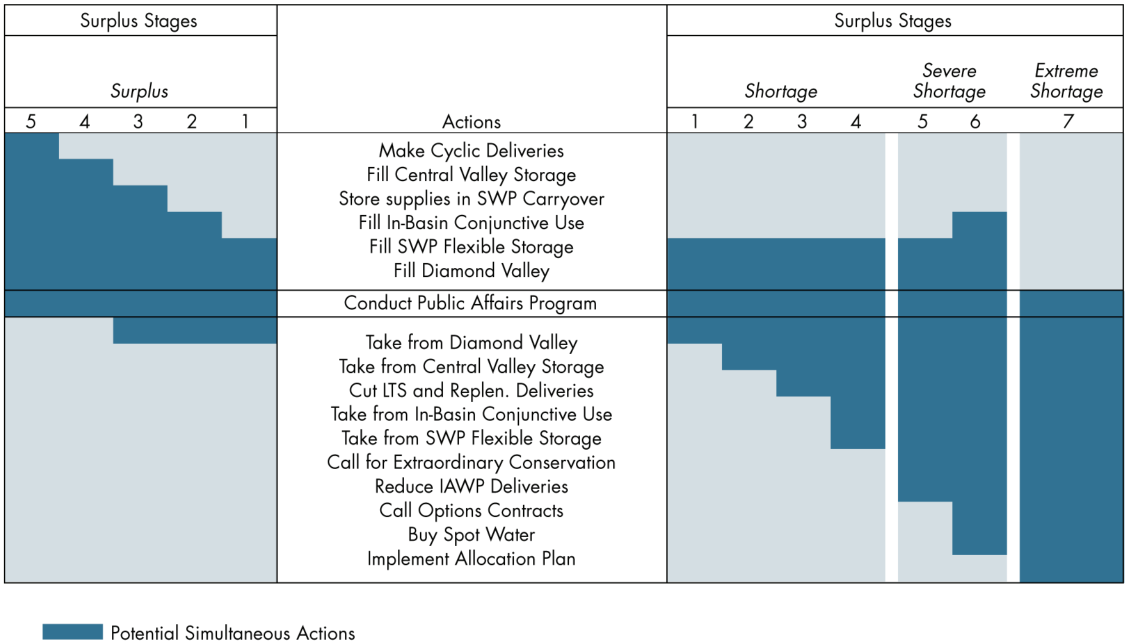


Table 2-12
Schedule of Reporting and Resource Allocation Decision-Making

Month	Information Report/Management Decision
January	Initial supply/demand forecasts for year
February - March	Update supply/demand forecasts for year
April - May	Finalize supply/demand forecasts Management decisions re: Contractual Groundwater and Option Transfer Programs Board decision re: Need for Extraordinary Conservation
October - December	Report on Supply and Carryover Storage
October	Management decisions re: Delivery Interruptions for the Replenishment and Interim Agricultural Water Programs

2.5 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 the 1996 IRP. Metropolitan's Board has approved both of these documents.

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, non-firm 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 up to half of DVL 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.

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 regional reservoirs such as DVL, Lake Mathews, Castaic Lake and Silverwood 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.

2.6 Other Supply Reliability Risks

Metropolitan provides water to a broad and heterogeneous service area with water supplies from a variety of sources and geographic regions. Each of these demand areas and supplies has its own unique set of benefits and challenges. Among the challenges Metropolitan faces are the following:

Supplies

- The region and Colorado River Basin have been experiencing drought conditions for multiple years.
- Endangered species protections and conveyance needs in the Sacramento-San Joaquin River Delta System have resulted in operational constraints particularly important because pumping restrictions impact many water resource programs – SWP supplies and additional voluntary transfers, Central Valley storage and transfers, in-region groundwater storage and in-region surface water storage.
- Changing climate patterns are predicted to shift precipitation patterns and possibly affect water supply.
- Difficulty and implications of environmental review, documentation, and permitting for multi-year transfer agreements, recycled water projects and seawater desalination plants.
- Public perception of recycled water use for replenishment.

Operations and Water Quality

- The cost and use of energy and greenhouse gas emissions.
- Water quality regulations and issues like the quagga mussels within the Colorado River Aqueduct. Controlling the spread and impacts of the quagga mussels will require more extensive maintenance and reduced operational flexibility.
- Salt and concentrate balance from variety of sources.

Demand

- Uncertain population and economic growth
- Uncertain location of growth
- Uncertain housing stock and density

The challenges posed by continued population growth, environmental constraints on the reliability of imported supplies, and new uncertainties imposed by climate change demand that Metropolitan assert the same level of leadership and commitment to taking on large-scale regional solutions to providing water supply reliability. New solutions are available in the form of dramatically improved water-use efficiency, indirect potable use of recycled water, and large-scale application of ocean desalinization.

Climate Change

Climate change adds its own new uncertainties to the challenges of planning. Metropolitan's water supply planning has been fortunate in having almost one-hundred years of hydrological data regarding weather and water supply. This history of rainfall data has provided a sound foundation for forecasting both the frequency and the severity of future drought conditions, as well as the frequency and abundance of above-normal rainfall. But, weather patterns can be expected to shift dramatically and unpredictably in a climate driven by increased concentrations of carbon dioxide in the atmosphere, as experienced in Australia. These changes in weather significantly affect water supply planning, irrespective of the debate associated with the sources and cause of increasing concentrations of greenhouse gasses. As a major steward of the region's water supply resources, Metropolitan is committed to performing its due diligence with respect to climate change.

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 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; and
- Alterations to power generation and pumping regimes.

Metropolitan's Activities Related to Climate Change Concerns

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.'

<u>Knowledge Sharing and Research Support</u>
Metropolitan is an active and founding member of the Water Utility Climate Alliance (WUCA). WUCA consists of ten nationwide water providers collaborating on climate change adaptation and green house gas mitigation issues. As a part of this effort, WUCA pursues a variety of activities on multiple fronts.

WUCA monitors development of climate change-related research, technology, programs and federal legislation. Activities to date include such things as:

- Letter of support for Western Water Assessment's continued funding as a Regional Integrated Sciences and Assessments team under the National Oceanic and Atmospheric Administration (NOAA)
- Letter of support for the 2009 Kerry-Boxer Water Utilities Mitigation and Adaptation Partnerships congressional bill addendum
- Regular communication and consultations with federal agencies on the U.S. Environmental Protection Agency's Climate Ready Water Utility Working Group
- NOAA Climate Service and January 2010 International Climate Change Forum

In addition to supporting federal and regional efforts, WUCA released a white paper entitled "Options for Improving Climate Modeling to Assist Water Utility Planning for Climate Change" in January 2010. The purpose of this paper was to assess Global Circulation Models, identify key aspects for water utility planning and make seven initial recommendations for how climate modeling and downscaling techniques can be improved so that these tools and techniques can be more useful for the water sector.

In order to address water provider-specific needs, WUCA has focused not only on climate change science and Global Circulation Models, but on how best to incorporate that knowledge into water planning. This was explored more thoroughly in a second January 2010 white paper on decision support methods for incorporating climate change uncertainty into water planning. This paper assessed five known decision support approaches for applicability in incorporating Climate Change uncertainty in water utility planning and identified additional research needs in the area of decision support methodologies.

In addition to these efforts, the member agencies of WUCA annually share individual agency actions to mitigate greenhouse gas emissions to facilitate further implementation of these programs. At a September 2009 summit at the Aspen Global Change Institute WUCA, members met with global climate modelers, along with federal agencies, academic scientists, and climate researchers to establish collaborative directions to progress climate science and modeling efforts. WUCA continues to pursue these opportunities and partnerships with water providers, climate scientists, federal agencies, research centers, academia and key stakeholders.

Metropolitan also continues to pursue knowledge sharing and research support activities outside of WUCA. Metropolitan regularly provides input and direction on California legislation related to climate change issues. Metropolitan is active in collaborating with other state and federal agencies, as well as non-governmental organizations on climate change related planning issues. The following list provides a sampling of entities that Metropolitan has recently worked with on a collaborative basis:

- U.S. Bureau of Reclamation
- U.S. Army Corps of Engineers
- American Water Works Association Research Foundation
- National Center for Atmospheric Research
- California Energy Commission
- California Department of Water Resources

<u>Quantification of Current Research</u>
Metropolitan continues to incorporate current climate change science into its planning efforts. A major component of the current IRP update effort is to explicitly reflect uncertainty in Metropolitan's future water management environment. This involves evaluating a wider range of water management strategies, and seeking robust and adaptive plans that respond to uncertain conditions as they evolve over time, and that ultimately will perform adequately under a wide range of future conditions. The potential impacts and risks associated with climate change, as well as other major uncertainties and vulnerabilities, will be incorporated into the update and accounted. Overall, Metropolitan's planning activities strive to support the Board adopted policy principles on climate change by:

- Supporting reasonable, economically viable, and technologically feasible management strategies for reducing impacts on water supply
- Supporting flexible "no regret" solutions that provide water supply and quality benefits while increasing the ability to manage future climate change impacts, and

- Evaluating staff recommendations regarding climate change and water resources against the California Environmental Quality Act (CEQA) to avoid adverse effects on the environment.

Implementation of Programs and Policies
Metropolitan has made great efforts to implement greenhouse gas mitigation programs and policies for its facilities and operations. To date, these programs and policies have focused on:

- Exploring water supply/energy relationships and opportunities to increase efficiencies;
- Joining the California Climate Action Registry;
- Acquiring "green" fleet vehicles, and supporting an employee Rideshare program;
- Developing solar power at the Skinner water treatment plant; and
- Identifying and pursuing development of "green" renewable water and energy programs that support the efficient and sustainable use of water.

Metropolitan also continues to be a leader in efforts to increase regional water use efficiency. Metropolitan has worked to increase the availability of incentives for local conservation and recycling projects, as well as supporting conservation Best Management Practices for industry and commercial businesses.

2.7 Pricing and Rate Structures

Revenue Management

A high proportion of Metropolitan's revenues come from volumetric water rates; during the last five fiscal years through 2008-09, water sales revenues were approximately 75 percent of Metropolitan's total revenues. As a result, Metropolitan's revenues vary according to regional weather and the availability of statewide water supplies. In dry years, local demands increase and Metropolitan may receive higher than anticipated revenues due to increased sales volumes. In contrast, in wet years demands decrease, and revenues drop due to lower sales volumes. In addition, statewide supply shortages such as those in 1991 and 2009 also affect Metropolitan's revenues. Such revenue surpluses and shortages could cause instability in water rates. To mitigate this risk, Metropolitan maintains financial 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 water sales and are used to offset the need for revenues during times of low sales.

Another way to mitigate rate increases is by generating a larger portion of revenues from fixed sources. Metropolitan currently has two fixed charges, the Readiness-to-Serve Charge and the Capacity Charge. Metropolitan also collects tax revenue from taxable property within its boundaries. For the last five fiscal years the revenues from fixed charges generated almost 18 percent of all Metropolitan revenues. RTS revenues have been increasing gradually, from $80 million in 2007, to $114 million in 2010, $125 million in 2011, and $146 million in 2012.

Finally, Metropolitan generates a significant amount of revenue from interest income, hydroelectric power sales, and miscellaneous income such as rents and leases. For the last five fiscal years, these averaged almost 7 percent of all Metropolitan revenues. These internally generated revenues are referred to as revenue offsets and reduce the amount of revenue that has to be collected from rates and charges.

Elements of Rate Structure

This section provides an overview of Metropolitan's rate structure. The different elements of the rate structure are discussed below and summarized in Table 2-13.

System Access Rate (SAR)

The SAR is a volumetric system-wide rate levied on each acre-foot of water that moves through the Metropolitan system. All system users (member agency or third party) pay the SAR to use Metropolitan's conveyance and distribution system. The SAR recovers the cost of providing conveyance and distribution capacity to meet average annual demands.

Water Stewardship Rate (WSR)

The WSR recovers the costs of providing financial incentives for existing and future investments in local resources including conservation and recycled water. These investments or incentive payments are identified as the "demand management" service function in the cost of service process. The WSR is a volumetric rate levied on each acre-foot of water that moves through the Metropolitan system.

System Power Rate (SPR)

The SPR recovers the costs of energy required to pump water to Southern California through the SWP 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.

Treatment Surcharge

The treatment surcharge recovers the costs of providing treated water service through a uniform, volumetric rate. The treatment surcharge recovers all costs associated with providing treated water service, including commodity, demand and standby related costs.

Capacity Charge

The capacity charge is levied on the maximum summer day demand placed on the system between May 1 and September 30 for a three-calendar year period. Demands measured for the purposes of billing the capacity charge include all firm demand and agricultural demand, including wheeling service and exchanges. Replenishment service is not included in the measurement of peak day demand for purposes of billing the capacity charge.

The capacity charge is intended to pay for the cost of peaking capacity on Metropolitan's system, while providing an incentive for local agencies to decrease their use of the Metropolitan system to meet peak day demands and to shift demands into lower use time periods. Over time, a member agency will benefit from local supply investments and operational strategies that reduce its peak day demand on the system in the form of a lower total capacity charge.

Readiness-To-Serve Charge (RTS)

The costs of providing standby service, including emergency storage and those standby costs related to the conveyance and aqueduct system, are recovered by the RTS.

The RTS is allocated to the member agencies based on each agency's proportional share of a ten-year rolling average of all firm deliveries (including water transfers and exchanges that use Metropolitan system capacity). The ten-year rolling average does not include replenishment service and interim agricultural deliveries because these deliveries will be the first to be curtailed in the event of an emergency. A ten-year rolling average leads to a relatively stable RTS allocation that reasonably represents an agency's potential long-term need for standby service under different demand conditions. Member agencies may choose to have a portion of their total RTS obligation offset by standby charge collections levied by Metropolitan on behalf of the member agency. These standby charges are assessed on parcels of land within the boundaries of a given member agency.

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 costs and reflects the cost of existing supplies. Each member agency has a predetermined amount of water that can be purchased at the lower Tier 1 Supply Rate in a calendar year. Purchases in excess of this limit will be made at the higher Tier 2 Supply Rate.

The Tier 1 Supply rate includes a Delta Supply Surcharge of $69 per AF in 2010, $51 per AF in 2011 and $58 per AF in 2012. This surcharge reflects the impact on Metropolitan's water supply rates due to lower deliveries from the SWP as a result of pumping restrictions designed to protect endangered fish species. The Delta Supply Surcharge will remain in effect until a long-term solution for the delta was achieved or until interim facility improvements restore SWP yield.

Tier 2 Supply Rate

The Tier 2 Supply Rate reflects Metropolitan's cost of developing long-term firm supplies. The Tier 2 Supply Rate recovers a greater proportion of the cost of developing additional supplies from member agencies that have increasing demands on the Metropolitan system.

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 supplies, when available, for the purpose of replenishing local storage. The Interim Agricultural Water Program (IAWP) makes surplus water available for agricultural purposes. In October 2008, the Board approved a phase out of the IAWP by 2013. Because of the critically dry conditions and uncertainty about future supply, discounted replenishment deliveries have been curtailed for the past three years. If water supply conditions improve and surplus water becomes available, Metropolitan could make Replenishment service available to its member agencies at discounted rates, subject to meeting Metropolitan's storage objectives to meet full service demands.

Table 2-13
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 ($/cfs)
Readiness-To-Serve Charge	Conveyance/Distribution/Emergency Storage(Standby Capacity)	Fixed ($Million)
Tier 1 Supply Rate	Supply	Volumetric/Fixed ($/AF)
Tier 2 Supply Rate	Supply	Volumetric ($/AF)
Surplus Water Rates	Replenishment/Agriculture	Volumetric ($/AF)

The following tables provide further information regarding Metropolitan's rates. Table 2-14 summarizes the rates and charges effective January 1, 2010, January 1, 2011, and January 1, 2012. 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, replenishment, and agricultural water purchases. Table 2-15 provides the details of the Capacity Charge, calculated for calendar year 2011.

Table 2-16 provides the details of the Readiness-to-Serve Charge calculation for calendar year 2011 broken down by member agency. Table 2-17 provides the current Purchase Order commitment quantities that member agencies will purchase from Metropolitan over the 10-year period starting January 2003 through December 2012. Tier 1 limits for each member agency are also shown in this table.

Table 2-14
Metropolitan Water Rates and Charges

Effective	Jan 1, 2010	Jan 1, 2011	Jan 1, 2012
Tier 1 Supply Rate ($/AF)	$101	$104	$106
Delta Supply Surcharge ($/AF)	$69	$51	$58
Tier 2 Supply Rate ($/AF)	$280	$280	$290
System Access Rate ($/AF)	$154	$204	$217
Water Stewardship Rate ($/AF)	$41	$41	$43
System Power Rate ($/AF)	$119	$127	$136
Full Service Untreated Volumetric Cost ($/AF)			
Tier 1	$484	$527	$560
Tier 2	$594	$652	$686
Replenishment Water Rate Untreated ($/AF)	$366	$409	$442
Interim Agricultural Water Program Untreated ($/AF)	$416	$482	$537
Treatment Surcharge ($/AF)	$217	$217	$234
Full Service Treated Volumetric Cost ($/AF)			
Tier 1	$701	$744	$794
Tier 2	$811	$869	$920
Treated Replenishment Water Rate ($/AF)	$558	$601	$651
Treated Interim Agricultural Water Program ($/AF)	$615	$687	$765
Readiness-to-Serve Charge ($M)	$114	$125	$146
Capacity Charge ($/cfs)	$7,200	$7,200	$7,400

Table 2-15
Capacity Charge Detail

	Peak Day Demand (cfs) (May 1 through September 30) Calendar Year				
Agency	**2007**	**2008**	**2009**	**3-Year Peak**	**Calendar Year 2011 Capacity Charge ($7,200/cfs)**
Anaheim	37.9	36.1	40.7	40.7	$ 293,040
Beverly Hills	33.9	32.9	31.0	33.9	244,080
Burbank	33.7	34.2	21.6	34.2	246,240
Calleguas	260.8	250.0	192.8	260.8	1,877,760
Central Basin	125.9	102.7	94.7	125.9	906,480
Compton	7.1	4.9	5.9	7.1	51,120
Eastern	303.0	263.1	227.8	303.0	2,181,600
Foothill	25.4	21.5	24.3	25.4	182,880
Fullerton	36.9	27.1	37.4	37.4	269,280
Glendale	54.6	55.7	56.0	56.0	403,200
Inland Empire	176.2	125.8	106.1	176.2	1,268,640
Las Virgenes	45.3	45.3	42.7	45.3	326,160
Long Beach	61.3	68.1	67.2	68.1	490,320
Los Angeles	768.5	821.9	698.2	821.9	5,917,680
MWDOC	469.2	453.7	489.5	489.5	3,524,400
Pasadena	58.5	55.6	50.2	58.5	$421,200
San Diego [1]	1278.4	1039.9	1055.3	1278.4	9,204,480
San Fernando	6.5	0.1	0.0	6.5	$46,800
San Marino	5.2	5.2	3.5	5.2	$37,440
Santa Ana	29.7	14.5	16.4	29.7	213,840
Santa Monica	27.6	26.2	25.0	27.6	198,720
Three Valleys	171.4	168.1	132.7	171.4	1,234,080
Torrance	41.6	35.5	39.3	41.6	299,520
Upper San Gabriel	63.8	36.9	27.6	63.8	459,360
West Basin	262.3	243.3	221.3	262.3	1,888,560
Western	289.1	271.4	219.9	289.1	2,081,520
Total	**4,673.8**	**4,239.7**	**3,927.1**	**4,759.5**	**$ 34,268,400**

Totals may not foot due to rounding

Table 2-16
Readiness-to-Serve Charge (by Member Agency)
Calendar Year 2011 RTS charge

Member Agency	Rolling Ten-Year Average Firm Deliveries (Acre-Feet) FY1999/00 - FY2008/09	RTS Share	12 months @ $125 million per year (1/11-12/11)
Anaheim	20,966	1.11%	$ 1,382,122
Beverly Hills	12,737	0.67%	839,692
Burbank	12,908	0.68%	850,938
Calleguas MWD	113,610	5.99%	7,489,554
Central Basin MWD	63,256	3.34%	4,170,058
Compton	3,146	0.17%	207,408
Eastern MWD	92,013	4.85%	6,065,789
Foothill MWD	11,570	0.61%	762,706
Fullerton	9,694	0.51%	639,087
Glendale	24,150	1.27%	1,592,015
Inland Empire Utilities Agency	61,205	3.23%	4,034,823
Las Virgenes MWD	23,282	1.23%	1,534,813
Long Beach	36,970	1.95%	2,437,211
Los Angeles	314,757	16.60%	20,749,798
Municipal Water District of Orange County	231,692	12.22%	15,273,878
Pasadena	23,397	1.23%	1,542,428
San Diego County Water Authority	491,238	25.91%	32,384,010
San Fernando	119	0.01%	7,819
San Marino	1,001	0.05%	65,963
Santa Ana	12,743	0.67%	840,028
Santa Monica	12,794	0.67%	843,429
Three Valleys MWD	73,095	3.85%	4,818,678
Torrance	20,742	1.09%	1,367,401
Upper San Gabriel Valley MWD	15,631	0.82%	1,030,447
West Basin MWD	141,522	7.46%	9,329,606
Western MWD	71,906	3.79%	4,740,301
MWD Total	**1,896,143**	**100.00%**	**$ 125,000,000**

Totals may not foot due to rounding

Table 2-17
Purchase Order Commitments and Tier 1 Limits
(by Member Agency)

	2011 Tier 1 Limit with Opt-outs	**Purchase Order Commitment** (acre-feet)
Anaheim	22,240	148,268
Beverly Hills	13,380	89,202
Burbank	16,336	108,910
Calleguas	110,249	692,003
Central Basin	72,361	482,405
Compton	5,058	33,721
Eastern	87,740	504,664
Foothill	10,997	73,312
Fullerton	11,298	75,322
Glendale	26,221	174,809
Inland Empire	59,792	398,348
Las Virgenes	21,087	137,103
Long Beach	39,471	263,143
Los Angeles	304,970	2,033,132
MWDOC	228,130	1,486,161
Pasadena	21,180	141,197
San Diego	547,239	3,342,571
San Fernando	630	-
San Marino	1,199	-
Santa Ana	12,129	80,858
Santa Monica	11,515	74,062
Three Valleys	70,474	469,331
Torrance	20,967	139,780
Upper San Gabriel	16,512	110,077
West Basin	156,874	1,045,825
Western	69,720	391,791
Total	**1,957,768**	**12,495,995**

Totals may not foot due to rounding.

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Implementing the Plan

3

The result of the recent strategic review process reveals a broader view of Metropolitan's role in comprehensive planning and implementation for regional reliability. As Metropolitan continues to deal with current and emerging concerns on changing trends in climate, cost and use of energy, endangered species protections, and conveyance issues in the Sacramento-San Joaquin River Delta System , the need for a robust and flexible water supply planning and implementation that can quickly adapt to variations in future trends becomes evident. Metropolitan's current strategy of implementing an adaptive resource development plan for the future will provide the most benefit for the region. What emanates from this adaptive strategy is a Metropolitan that can adopt alternative roles, including that of an enhanced water importer, local supply funder, and project developer; and a Metropolitan that can respond to changing regional conditions that ultimately will perform efficiently under a wide range of possible future conditions.

This section summarizes Metropolitan's implementation plans and continued progress in developing a diversified resource mix that enables the region to meet its water supply needs. The investments that Metropolitan has made and its on-going efforts in many different areas coalesce toward its goal of long-term regional water supply reliability. Many of the resource programs discussed are already successfully implemented. Others, including institutional and facility changes in the Colorado River region and the SWP, will take more time to execute. Considerations are also in place for emerging integrated supplies, which could augment sources of regional water supply from non-traditional sources. In addition, water demand reductions brought about by legislative mandates could also affect the landscape of future supply planning and implementation. The following sections discuss each of these programs, presenting both successes to date and the programs that are still under way.

3.1 Colorado River Aqueduct

Metropolitan continues to pursue Colorado River Aqueduct (CRA) supplies of 1.2 MAF per year. However, over the years, a number of constraints have developed that restrict Metropolitan's access to Colorado River supplies. As a result, Metropolitan adopted a revised policy of utilizing the full capacity of the CRA when needed through the basic apportionment and various water banking and acquisition programs. This water will help Metropolitan manage regional storage conditions and water quality.

Metropolitan was established to obtain an allotment of Colorado River water, and its first mission was to construct and operate the CRA. Under its contracts with the federal government, Metropolitan has a basic entitlement of 550 TAF per year of Colorado River water. Metropolitan also holds a fifth priority for an additional 662 TAF per year that exceeds California's 4.4 MAF per year basic apportionment, and another 180 TAF per year when surplus flows are available. Metropolitan can obtain water under the fifth priority from:

- Water unused by the California holders of priorities 1 through 3
- Water saved by the Palo Verde land management, crop rotation, and water supply program, or
- When the U.S. Secretary of the Interior makes available either or both:
  - Surplus water, and
  - Water apportioned to, but unused by, Arizona and/or Nevada.

Background

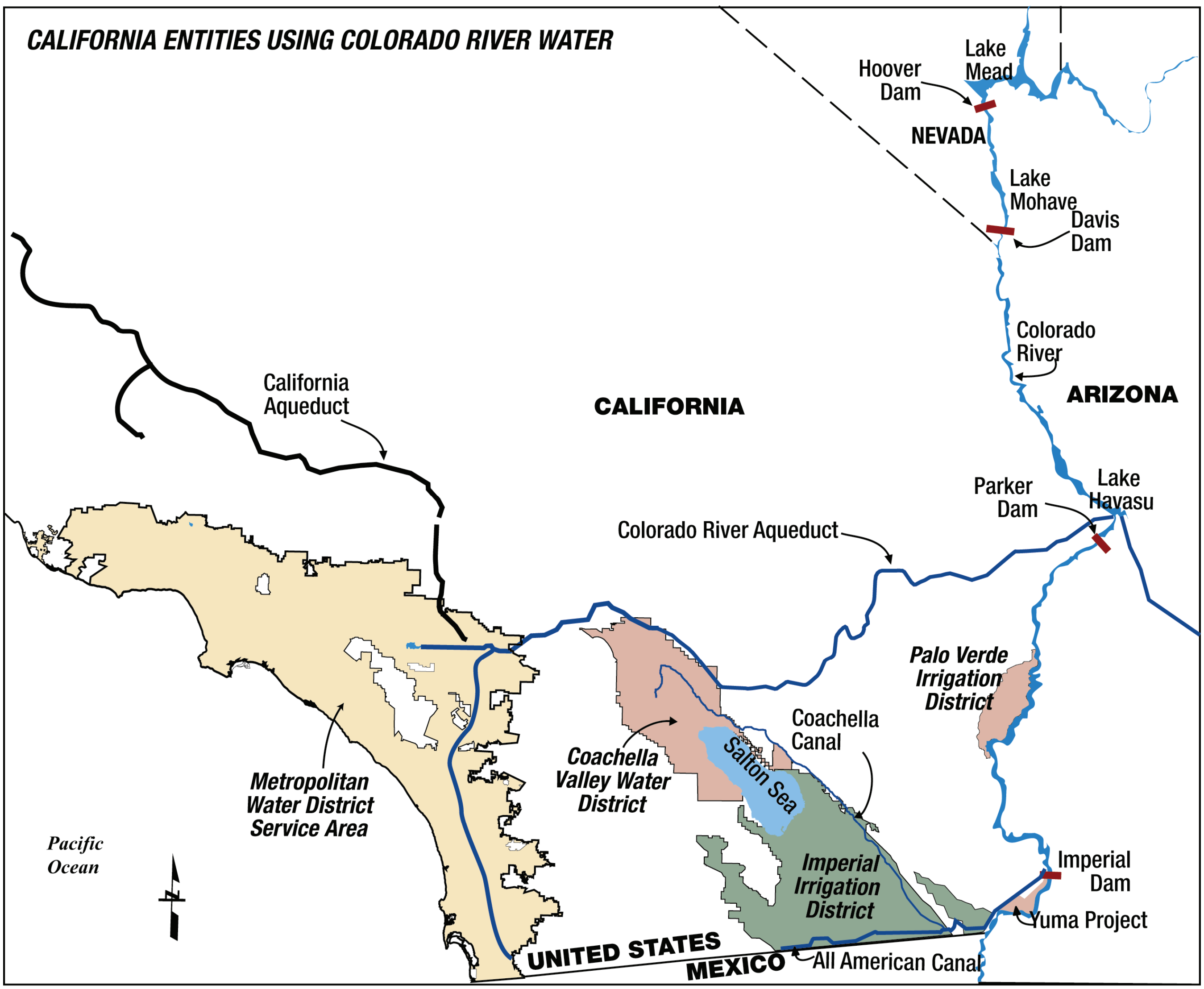
To satisfy a condition imposed by Congress in the Boulder Canyon Project Act, California's legislature enacted the Limitation Act in 1929 agreeing to limit consumptive use of Colorado River water to 4.4 MAF per year, plus not more than one-half of any excess or surplus waters unapportioned by the Colorado River Compact. The 1931 Seven Party Agreement provides the basis for the priorities among California's contractors to use of Colorado River water made available to California. Palo Verde Irrigation District (PVID), the Yuma Project (Reservation Division), Imperial Irrigation District (IID), and Coachella Valley Water District (CVWD), collectively the "agricultural entities"), and Metropolitan are the entities that currently hold the priorities. These priorities are included in the contracts that the Department of the Interior executed with the California agencies in the 1930s for delivery of water from Lake Mead. The first four priorities total the 4.4 MAF per year available to California. Metropolitan has the fourth priority to California's basic apportionment and the fifth priority to 662 TAF per year. Under Priorities 1 through 3, an amount not to exceed 3.85 MAF was apportioned to the agricultural entities for beneficial consumptive use. The Seven Party Agreement did not specify individual quantities for each of the first three priorities; rather, the amount of water available under the third priority was limited to the amount unused by the holders of priorities 1 and 2 on designated areas of land. This lack of quantification among the agricultural priorities posed an obstacle to the acquisition of water from the agricultural entities for use in Metropolitan's service area.

The Consolidated Decree of the U.S. Supreme Court in Arizona v. California, preceded by a 1964 decree, confirmed the allocation of 4.4 MAF per year to California. This limit reduced Metropolitan's dependable supply of Colorado River water to its fourth priority amount of 550 TAF per year. For a period following the Court's ruling, Metropolitan's fifth priority rights were satisfied with water allocated to Arizona and Nevada which they did not use. With the commencement of Colorado River water deliveries to the Central Arizona Project in 1985, the availability of Colorado River water to meet Metropolitan's Consolidated Decree, preceded by a 1979 decree, also quantifies present perfected rights (PPRs) to the use of Colorado River water by certain Indian reservations, federal wildlife refuges, and other users. Since 1985, these PPR holders have used less than 20 TAF annually. Some but not all of these PPR's are encompassed by the Seven Party Agreement. Consumptive use under these non-encompassed PPRs, known as "Miscellaneous and Indian PPRs," could reach as much as 61 TAF annually. Because over 5.362 MAF of Colorado River water were already allocated by California's Seven Party Agreement, it was not clear which rights would be affected by the use of these non-encompassed 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 the Interior. As a result, the year-to-year availability of Colorado River water to Metropolitan was uncertain beginning in 1985.

Figure 3-1 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 3-1



Changed Conditions

Metropolitan and the State of California acknowledged that Metropolitan would obtain less water from the Colorado River in the future than Metropolitan had in the past, but the lack of clearly quantified water rights hindered efforts to promote water management projects. The Secretary of the 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 plan to resolve 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 MAF per year plus any available surplus water. The 2003 Quantification Settlement Agreement (QSA) among IID, CVWD and Metropolitan is a 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, and specifies that IID, CVWD, and Metropolitan would forbear use of water to permit the Secretary of the Interior to satisfy the uses of the non-encompassed PPRs.

On November 5, 2003, IID filed a validation action in Imperial County Superior Court, seeking a judicial determination that thirteen agreements associated with the IID/SDCWA water transfer and the QSA are valid, legal and binding. Other lawsuits also were filed challenging the execution, approval and subsequent implementation of the QSA on various grounds. All of the QSA cases were coordinated in Sacramento County Superior Court. After a number of pleading challenges, appeal of rulings dismissing one Imperial County case and dismissing portions of another, and pretrial rulings, the first phase of trial began on November 9, 2009, and concluded on December 2, 2009. One of the key issues was the constitutionality of the QSA Joint Powers Authority Agreement, pursuant to which IID, CVWD, and SDCWA agreed to commit $133 million toward certain mitigation costs associated with implementation of the transfer of 300 TAF of water conserved by IID pursuant to the QSA, and the State agreed to be responsible for any mitigation costs exceeding this amount. A final judgment was issued on February 11, 2010, holding that the State's commitment was unconditional in nature and, as such, violated the State's debt limitation under the California Constitution, and that eleven other agreements, including the QSA, also are invalid because they are inextricably interrelated with the QSA Joint Powers Authority Agreement and the funding mechanism it established to cover such mitigation costs. The court also ruled that all other claims raised by the parties, including CEQA claims related to the QSA Programmatic EIR and the IID Transfer Project EIR, are moot.

Metropolitan, CVWD and SDCWA have filed appeals of the court's decision, which will stay the ruling pending outcome of the appeal. If the ruling stands, it could delay the implementation of programs authorized under the QSA or result in increased costs or other adverse impacts. The impact, if any, that the ruling might have on Metropolitan's water supplies cannot be adequately determined at this time.

Runoff in the Colorado River Basin above Lake Powell from 2000 through 2007 was the lowest eight-year runoff on record bringing Colorado River system storage down to 50 percent of capacity. Runoff returned to near normal during 2008 through 2010 but the system storage remained slightly above 50 percent of capacity.

SDCWA is participating in two projects that are providing additional water supplies to that agency.[1] These projects are resulting in increased amounts of Colorado River water

[1] These projects, the San Diego County Water Authority/Imperial Irrigation District transfer and the Coachella and All-American canal lining projects will be discussed in that Authority's Urban Water Management Plan.

being diverted into the CRA. In exchange, Metropolitan is delivering an amount of water equal to the amount conserved for SDCWA. Federal law allocates a portion of the water available as a result of the Coachella and All-American Canal lining projects for the benefit of parties, including five Indian Bands, involved in litigation over water rights to the San Luis Rey River in San Diego County once certain conditions have been satisfied. Metropolitan has agreed to exchange that water and provide an equal amount of water to the United States for use by the San Luis Rey Settlement Parties, and SDCWA has agreed to convey the water when capacity is available for use within the Settlement Parties' service areas. As the Settlement Parties had not satisfied the conditions required to receive the benefit of those supplies through 2009, Metropolitan has utilized this water. The remainder of the water available as a result of the canal lining projects is exchanged with SDCWA and decreases San Diego's demands on Metropolitan water supplies.

In 2005, Metropolitan entered into a settlement agreement in *Arizona v. California* with the Quechan Indian Tribe and other parties. The Tribe uses Colorado River water on the Fort Yuma Indian Reservation. Under the settlement agreement, the Tribe, in addition to the amounts of water decreed for the benefit of the Reservation in the 1964 decree, is entitled to (a) an additional 20,000 acre-feet of diversions from the Colorado River or (b) the amount necessary to supply the consumptive use required for irrigation of a specified number of acres, and for the satisfaction of related uses, whichever is less. Of the additional water, 13,000 acre-feet became available to the Tribe in 2006. An additional 7,000 acre-feet becomes available to the Tribe in 2035. Metropolitan and the Tribe agreed that if the Tribe chooses to limit proposed development and utilization of their farm lands, which would require the diversion of any of the additional water in a year, and instead allows the water which would otherwise be used to be diverted by Metropolitan, Metropolitan provides an incentive payment to the Tribe to avoid or reduce a loss of supply.

Implementation Approach

Metropolitan's planning strategy recognized explicitly that program development would play an important part in reaching the target level of deliveries from the CRA. The implementation approach explored a number of water conservation programs with water agencies that received water from the Colorado River or were located in close proximity to the CRA. Negotiating the QSA was a necessary first step for all of these programs. On October 10, 2003, after lengthy negotiations, representatives from Metropolitan, IID, and CVWD executed the QSA and other related agreements. Parties involved also included the 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 Settlement Parties. One of those related agreements was the Colorado River Water Delivery Agreement: Federal Quantification Settlement Agreement which specifies to which agencies water will be delivered under priorities 3a and 6a of the Seven Party Agreement during its term.

Metropolitan has identified a number of programs that could be used to achieve the regional long-term development targets for the CRA, as shown in Table 3-1. Metropolitan has entered into or is exploring agreements with a number of agencies as described in this section. In addition, Appendix A.3 provides a detailed discussion of these programs and describes whether the programs are being implemented, are deferred, or under investigation. In developing these supply capabilities, Metropolitan assumed a simulated median storage level going into year 2030 based on the balances of supplies and demands. Under the median storage condition, there is an estimated 50 percent probability that storage levels would be higher and a 50 percent probability that storage levels would be lower than the assumption used. In addition, the storage capability used in this evaluation reflects actual storage program conveyance constraints.

Colorado River Water Management Programs

Imperial Irrigation District / Metropolitan Water District 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, and drip irrigation systems. Through this program, Metropolitan obtained an additional 105 TAF per year, on average upon completion of program implementation. 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 if the term of the QSA extends through 2077 and guaranteeing Metropolitan at least 85 TAF per year. The remainder of the conserved water is available to CVWD.

Palo Verde Land Management, Crop Rotation, and Water Supply Program

In May 2004, Metropolitan's Board authorized a 35-year land management, crop rotation, and water supply program with PVID. Under the program, participating farmers in PVID are paid to reduce their water use by not irrigating a portion of their land. A maximum of 29 percent of the lands within the Palo Verde Valley can be fallowed in any given year. Under the terms of the QSA, water savings within the PVID service area are made available to Metropolitan. This program provides up to 133 TAF of water to be available to Metropolitan in certain years, and a minimum of 33 TAF per year. In 2005, 2006, 2007, 2008, and 2009 approximately 108.7, 105.0, 72.3, 94.3, and 120.2 TAF of water, respectively, were saved and made available to Metropolitan. In March 2009, Metropolitan and PVID entered into a one-year supplemental fallowing program within PVID that provides for the fallowing of additional acreage, with savings projected to be as much as 62 TAF. Of that total, 24.1 TAF of water was saved in 2009, with the balance to be made available in 2010.

Southern Nevada Water Authority and Metropolitan Storage and Interstate Release Agreement

Southern Nevada Water Authority (SNWA) has undertaken extraordinary water conservation measures to maintain its consumptive use within Nevada's basic apportionment of 300 TAF. The success of the conservation program has resulted in unused basic apportionment for Nevada. As SNWA expressed interest in storing a portion of the water with Metropolitan, the agencies along with the United States and the Colorado River Commission of Nevada entered into a storage and interstate release agreement in October 2004. Under the agreement, additional Colorado River water supplies are made available to Metropolitan when there is space available in the CRA to receive the water. Metropolitan has received 70 TAF through 2009. SNWA may call on Metropolitan to reduce its Colorado River water order to return this water no earlier than 2019, unless Metropolitan agrees otherwise.

Lower Colorado Water Supply Project

In March 2007, Metropolitan, the City of Needles, and the USBR executed a Lower Colorado Water Supply Project contract. Under the contract, Metropolitan receives, on an annual basis, Lower Colorado Water Supply Project water unused by Needles and other entities with no rights or insufficient rights to use of Colorado River water in California, the beneficiaries of the project. A portion of the payments made by Metropolitan to Needles are placed in a trust fund for potentially acquiring a new water supply for Needles and other users of the Project should the groundwater pumped from the project's wells become too saline for use. In 2009, Metropolitan received 2.3 TAF from this project.

Lake Mead Storage Program

In May 2006, Metropolitan and the USBR executed an agreement for a demonstration program that allowed Metropolitan to leave conserved water in Lake Mead that Metropolitan would otherwise have used in 2006 and 2007. USBR would normally make unused water available to other Colorado River water users, so the program included a provision that water left in Lake Mead must be conserved through extraordinary conservation measures and not simply be water that was not needed by Metropolitan in the year it was stored. This extraordinary conservation was accomplished through savings realized under the Palo Verde Land Management, Crop Rotation, and Water Supply Program. Through the two-year demonstration program, Metropolitan created 44.8 TAF of "Intentionally Created Surplus" (ICS) water. In December 2007, Metropolitan entered into agreements to set forth the rules under which ICS water is developed, and stored in and delivered from Lake Mead. The amount of water stored in Lake Mead, created through extraordinary conservation, that is available for delivery in a subsequent year is reduced by a one-time deduction of five percent, resulting in additional system water in storage in the lake, and an annual evaporation loss, beginning in the year following the year the water is stored. Metropolitan created 55.8 TAF of ICS water through the Palo Verde Land Management, Crop Rotation, and Water Supply Program in 2009. As of January 1, 2010, Metropolitan had a total of 79.8 TAF of Extraordinary Conservation ICS water in Lake Mead.

The December 2007 federal guidelines concerning the operation of the Colorado River system reservoirs provided the ability for agencies to create "System Efficiency ICS" through the development and funding of system efficiency projects that save water that would otherwise be lost from the Colorado River. To that end, in 2008 the Central Arizona Water Conservation District (CAWCD), SNWA, and Metropolitan contributed funds for the construction of the Drop 2 Reservoir by the USBR. The purpose of the Drop 2 Reservoir is to increase the capacity to regulate deliveries of Colorado River water at Imperial Dam reducing the amount of excess flow downstream of the dam by approximately 70 TAF annually. In return for its $28.7 million contribution toward construction[2], 100 TAF of water that remains stored in Lake Mead was assigned to Metropolitan as System Efficiency ICS. As of January 1, 2010, Metropolitan had 66 TAF of System Efficiency ICS water in Lake Mead.

In 2009, Metropolitan entered into an agreement with the United States, SNWA, the Colorado River Commission of Nevada, and CAWCD to have USBR conduct a one-year pilot operation of the Yuma Desalting Plant at one-third capacity. The pilot operation began in May 2010 and is providing data for future decision making regarding long-term operation of the Plant and developing a near-term water supply. Metropolitan's contribution toward plant operating costs is expected to secure 23.2 TAF of System Efficiency ICS by 2011.

Hayfield Groundwater Storage Program

The Hayfield Groundwater Storage 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. In June 2000, the Metropolitan Board approved the implementation of the Hayfield program and authorized storage of 800 TAF of

[2] As of April 2010, $1.6 million is being returned to Metropolitan as construction costs are lower than estimated.

CRA supplies when available. As of 2003, there were over 70 TAF in storage. At that time, construction of facilities for extracting the stored water began, but it was then deferred because drought conditions in the Colorado River watershed resulted in a lack of surplus supplies for storage. A prototype well was completed in August 2009. Hydrogeologic investigations indicate that conversion of the prototype well into a production well could extract as much as 5 TAF per year of previously stored water. When water supplies become more plentiful, Metropolitan may pursue this program and develop storage capacity of about 400 TAF.

Achievements to Date

Metropolitan recognizes that in the short-term, programs are not yet in place to provide the full targeted amount, even with the programs adopted under the QSA and the opportunities to store conserved water in Lake Mead. The December 2007 federal guidelines concerning the operation of the Colorado River system reservoirs provide more certainty to Metropolitan with respect to the determination of a shortage, normal, or surplus condition for the operation of Lake Mead.

Table 3-1
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			
Basic Apportionment – Priority 4	550,000	550,000	550,000
IID/MWD Conservation Program	85,000	85,000	85,000
Priority 5 Apportionment (Surplus)	0	0	13,000
PVID Land Management, Crop Rotation, and Water Supply Program	133,000	133,000	133,000
Lower Colorado Water Supply Project	5,000	5,000	5,000
Lake Mead Storage Program	400,000	400,000	400,000
Quechan Settlement Agreement Supply	7,000	7,000	7,000
Forbearance for Present Perfected Rights	(47,000)	(47,000)	(47,000)
CVWD SWP/QSA Transfer Obligation	(35,000)	(35,000)	(35,000)
DWCV SWP Table A Obligation	(77,000)	(60,000)	(155,000)
DWCV SWP Table A Transfer Callback	41,000	32,000	82,000
DWCV Advance Delivery Account	36,000	28,000	73,000
Drop 2 Reservoir Funding	22,000	25,000	25,000
SNWA Agreement	0	0	0
Expand SNWA Agreement	0	0	0
Subtotal of Current Programs	***1,120,000***	***1,123,000***	***1,136,000***
Programs Under Development			
Additional PVID Transfers (Crop Stressing/Fallowing)	62,000	62,000	62,000
Arizona Programs - CAP	50,000	50,000	50,000
California Indians / Other Ag	10,000	10,000	10,000
ICS Exchange	25,000	25,000	25,000
Agreements with CVWD	35,000	35,000	35,000
Hayfield Groundwater Extraction Project	0	0	0
Subtotal of Proposed Programs	***182,000***	***182,000***	***182,000***
Additional Non-Metropolitan CRA Supplies			
SDCWA/IID Transfer	200,000	200,000	200,000
Coachella & All-American Canal Lining			
To SDCWA	80,000	80,000	80,000
To San Luis Rey Settlement Parties1	16,000	16,000	16,000
Subtotal of Non-Metropolitan Supplies	***296,000***	***296,000***	***296,000***
Maximum CRA Supply Capability[2]	**1,598,000**	**1,601,000**	**1,614,000**
Less CRA Capacity Constraint (amount above 1.25 MAF)	*(348,000)*	*(351,000)*	*(364,000)*
Maximum Expected CRA Deliveries[3]	**1,250,000**	**1,250,000**	**1,250,000**
Less Non-Metropolitan Supplies[4]	*(296,000)*	*(296,000)*	*(296,000)*
Maximum Metropolitan Supply Capability[5]	**954,000**	**954,000**	**954,000**

[1] Subject to satisfaction of conditions specified in agreement among Metropolitan, the United States, and the San Luis Rey Settlement Parties
[2] Total amount of supplies available without taking into consideration CRA capacity constraint.
[3] The Colorado River Aqueduct delivery capacity is 1.250 MAF annually.
[4] Exchange obligation for the SDCWA-IID transfer and the Coachella and All American Canal Lining projects.
[5] The amount of CRA water available to Metropolitan after meeting its exchange obligations.

3.2 State Water Project

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.

The SWP consists of a series of pump stations, reservoirs, aqueducts, tunnels, and power plants operated by DWR. Figure 3-2 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 1,911 TAF.

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 8.9 percent of its SWP contract – 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 or about 22 percent of Metropolitan's SWP contractual amounts. Consequently, Metropolitan's key concern is the continual deterioration of water supply reliability.

Another important concern for Metropolitan is sustained improvement in SWP water quality. 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 Bay-Delta water supply by cost effectively combining alternative source waters, source improvement, and treatment facilities. Additionally, Metropolitan requires water quality improvements of Bay-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.

Background

The listing of several fish species as threatened or endangered under the federal or California Endangered Species Acts (respectively, the "Federal ESA" and the "California ESA" and, collectively, the "ESAs") have adversely impacted operations and limited the flexibility of the SWP. An annual environmental water account established under the Bay-Delta Program as a means of meeting environmental flow requirements and export limitations has helped to mitigate these impacts. Currently, five species (the winter-run and spring-run Chinook salmon, Delta smelt, North American green sturgeon, and Central Valley steelhead) are listed under the ESAs. In addition, on June 25, 2009, the California Fish and Game Commission declared the longfin smelt a threatened species under the California ESA.

In 2004 and 2005, the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) issued biological opinions and incidental take statements that govern operations of the SWP and the CVP with respect to the Delta smelt, the winter-run and spring-run Chinook salmon, and the Central Valley steelhead. In July 2006, the USBR reinitiated consultation with the USFWS and NMFS with respect to the 2004 and 2005 biological opinions (with the addition of the North American green sturgeon, which was listed in April 2006) following the filing of legal challenges to those biological opinions and incidental take statements.

Figure 3-2
Current and Projected Facilities of the State Water Project

Litigation filed by several environmental interest groups alleged that the 2004 and 2005 biological opinions and incidental take statements inadequately analyzed impacts on listed species under the Federal ESA. On May 25, 2007, Federal District Judge Wanger issued a decision on summary judgment in *NRDC v. Kempthorne*, finding the USFWS biological opinion for Delta smelt to be invalid. On December 14, 2007, Judge Wanger issued his Interim Remedial Order requiring that the SWP and CVP operate according to certain specified criteria until a new biological opinion for the Delta smelt is issued. Under the Interim Remedial Order, SWP operations were constrained in the winter and spring of 2007-08 by prevailing conditions and the status of the Delta smelt. Export restrictions resulting from the Interim Remedial Order during the winter and spring of 2007-08 reduced SWP deliveries to Metropolitan by approximately 250 TAF, as water that otherwise could have been diverted for delivery through the California Aqueduct bypassed the SWP pumps.

The USFWS released a new biological opinion on the impacts of the SWP and CVP on Delta smelt on December 15, 2008. Metropolitan, The San Luis & Delta Mendota Water Authority, Westlands Water District, Kern County Water Agency, Coalition for a Sustainable Delta and State Water Contractors, a California nonprofit corporation formed by agencies contracting with DWR for water from the SWP (the "State Water Contractors"), the Family Farm Alliance and the Pacific Legal Foundation on behalf of several owners of small farms in California's Central Valley have filed separate lawsuits in federal district court challenging the biological opinion.

The federal court consolidated the six lawsuits challenging the Delta smelt biological opinion under the caption Delta Smelt Consolidated Cases.

On April 16, 2008, the court granted the plaintiffs' motion for summary judgment in *Pacific Coast Federation of Fishermen's Associations v. Gutierrez* and invalidated the 2004 NMFS's biological opinion for the salmon and other fish species that spawn in rivers flowing into the Bay-Delta. The NMFS released its new biological opinion for salmonid species on June 4, 2009. The salmonid species biological opinion contains additional restrictions on SWP and CVP operations. The NMFS calculated that these restrictions will reduce the amount of water the SWP and CVP combined will be able to export from the Bay-Delta by 5 to 7 percent, in addition to restriction due to biological opinion for Delta smelt. DWR estimated a 10 percent average water loss, expected to begin in 2010, under this biological opinion. Six lawsuits have been filed challenging the 2009 salmon biological opinion which the court has consolidated under the caption *Consolidated Salmon Cases.* The court held a multiple-day hearing on motions for preliminary injunction in both the *Delta Smelt Consolidated Cases* and the *Consolidated Salmon Cases. [Discussion to be updated for the Final RUWMP since ruling is expected by May 2010.]*

The impact on SWP deliveries attributable to the Delta smelt and salmonid species biological opinions combined is estimated to be 1.0 MAF in an average year, reducing SWP deliveries from approximately 3.3 MAF to approximately 2.3 MAF for the year under average hydrology.

In addition to the litigation under the Federal ESA, other environmental groups sued DWR on October 4, 2006 in the Superior Court of the State of California for Alameda County alleging that DWR was "taking" listed species without authorization under the California ESA. On April 18, 2007, the Alameda County Superior Court issued its Statement of Decision in this litigation (*Watershed Enforcers v. California Department of Water Resources*), which found that DWR was illegally "taking" listed fish through operation of the SWP export facilities. The Superior Court ordered DWR to "cease and desist from further operation" of those facilities within 60 days unless it obtains take authorization from the California Department of Fish and Game.

DWR appealed the Alameda County Superior Court's order on May 7, 2007. DWR applied for incidental take authorization for the Delta smelt and salmon under the California ESA, based on the consistency of the federal biological opinions with California ESA requirements ("Consistency Determinations"). The California Department of Fish & Game subsequently issued Consistency Determinations under the California ESA authorizing the incidental take of both Delta smelt and salmon. The State Water Contractors and Kern County Water Agency have filed suit in state court challenging the Consistency Determinations under the California ESA that have been issued for both Delta smelt and salmon.

The California Fish and Game Commission's issued its declaration of the longfin smelt as a threatened species on June 25, 2009. On February 23, 2009, in anticipation of the listing action, the California Department of Fish and Game issued a California ESA section 2081 incidental take permit to DWR authorizing the incidental take of longfin smelt by the SWP. This permit authorizes continued operation of the SWP under the conditions specified in the section 2081 permit. The State Water Contractors filed suit against the California Department of Fish and Game on March 25, 2009, alleging that the export restrictions imposed by the section 2081 permit have no reasonable relationship to any harm to longfin smelt caused by SWP operations, are arbitrary and capricious and are not supported by the best available science.

DWR has altered the operations of the SWP to accommodate species of fish listed under the ESAs. These changes in project operations have adversely affected SWP deliveries. Restrictions on Bay-Delta pumping under the Interim Remedial Order in *NRDC v. Kempthorne* reduced deliveries of SWP water to Metropolitan by approximately 250 TAF in 2008. Based on the Water Allocation Analysis released by DWR on March 22, 2010, which incorporated the Delta smelt biological opinion's effects on SWP operations, export restrictions could reduce deliveries to Metropolitan by 150 to 200 TAF for 2010 under median hydrologic conditions. DWR has reported that as of April 21, 2010, real time measurements indicate approximately 520,000 acre-feet have been lost to the SWP for calendar year 2010, of which nearly 240 TAF would have been made available to Metropolitan.

Operational constraints likely will continue until a long-term solution to the problems in the Bay-Delta is identified and implemented. The Delta Vision process, established by Governor Schwarzenegger, was aimed at identifying long-term solutions to the conflicts in the Bay-Delta, including natural resource, infrastructure, land use, and governance issues. In addition, State and federal resource agencies and various environmental and water user entities are currently engaged in the development of the Bay Delta Conservation Plan (BDCP), which is aimed at addressing ecosystem needs and securing long-term operating permits for the SWP.

Other issues, such as the recent decline of some fish populations in the Bay-Delta and surrounding regions and certain operational actions in the Bay-Delta, may significantly reduce Metropolitan's water supply from the Bay-Delta. SWP operational requirements may be further modified under new biological opinions for listed species under the Federal ESA or by the California Department of Fish and Game's issuance of incidental take authorizations under the California ESA. Biological opinions or incidental take authorizations under the Federal ESA and California ESA might further adversely affect SWP and CVP operations. Additionally, new litigation, listings of additional species or new regulatory requirements could further adversely affect SWP operations in the future by requiring additional export reductions, releases of additional water from storage or other operational changes impacting water supply operations. Metropolitan cannot predict the ultimate outcome of any of the litigation or regulatory processes described above but believes they could have an adverse impact on the operation of the SWP pumps, Metropolitan's SWP supplies and Metropolitan's water reserves.

Changed Conditions

In August 2008, DWR issued its 2007 biannual SWP Delivery Reliability Report (Reliability Report). In projecting SWP delivery reliability, DWR incorporated the court-ordered interim operating rules to protect Delta smelt. The Reliability Report identified three areas of reliability uncertainty including pelagic organism decline, climate change and sea level rise, and vulnerability of Delta levees for failure. DWR estimated that with current facilities and regulatory requirements, the SWP will deliver 3.0 MAF per year on average. SWP single dry year and wet year delivery capability was reported to be 0.243 TAF and 3.848 TAF, respectively. Under its contract Metropolitan may use 46 percent of this quantity.

In December 2009, DWR released a draft of the biannual update. The report shows that future SWP deliveries will be impacted by two significant factors. The first is the significant restrictions on SWP and CVP Delta pumping required by the biological opinions issued by the USFWS (December 2008) and NMFS (June 2009). The second is climate change, which is altering the hydrologic conditions in the State. The 2009 draft Reliability Report shows greater reductions in water deliveries on average when compared to the 2007 report. Over multiple-year dry periods, average annual Table A deliveries vary from 32% to 34% of the maximum Table A amount, while average annual deliveries over multiple-year wet periods range from 72 to 94 percent of the maximum Table A amount. Under future conditions, annual SWP Article 21 deliveries average 62 TAF, ranging from 1 TAF to 550 TAF over the 82-year simulation period.

In evaluating the supply outlook for the 2010 RUWMP, Metropolitan used the draft 2009 reliability report as this presents DWR's current estimate of the amount of SWP water deliveries for current (2009) conditions and conditions 20 years in the future.

Implementation Approach

Metropolitan's implementation approach for the SWP depends on the full use of the current State Water Contract provisions, including its basic contractual amounts, Article 21 interruptible supplies, and Turnback Pool supply provisions. In addition, it requires successful negotiation and implementation of a number of agreements, including the Sacramento Valley Water Management (Phase 8 Settlement) Agreement, and the BDCP. 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 discussion provides details of the major actions Metropolitan is undertaking to improve SWP reliability. The BDCP is being prepared through a collaboration of state, federal, and local water agencies, state and federal fish agencies, environmental organizations, and other interested parties. These organizations have formed the BDCP Steering Committee. The plan will identify a set of water flow and habitat restoration actions that contribute to the recovery of endangered and sensitive species and their habitats in California's Bay-Delta. The goal of the BDCP is to provide for both species/habitat protection and improved reliability of water supplies.

In order to select the most appropriate elements of the final conservation plan, the BDCP will consider a range of options for accomplishing these goals using information developed as part of an environmental review process. Potential habitat restoration and water supply conveyance options included in the BDCP will be assessed through an Environmental Impact Report (EIR)/ Environmental Impact Statement (EIS). The BDCP planning process and the supporting EIR/EIS process is being funded by state and federal water contractors.

Lead agencies for the EIR/EIS are DWR, USBR, the USFWS, and NOAA's NMFS, in cooperation with the California Department of Fish and Game, the U.S. Environmental Protection Agency (USEPA), and the U.S. Army Corps of Engineers.

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 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.

<u>Monterey Amendment</u>

The Monterey Amendment originated from disputes between the urban and agricultural SWP contractors over how contract supplies are to be allocated in times of shortage. In 1994, in settlement discussions in Monterey, the contractors and the DWR reached agreement to settle their disputes by amending certain provisions the long-term water supply contracts. These changes, known as the Monterey Amendment, altered the water allocation procedures such that both shortages and surpluses would be shared in the same manner for all contractors, eliminating the prior "agriculture first" shortage provision. In turn, the agricultural contractors agreed to permanently transfer 130 TAF to urban contractors and permanently retire 45 TAF of their contracted supply. The amendment facilitated several important water supply management practices including ground water banking, voluntary water marketing, and more flexible and efficient use of SWP facilities including borrowing from Castaic Lake and Lake Perris and use of carryover storage in San Luis Reservoir to enhance dry-year supplies. It also provided for the transfer of DWR land to the Kern County Water Agency for development of the Kern Water Bank. The Monterey Amendment was challenged in court and the original Environmental Impact Report (EIR) invalidated. Following a settlement, a new EIR was completed and the CEQA process concluded in May 2010. However, the project has been challenged again in a new round of lawsuits.

<u>SWP Terminal Storage</u>

Metropolitan has contractual rights to 65 TAF of flexible storage at Lake Perris (East Branch terminal reservoir) and 153.94 TAF 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.

<u>Yuba Dry Year Water Purchase Program</u>

In December 2007, Metropolitan entered into an agreement with DWR providing for Metropolitan's participation in the Yuba Dry Year Water Purchase Program between Yuba County Water Agency and DWR. This program provides for transfers of water from the Yuba County Water Agency during dry years through 2025.

<u>Desert Water Agency/Coachella Valley WD SWP Table A Transfer</u>

Under the transfer agreement, Metropolitan transferred 100 TAF of its SWP Table A contractual amount to Desert Water Agency/Coachella Valley Water District

(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 to Perris Reservoir as well as the associated variable costs. 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 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.

<u>Desert Water Agency/Coachella Valley WD Advance Delivery Program</u>

Under this program, Metropolitan delivers Colorado River water to the Desert Water Agency and Coachella Valley WD in advance of the exchange for their SWP Contract Table A allocations. In addition to their Table A supplies, Desert Water Agency and Coachella Valley WD, subject to Metropolitan's written consent, may take delivery of SWP supplies available under Article 21, the Turn-back Pool Program. By delivering enough water in advance to cover Metropolitan's exchange obligations, Metropolitan is able to receive Desert Water Agency and Coachella Valley WD's available SWP supplies in years in which Metropolitan's supplies are insufficient without having to deliver an equivalent amount of Colorado River water. This program allows Metropolitan to maximize delivery of SWP and Colorado River water in such years. These Table A deliveries are incorporated into the estimate of SWP Deliveries under Current Programs shown in Table 3-2.[1]

<u>Desert Water Agency/Coachella Valley WD Other SWP deliveries</u>

Since 2008, Metropolitan has provided Desert Water Agency and Coachella Valley WD written consent to take delivery from the SWP facilities non-SWP supplies separately acquired by each agency. These deliveries include water acquired from the Yuba Dry Year Water Purchase Program and the 2009 Drought Water Bank. Metropolitan has also consented to,

- 10 TAF of exchange deliveries to CVWD for non-SWP water acquired from the San Joaquin Valley from 2008 through 2010, and
- 36 TAF of exchange deliveries to DWA for non-SWP water acquired from the San Joaquin Valley from 2008 through 2015.

Table 3-2 summarizes Metropolitan's SWP supply range for 2030. In developing the program capabilities shown in this table, Metropolitan assumed a simulated median storage level going into year 2030 based on the balances of supplies and demands. Under the median storage condition, there is an estimated 50 percent probability that storage levels would be higher than the assumption used, and a 50 percent probability that storage levels would be lower than the assumption used. In addition, the supply capabilities shown reflect actual storage program conveyance constraints.

[1] 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.

Table 3-2
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			
MWD Table A	469,000	107,000	1,026,000
DWCV Table A	77,000	60,000	155,000
San Luis Carryover [1]	69,000	208,000	208,000
Article 21 Supplies	0	0	52,000
Yuba River Accord Purchase	0	0	0
Subtotal of Current Programs	***615,000***	***375,000***	***1,441,000***
Programs Under Development			
Delta Improvements	341,000	628,000	605,000
IRP SWP Target [2]	0	0	0
Subtotal of Proposed Programs	***341,000***	***628,000***	***605,000***
Maximum Supply Capability	**956,000**	**1,003,000**	**2,046,000**

[1] Includes DWCV carryover.
[2] Remaining supply needed to meet IRP target.

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 require that blended water supplied to the member agencies meets the TDS goals adopted by Metropolitan's Board, which specify a salinity objective of 500 mg/L for blended imported water.

Metropolitan is actively involved in DWR's Municipal Water Quality Investigations Program. The highly variable quality of State Water Project water influences the operation of Metropolitan's system and its water treatment process. Increasingly restrictive State and Federal drinking water standards, concerns over emerging contaminants such as personal care products and pharmaceuticals, algal taste and odors, and Delta ecosystem fisheries issues are critical variables. DWR's MWQI program strives to monitor, protect, and improve drinking water quality of Delta water deliveries to the urban State Water Contractors and other users of Delta water. The program focuses on issues related to drinking water quality through regular water quality monitoring, special field and laboratory studies, the use of forecasting tools such as computer models and data management systems, and reporting. While the program has developed extensive monitoring in the Delta including real-time monitoring, increased monitoring along the California Aqueduct is the next major step.

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[2] 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.

DWR and USBR proposed to implement the Franks Tract Project to improve water quality and fisheries conditions in the Bay-Delta. DWR and USBR are evaluating installing operable gates to control the flow of water at key locations (Three mile Slough and/or West False River) to reduce sea water intrusion, and to positively influence movement of fish species of concern to areas that provide favorable habitat conditions. By protecting fish resources, this project also would improve operational reliability of the SWP and CVP because curtailments in water exports (pumping restrictions) are likely to be less frequent.

The state has adopted an "equivalent level of public health protection" (ELPH) program that targets water quality actions outside the Delta. The Bay-Delta Program is coordinating a feasibility study on water quality improvement in the California Aqueduct.

Metropolitan and the Friant Water Users Authority (FWUA) have entered into a partnership 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 studied projects that benefited both regions. Using Proposition 13 funds, an existing canal belonging to the Arvin-Edison Water Storage District was enlarged, enabling greater volumes of water to be exchanged between their groundwater and the California Aqueduct.

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 Bay-Delta 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, DWR and other 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

[2] The importance of bromides is discussed in the Water Quality chapter.

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 Army Corps of Engineers (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. 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.

Because of the risk of a prolonged shutdown of the SWP caused by seismic or hydrologic events either within the Delta or along the California 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.

Metropolitan is investigating the potential for carbon sequestration in the Delta islands to create a revenue source for Delta landowners. Farming the Delta peat soils generates a large amount of carbon dioxide, and growing native vegetation not only stops those emissions, but actually sequesters an even larger amount of carbon dioxide while rebuilding the peat soils. With the soils rebuilding to their historic elevations, the risk of levee failure would decrease, and may eventually be eliminated.

Achievements to Date

SWP Reliability

<u>Delta Vision</u>

The Delta has suffered from multiple crises for years – ecosystem, water supply, levee stability, water quality, policy, program and litigation. The ecosystem condition continues to deteriorate, with record-low reports of fish populations, Delta smelt and other species on the brink of extinction, and the commercial salmon season shut down completely for two years in a row. Continued drought conditions and court-ordered restrictions on water exports have led to reductions in water deliveries to contractors. Deteriorating levees, land subsidence, earthquake risk and climate change all contribute to growing concerns about mass Delta levee failure. Delta water quality also continues to decline, as the freshwater barrier that keeps salinity from the bay from moving upstream becomes more difficult to maintain, and both agricultural and urban communities contribute contaminants to the system. Finally, the litigation crisis grows as more than 25 lawsuits now stand on Delta-related issues.

Metropolitan's Long-Term Action Plan

Besides the short- and mid-term actions described earlier in Section 1.4, Metropolitan's adopted Delta action plan in June 2007 includes a long-term Delta Plan. The long-term action plan recognizes the need for a global, comprehensive approach to the fundamental issues and conflicts in the Delta to result in a truly sustainable Delta. A piecemeal approach cannot satisfy the many stakeholders that have an interest in the Delta and will fail; there must be a holistic approach that deals with all issues simultaneously. In dealing with the basic issues of the Delta, solutions must address the physical changes required, as well as the financing and governance. There are three basic elements that must be addressed: Delta ecosystem restoration, water supply conveyance, and flood control protection and storage development. In addition, the state needs to establish governance structures and financing approaches to implement and manage the three identified elements.

Governor's Delta Vision Process

Through this enduring Delta crisis, the Legislature and the Governor initiated, in 2006, a process to develop a new long-term vision for the Delta. SB 1574 (Kuehl/2006) required a cabinet committee to present recommendations for a Delta strategic vision. The governor created a Delta Vision Blue-Ribbon Task Force to advise the Cabinet Committee. The Task Force produced an October 2008 Strategic Plan, which the Cabinet Committee largely adopted and submitted, with its recommendations, to the Legislature on January 3, 2009. Metropolitan, as a stakeholder to the process, provided input to the Task Force.

The 2009 Delta Legislation

After delivery of the Delta Vision recommendations, the Legislature held informational hearings from Delta experts, Task Force members, and the Schwarzenegger Administration, as well as the public at large, and engaged in vigorous water policy discussions. Following the informational hearings, several legislators began developing detailed legislation which culminated in pre-print proposals being issued in early August of 2009 for public review and discussion over the summer recess. The Assembly Water, Parks and Wildlife Committee and the Senate Natural Resources and Water Committee then held joint informational hearings on the pre-print proposals and received extensive public comment. Thereafter, legislative leadership appointed a conference committee, which convened and held additional public hearings, with further legislator discussions on key issues. That work continued into the 7th Extraordinary Session, which was called by the governor specifically to address the pending Delta and water issues, and culminated in the signing of a historic package of bills. One of the keystones of that package was SB 1 X7, which reformed Delta policy and governance. Specifically, SB 1 X7:

- Establishes a new legal framework for Delta management, emphasizing the coequal goals of "providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem" as foundation for state decisions as to Delta management.
- Reconstitutes and redefines role of the Delta Protection Commission (DPC), to narrow membership to focus on local representation and to expand DPC role in economic sustainability.
- Creates a new Sacramento-San Joaquin Delta Conservancy (Conservancy), to support efforts that advance environmental protection and the economic well-being of Delta residents.

- Creates the Delta Stewardship Council (Council) as an independent state agency to guide actions in the Delta that furthers the coequal goals of Delta restoration and water supply reliability.
- Repeals the CALFED Bay-Delta Authority Act and transfers existing staff, contracts, etc. to the Council.
- Creates Delta Independent Science Board (Science Board) and Delta Science Program.
- Requires the State Water Resources Control Board (SWRCB), by August 12, 2010, to develop new flow criteria for the Delta ecosystem necessary to protect public trust resources.
- Requires the Department of Fish and Game (DFG), by December 31, 2010, to develop and recommend to the SWRCB flow criteria and quantifiable biological objectives for aquatic and terrestrial species.
- Creates a Delta Watermaster as the enforcement officer for SWRCB in the Delta.
- Requires the Council to develop, adopt, and commence implementation of the "Delta Plan" by January 1, 2012, with a report to the Legislature by March 31, 2012.
- Requires the DPC to develop a proposal to protect, enhance, and sustain the unique cultural, historical, recreational, agricultural, and economic values of the Delta as an evolving place.
- Requires Delta Plan to further the coequal goals of Delta ecosystem restoration and a reliable water supply.
- Requires the Delta Plan to promote statewide water conservation, water use efficiency, and sustainable use of water, as well as improvements to water conveyance/storage and operation of both to achieve the coequal goals.
- Requires the Delta Plan to attempt to reduce risks to people, property, and state interests in the Delta by promoting effective emergency preparedness, appropriate land uses, and strategic levee investments.
- Requires the Council to consider including the Bay Delta Conservation Plan (BDCP) in the Delta Plan and makes the BDCP eligible for state funding if:
  - The BDCP complies with Natural Community Conservation Planning Act (NCCPA).
  - The BDCP complies with the California Environmental Quality Act and includes a full range of alternatives, including a reasonable range of flow criteria, rates of diversion, and other operational criteria.
  - DWR consults with the Council and Science Board during development of the BDCP.
  - The BDCP incorporates a transparent, real-time operational decision making process in which the fishery agencies ensure that applicable biological performance measures are achieved in a timely manner.

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.

Progress was also made on the Southern California-San Joaquin Regional Water Quality Exchange Project. In 2009, Metropolitan and Arvin Edison Water Storage District enlarge their South Canal to enable exchanging more water between their groundwater basins and the California Aqueduct. Their relatively pure water allows Metropolitan to improve source water, and increase quantities, during times when quality and quantity are relatively poor. This project also allows MWD better access to water it has stored in the Arvin Edison Groundwater Storage Project.

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 810 TAF that provides Southern California with a six-month emergency water supply as well as carryover and regulatory storage.

<u>The Inland Feeder Project</u>

The Inland Feeder project is a high-capacity water delivery system designed to increase Southern California's water supply reliability in the face of future weather pattern uncertainties, while minimizing the impact on the San Francisco Bay/Sacramento-San Joaquin Delta environment in northern California. The massive water project will take advantage of large volumes of water when available from northern California, depositing it in surface storage reservoirs, such as Diamond Valley Lake, and local groundwater basins for use during dry periods and emergencies. The project also will improve the quality of the Southland's drinking water by allowing more uniform blending of better quality water from the state project with Colorado River supplies, which have a higher mineral content.

3.3 Central Valley/State Water Project Storage and Transfer Programs

Metropolitan endeavors to increase the reliability of supplies received from the California Aqueduct by developing flexible Central Valley storage and transfer programs. Over the years, Metropolitan has developed numerous voluntary Central Valley storage and transfer programs, aiming to develop additional dry-year water supplies.

To date, Metropolitan's Central Valley/SWP 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 include partnerships with Sacramento Valley Central Valley Project (CVP) and SWP settlement contractors. They allow Metropolitan to purchase water in drier years for delivery via the California Aqueduct to Metropolitan's service area.

Background

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 8.9 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 22 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 August 2008, 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 134 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 414 TAF.

Metropolitan believes that it now has in place Central Valley/SWP storage and transfer programs capable of reaching its planning 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 resource target under a wide range of hydrologic conditions and CVP/SWP operations.

The Central Valley/SWP storage and transfer 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 DWR and USBR 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 several Central Valley/SWP 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 3-3 lists the expected yields from these programs. Figure 3-3 shows the location of Metropolitan's statewide groundwater banking programs.

Storage and Transfer Programs

Semitropic Storage Program

Metropolitan has a groundwater storage program with Semitropic Water Storage District located in the southern part of the San Joaquin Valley. The maximum storage capacity of the program is 350 TAF. The specific amount of water Metropolitan can store in and subsequently expect to receive from the programs depends upon hydrologic conditions, any regulatory requirements restricting Metropolitan's ability to export water for storage, and the demands placed on the Semitropic Program by other program participants. During the recent dry year of 2008, the storage program delivered 125 TAF to Metropolitan. During wet years, Metropolitan has the discretion to use the program to store portions of its SWP entitlement water that are in excess of the amounts needed to meet Metropolitan's service area demand. In Semitropic, the water is 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 by direct groundwater pump-in return and the exchange of State Water Project entitlement water.

Arvin-Edison Storage Program

Metropolitan amended the groundwater storage program with Arvin-Edison Water Storage District in 2008 to include the South Canal Improvement Project. The project increases the reliability of Arvin-Edison returning higher water quality to the California Aqueduct. The program storage capacity is 350 TAF. The specific amount of water Metropolitan can expect to store in and subsequently receive from the programs depends upon hydrologic conditions and any regulatory requirements restricting Metropolitan's ability to export water for storage. The storage program is estimated to deliver 75 TAF. During wet years, Metropolitan has the discretion to use the program to store portions of its SWP Table A supplies which are in excess of the amounts needed to meet Metropolitan's service area demand. The water can be either directly recharged into the groundwater basin or delivered to district farmers who use the water in-lieu of pumping groundwater. During dry years, the district returns Metropolitan's previously stored water to Metropolitan by direct groundwater pump-in return or by exchange of surface water supplies.

Table 3-3 summarizes Metropolitan's Central Valley/SWP transfer programs supply range for 2030. In developing the program capabilities shown in this table, Metropolitan assumed a simulated median storage level going into year 2030 based on the balances of supplies and demands. Under the median storage condition, there is an estimated 50 percent probability that storage levels would be higher than the assumption used, and a 50 percent probability that storage levels would be lower than the assumption used. The supply capabilities shown reflect actual storage program conveyance constraints. In addition, SWP supplies are estimated using the draft 2009 SWP Delivery Reliability Report distributed by DWR in December 2009. The draft 2009 reliability report presents the current DWR estimate of the amount of water deliveries for current (2009) conditions and conditions 20 years in the future. These estimates incorporate restrictions on SWP and Central Valley Project (CVP) operations in accordance with the biological opinions of the U.S. Fish and Wildlife Service and National Marine Fishery Service

Table 3-3
Central Valley/State Water Project Storage and Transfer Programs
Supply Projection
Year 2030
(acre-feet per year)

Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
San Bernardino Valley MWD Minimum Purchase	12,000	8,000	20,000
San Bernardino Valley MWD Option Purchase	12,000	11,000	29,000
Central Valley Storage and Transfers			
Semitropic Program	46,000	41,000	69,000
Arvin Edison Program	63,000	75,000	75,000
San Bernardino Valley MWD Program	16,000	49,000	49,000
Kern Delta Program	47,000	50,000	50,000
Subtotal of Current Programs	***196,000***	***234,000***	***292,000***
Programs Under Development			
Mojave Groundwater Storage Program	11,000	5,000	43,000
North of Delta/In-Delta Transfers	33,000	33,000	33,000
SBVMWD Central Feeder	5,000	5,000	5,000
Shasta Return	18,000	18,000	18,000
Semitropic Agricultural Water Reuse Demonstration	11,000	11,000	11,000
Subtotal of Proposed Programs	***78,000***	***72,000***	***110,000***
Maximum Supply Capability	**274,000**	**306,000**	**402,000**

issued on December 15, 2008, and June 4, 2009, respectively.

San Bernardino Valley MWD Storage Program

The San Bernardino Valley MWD Storage program allows for the purchase of a portion of San Bernardino Valley Municipal Water District's State Water Project supply. The program includes a minimum purchase provision of 20 TAF and the option of purchasing additional supplies when available. This program can deliver between 20 TAF and 70 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.

Kern-Delta Water District Storage Program

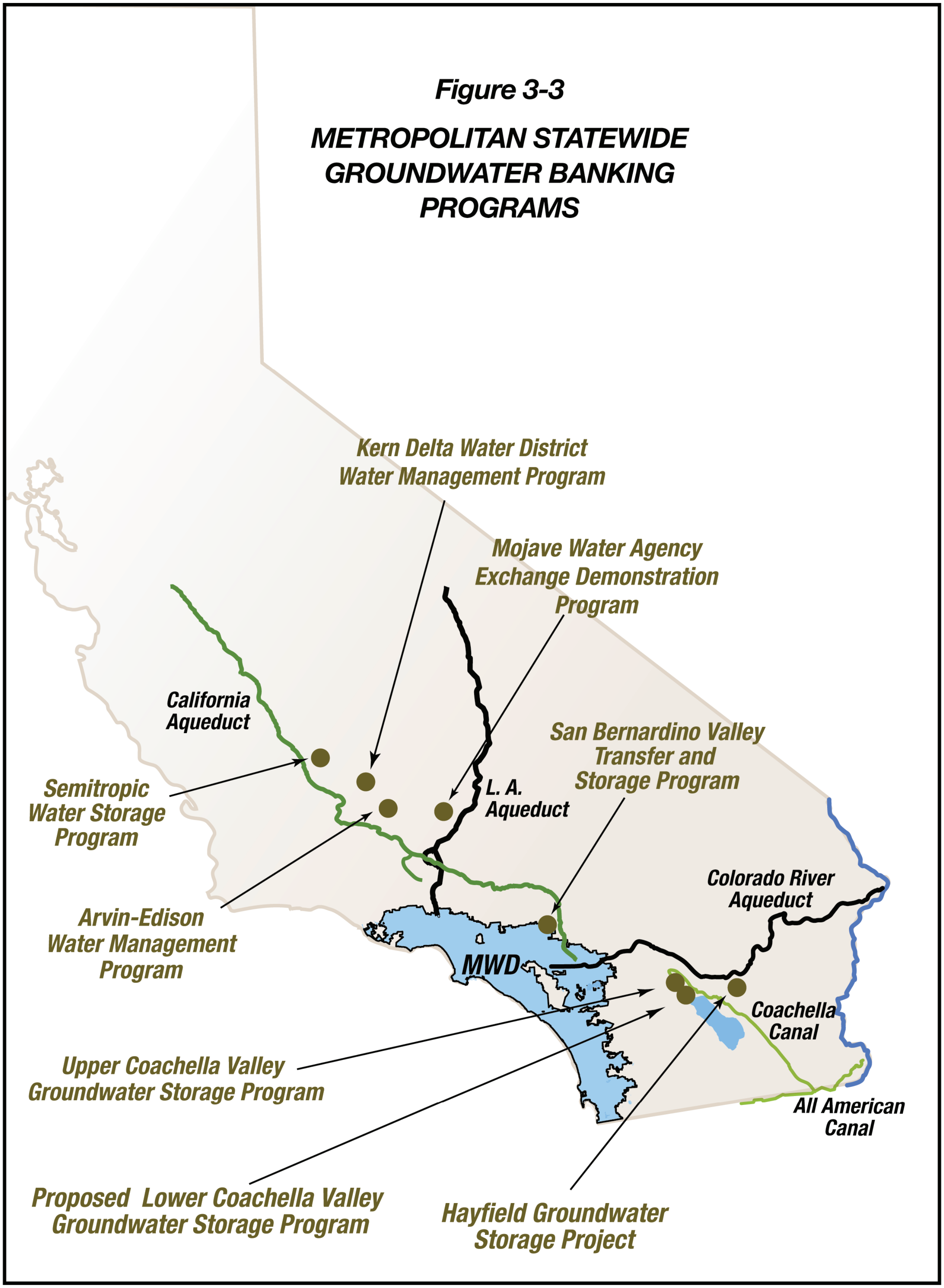
This groundwater storage program has 250 TAF of storage capacity. When fully developed, it will be capable of providing 50 TAF of dry-year supply. The water can be either directly recharged into the groundwater basin or delivered to district farmers who use the water in-lieu of pumping groundwater. During dry years, the districts returns Metropolitan's previously stored water to Metropolitan by direct groundwater pump-in return or by exchange of surface water supplies.

Mojave Storage Program

Currently operated as a demonstration 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 depending on hydrologic conditions.

Figure 3-3

METROPOLITAN STATEWIDE GROUNDWATER BANKING PROGRAMS



Central Valley Transfer Programs

Metropolitan expects to secure Central Valley water transfer supplies via spot markets and option contracts to meet its service area demands when necessary. Hydrologic and market conditions, and regulatory measures governing Delta pumping plant operations will determine the amount of water transfer activity occurring in any year. Transfer market activity in 2003, 2005, 2008, and 2009 provide examples of how Metropolitan has secured water transfer supplies as a resource to fill anticipated supply shortfalls needed to meet Metropolitan's service area demands.

In 2003, Metropolitan secured options to purchase approximately 145 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 have arisen 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, 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 exercise these options.

In 2008, Metropolitan in partnership with seven other State Water Contractors, secured approximately 40 TAF of water from willing sellers in the Sacramento Valley, of which Metropolitan's share was approximately 27 TAF.

In 2009, Metropolitan in partnership with eight other buyers and 21 sellers participated in a statewide Drought Water Bank, which secured approximately 74 TAF, of which Metropolitan's share was approximately 37 TAF.

Metropolitan's recent water transfer activities in have demonstrated Metropolitan's ability to develop and negotiate water transfer agreements either working directly with the agricultural districts who are selling the water or through a statewide Drought Water Bank. 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 and federal cooperation to facilitate voluntary, market-based exchanges and sales of water as a critical component of its overall water transfer strategy.

Achievements to Date

Metropolitan has made rapid progress to date developing Central Valley/SWP 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/SWP 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 DWR and USBR staff to facilitate Central Valley storage and transfer programs.

3.4 Conservation and Public Affairs

Conservation is a core element of Metropolitan's long-term water management strategy. Metropolitan continues to build on a nearly 20-year investment in conservation of more than $268 million, reflecting a long-term commitment to water conservation. Among other measures, this investment has resulted in the retrofit of more than 2.7 million toilets with more water efficient models and the distribution of more than 334,000 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 1.033 MAF per year from 1980 through 2025.

Metropolitan's conservation policies and practices are shaped largely by two factors: Metropolitan's planning strategy 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 pledged to make a good faith attempt to implement a prescribed set of urban water conservation Best Management Practices (BMPs).

Metropolitan's planning strategy places equal emphasis on local and imported resource development and treats conservation as a core local supply, on par with other resources such as water recycling and storage. Conservation savings result from active, code-based, and price-effect conservation efforts. Active conservation consists of water-agency funded programs such as rebates, installations, and education. Code-based and price-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. Including regional pre-1990 conservation savings, Metropolitan continues to pursue a 2025 total conservation target of approximately 1.033 MAF 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, code changes, and price-effects.

Background

Unlike traditional water supplies, conservation reduces water demand in ways that are quantified indirectly. Demand is reduced through changes in consumer behavior and savings from water-efficient fixtures like toilets and showerheads. Quantifying and projecting conservation savings requires specially designed estimating models. Such models were used during Metropolitan's planning process.

Conservation savings are commonly estimated from a base-year water-use profile. Metropolitan uses 1980 as the base year because it 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 TAF per year as the result of this 1980 plumbing code and unrelated water rate increases. These savings are referred to as "pre-1990 savings." Metropolitan's resource planning target combines pre-1990 savings and estimates of more recently achieved savings.

Distinguishing between active, code-based and price-effect conservation can be analytically complex when, for example, active programs for fixtures are concurrent with conservation-related plumbing codes. This plan combines active, code-based, and price-effect 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 is difficult to measure. It is generally accepted that these programs prompt consumers to install water saving fixtures and change water-use behavior thereby creating a residual benefit of increasing the effectiveness of companion conservation programs.

Implementation Approach

Metropolitan's implementation approach for achieving the conservation target includes support to member agencies in developing cost-effective BMP-oriented active conservation programs and new, innovative programs that address regional water uses. The stewardship charge in Metropolitan's rate structure provides the funding mechanism for active programs and non-incentive strategies. Metropolitan continues to seek supplemental state and federal funding in coordination with the member agencies.

Implementation of Conservation "Best Management Practices"

Metropolitan's conservation 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 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 3-4 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, as Appendix A.7, are copies of the BMP reports Metropolitan has filed with the CUWCC.

Table 3-4
Urban Water Conservation Best Management Practices

BMP Number	BMP Description	Applies to	
		Retailers	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

In December 2008, the Urban MOU was amended and the BMPs were revised. The revision reorganized the Council's 14 BMPs into five categories. Two categories, Utility Operations and Education, are referred to as "Foundational BMPs," because they are considered to be essential water conservation activities by any utility and are adopted for implementation by all signatories to the Urban MOU as ongoing practices with no time limits. The remaining BMPs are "Programmatic BMPs" and are organized into Residential; Commercial, Industrial, and Institutional (CII); and Landscape categories.

A mapping from the old BMPs to the new BMPs is shown in Table 3-5.

Table 3-5
Mapping of Prior BMPs to New BMPs

Prior BMP Number & Name	New BMP category
Water Survey Programs for Single-Family Residential and Multi-Family Residential Customers	Programmatic: Residential
Residential Plumbing Retrofit	Programmatic: Residential
System Water Audits, Leak Detection and Repair	Foundational: Utility Operations – Water Loss Control
Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections	Foundational: Utility Operations – Metering
Large Landscape Conservation Programs and Incentives	Programmatic: Landscape
High-Efficiency Clothes Washing Machine Financial Incentive Programs	Programmatic: Residential
Public Information Programs	Foundational: Education – Public Information Programs
School Education Programs	Foundational: Education – School Education Programs
Conservation Programs for Commercial, Industrial, and Institutional (CII) Accounts	Programmatic: Commercial, Industrial, and Institutional
Wholesale Agency Assistance Programs	Foundational: Utility Operations – Operations
Retail Conservation Pricing	Foundational: Utility Operations – Pricing
Conservation Coordinator	Foundational: Utility Operations – Operations
Water Waste Prohibition	Foundational: Utility Operations – Operations
Residential ULFT Replacement Programs	Programmatic: Residential

In addition to implementing cost-effective BMPs, Metropolitan actively supports many CUWCC committee and research activities. For example, Metropolitan has historically assisted in CUWCC's ongoing efforts to document and increase the effectiveness of BMP-related conservation efforts. Presently, Metropolitan is represented on the following CUWCC committees:

- Board (formerly Steering Committee)
- Commercial, Industrial, and Institutional Committee
- Residential Committee
- Landscape Committee
- Research and Evaluation Committee
- Utility Operations Committee
- Education Committee
- BMP Reporting Committee

The following sections describe Metropolitan's conservation programs.

Regional Conservation Programs

Metropolitan's conservation programs focus on two main areas: residential programs, and commercial, industrial and institutional programs.

Residential Programs

Metropolitan's residential conservation consists of three major programs:

SoCal Water$mart

In July 2008, Metropolitan initiated a new region-wide residential program named SoCal Water$mart. During its first year of operation, rebate activity exceeded expectations as many residential customers became increasingly aware of the financial incentives available to them to help offset the purchase of water-efficient devices. Metropolitan issued a record 54,000 rebates for residential fixtures totaling $10 million in fiscal year 2008/09, resulting in approximately 2.3 TAF of water to be saved annually.

Save Water, Save A Buck (Multi-Family)

Metropolitan's regional Save-A-Buck program extends rebates to multi-family dwellings. More than 40,000 rebates were issued fiscal year 2008/09 for high-efficiency toilets and washers for multi-family units within Southern California.

Member Agency Residential Programs

In addition to regional programs implemented by Metropolitan, member and retail agencies also implement local water conservation programs within their respective service areas and receive Metropolitan incentives for qualified retrofits and other water-saving actions. Typical projects include toilet replacements, locally administered clothes washer rebate programs, and residential water audits.

Metropolitan provides incentives on a variety of water efficient devices for the residential sector. The following is a brief description of current and past devices that contribute to projected conservation savings:

High-Efficiency Clothes Washers

High-efficiency clothes washers (HECWs) is a growing segment in water conservation. Metropolitan has supplemented its HECW rebate using state or federal grants whenever possible. The water efficiency of clothes washers is represented by the "water factor," which is a measure of the amount of water used to wash a standard load of laundry. Washers with a lower water factor save more water. Metropolitan has continued to move the market by changing its program requirement to lower water factors. The program eligibility requirement is currently set at water factor 4.0, which saves over 10,000 gallons per year per washer over a conventional top loading washer.

High-Efficiency Toilets and Ultra-Low-Flush Toilets

Metropolitan has provided incentives for toilet programs since 1988. Currently, Metropolitan only provides funding for high-efficiency toilets (1.28 gallons per flush or less), which use

20 percent less than ultra-low-flush toilets (1.6 gallons per flush). Ultra-low-flush toilets are the current standard defined by the plumbing code. Metropolitan uses the EPA's WaterSense list of tested toilets in its programs as qualifying models.

Irrigation Evaluations and Residential Surveys

Metropolitan provides funding to its member agencies that choose to implement irrigation evaluations and indoor surveys for residents. Irrigation evaluations provide customers with a recommended irrigation schedule and suggested improvements for irrigation systems. Indoor residential surveys provide customers with information on identifying leaks and making changes to water-using devices in the home.

Rotating Nozzles for Sprinklers

Pop-up spray heads with multi-stream, multi-trajectory rotating nozzles represent a new alternative to the irrigation of landscapes. Field tests demonstrate these devices apply water more evenly than traditional nozzles with fixed conical spray patterns, offering the potential for significant water savings. Low precipitation rates associated with these nozzles can reduce run-off and related pollution, thereby offering a significant value-added benefit when irrigating sloping landscapes.

Weather-Based Irrigation Controllers

Weather-based irrigation controllers (WBIC) are a rapidly evolving conservation technology. Rather than relying on periodic manual adjustments, WBICs 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.

Synthetic Turf

From July 2007 through June 2010, Metropolitan offered an incentive for synthetic turf based on a pilot project conducted with financial assistance from the United States Bureau of Reclamation (USBR). Synthetic turf provides water savings benefits as a replacement for irrigated turf and lawn areas.

Commercial, Industrial and Institutional Programs

Metropolitan's commercial industrial and institutional (CII) conservation consists of three major programs:

Save Water, Save-A-Buck Program

The majority of the CII conservation activity comes from Metropolitan's regional Save-A-Buck program. The Save-A-Buck program had its largest year in fiscal year 2008/09, providing about $8.8 million in rebates for approximately 145,000 device retrofits.

Water Savings Performance Program

The Water Savings Performance Program is a component of the commercial program and provides financial incentives for documented water savings for landscape irrigation and industrial process improvements. This program allows large-scale water users to customize conservation projects and receive incentives for five years of water savings for capital water-use efficiency improvements.

Member Agency Commercial Programs

Member and retail agencies also implement local commercial water conservation programs using Metropolitan incentives. Projects target specific commercial sectors, with many programs also receiving assistance from state or federal grant programs. Metropolitan incentives are used as the basis for meeting cost-share requirements.

Accelerated Public Sector Water Efficiency Partnership Demonstration Program

A fourth program, the Public Sector Demonstration Program, also contributes to the savings. From August 2007 through 2008, Metropolitan offered a one-time program to provide up-front funding to increase water use efficiency in public buildings and landscapes within its service area. The program was designed to reinforce the region's conservation message by demonstrating willingness for public agencies to respond to the call to save water. Participants included various special districts, school districts, state colleges and universities, municipalities, counties and other government agencies. There were four components of the program:

1. Water audits
2. Enhanced incentives
3. Pay-for-performance
4. Recycled water hook-up

Free water audits were provided to assess current indoor and outdoor water use and make specific recommendations for practical solutions and improvements for public facility and landscape areas. Water use experts created an equipment inventory list and made recommendations for replacements or upgrades. A written report was provided as a guide to initiating equipment upgrades.

Enhanced incentives were provided to replace high water-use equipment including toilets, urinals, and irrigation controllers. Program incentives were often sufficient to cover the total cost of the equipment, capped at the manufacturer's suggested retail price.

Pay-for-performance incentives were also offered to reduce landscape irrigation water use by at least 10 percent through behavioral modifications.

Metropolitan' s CII programs provide rebates for water-saving plumbing fixtures, landscaping equipment, food-service equipment, cleaning equipment, HVAC (heating, ventilating, air conditioning) and medical equipment. Following is a list of current and past devices that contribute to projected conservation savings:

- Connectionless Food Steamer
- Cooling Tower Conductivity Meter
- Dry Vacuum Pump
- High-Efficiency Clothes Washers
- High-Efficiency Toilet
- High-Efficiency Urinal
- Large Rotors - High Efficiency Nozzle
- Multi Stream Rotating Nozzles
- pH Cooling Tower Controller
- Pre-rinse Spray Head
- Steam Sterilizer
- Synthetic Turf
- Ultra-Low-Flush Toilet
- Ultra-Low-Flush Urinals
- Water Broom
- Weather-Based Irrigation Controller
- X-ray Processor
- Zero Water Urinal

Research and Development Programs

Metropolitan encourages research and development of new and creative ways to conserve water. The Innovative Conservation Program provides funding to individuals and organizations to test new technologies. The Enhanced Conservation Program provides funding directly to Metropolitan's member agencies to encourage new and creative approaches to implement urban water conservation.

Water Conservation Ordinances

In June 2008, Metropolitan adopted a Water Supply Alert resolution following Governor Arnold Schwarzenegger's proclamation of a statewide drought. Among other provisions, the Alert encouraged cities, counties, and local public water agencies to adopt and enforce local water conservation ordinances. To facilitate ordinance adoption, Metropolitan compiled a library of available local ordinances, developed a model water conservation ordinance, and hosted several workshops. Approximately half of the 19 million residents in Metropolitan's service area are now covered by adopted ordinances, and an additional one-third reside in jurisdictions that have taken action toward adoption of ordinances.

New Construction Programs

With grants from the USBR and the State of California, Metropolitan offered financial incentives through the California Friendly® New Home Program. Builders of new single-family model homes and multi-family developments are encouraged to incorporate water efficient fixtures and landscapes, including high-efficiency toilets and clothes washers, smart irrigation controllers, and landscapes designed with appropriate plant palettes and efficient irrigation systems. California Friendly model homes showcase residential water efficiency, helping to increase consumer awareness of water-conserving features and provide inspiration for water-conserving landscapes.

Since program inception in 2003, Metropolitan has provided incentives to eight homebuilders for more than 220 new homes with over 300,000 square feet of landscape.

Conservation Funding

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 $195 per acre-foot of water saved or one-half of average device 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.

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 3-6 and the following summaries describe briefly past sources and uses of these funds.

Measurement and Evaluation

Measurement and evaluation is an important component of Metropolitan's conservation program. These serve 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 3-7 summarizes the major conservation-related activities for the public information BMP administered by External Affairs. Table 3-8 shows Metropolitan's extensive commitment to the BMP for conservation-related education programs.

Conservation Outreach Campaign

Metropolitan has conducted annual advertising, education, and community outreach campaigns since 2003 under its bewaterwise.com® and California Friendly® brands to urge Southern California consumers and business owners to make permanent changes in their everyday uses of water. From 2007 through 2010, the Board authorized an expansion of these efforts in order to meet the critical water supply crisis facing the state. Outreach campaigns in the latter part of the decade reflected these unprecedented challenges with more urgent calls for water conservation behavior. Creative such as "Time to Get Serious" and "Cut Your Water Use" were seen and heard across more media outlets at higher frequency levels and over longer periods of time than pre-2007 campaigns. Metropolitan was a lead sponsor of the "California's Water: A Crisis We Can't Ignore" statewide campaign with the Association of California Water Agencies in fall 2007. Leading up to the summer of 2009, Metropolitan's "Move the Needle" outreach campaign (featuring a water supply gauge nearing empty) communicated the change from voluntary to mandatory water conservation in many Southern California cities and communities.

Other activities include:

- Annual reports to the Legislature (SB 60)
- Maintaining and updating the bewaterwise.com® website in English and Spanish (more than 1.7 million individuals have visited bewaterwise.com® for information on water conservation from 2005 to 2010)
- Maintaining 9 California Irrigation Management Information System (CIMIS) stations
- Conducting consumer focus groups and surveys to measure effectiveness of outreach efforts
- Participating in workshops and local fairs regarding conservation outreach

California Friendly Landscape Training Program

Metropolitan's California Friendly Landscape Training Program, formerly known as Professional Protector del Agua, offers in-person and online courses in irrigation efficiency and water-wise garden design. Nearly 9,000 landscape maintenance professionals and residents attended the workshops in fiscal year 2008/09. Courses are conducted in English and Spanish.

Achievements to Date

Conservation is an integral part of water supply planning at Metropolitan. The Regional Supply Unit within Metropolitan works to improve understanding of costs and benefits of water 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 USBR and California Municipal Utilities Association.

Table 3-9 summarizes Conservation Credits Program savings and investments.
Table 3-10 summarizes activities Metropolitan implemented in its service area beginning fiscal year 1990-91 and shows the achievements the region has made in implementing these programs.

Conservation continues to be an important part of Metropolitan's water supply planning. Continued investment in cost-effective conservation remains a key component of Metropolitan's resource goals

Table 3-6
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
Prop 13 Grants				
	HECW	$2,500	Increase rebate amount	Completed
	ET Controllers	$1,800	Initiate rebates	Completed
CPUC (w/CUWCC)				
2003	Pre-Rinse Spray Valves: Phase 1	$1,600[1]	12,000 direct installations[1]	Completed
2004	Pre-Rinse Spray Valves: Phase 2	$2,200[1]	17,000 direct installations[1]	Completed
USBR				
2003	CA-Friendly Landscapes	$182	New home landscapes	Completed
2003	Data Loggers	$50	Software error analysis	Deferred
2004	CA-Friendly Landscapes	$60	New home landscapes	Completed
2004	Synthetic Turf pilot	$220	Provide incentives	Completed
2004	World Forum	$50	College/university grants	Completed
2004	CII Region wide	$250	Add $ to rebate amounts and for administration	Completed
2005	Protector del Agua	$50	Develop web classes	Completed
2005	Landscape Market Analysis	$50	Analyze landscape conservation opportunities	Completed
2005	City Makeover	$50	Public landscapes	Completed
2006	Innovative Conservation Program	$300	Support research projects	Completed
2008	Innovative Conservation Program	$300	Support research projects	In Progress
Water for the West				
	Protector del Agua	$25	Develop web classes	Completed
Prop 50				
	Residential HECW	$1,660	Increase rebate amount	Completed
	CA-Friendly Landscapes	$423	Common area landscapes	In Process
	High Efficiency Toilets	$1,000	Increase rebate amount	Completed
	Protector del Agua	$78	Develop on-line classes	Completed
2008	Residential HECW	$2,000	Increase rebate amount	In Process

[1] This is the funding amount and number of installations that represents Metropolitan's share of the project.

Table 3-7
External Affairs Group
Conservation-Related Activities

Program or Activity	Description
Paid and public service advertising	Metropolitan has conducted annual water conservation advertising and education campaigns since 2003 using television, radio, online, event sponsorship and outdoor billboards.
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 65 to 70 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 100,000 students per year. Metropolitan partners with community-based organizations and others to promote water education through event sponsorships and cost-sharing of educational materials.
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 3-8
School Education Programs

Program or Activity	Date Initiated	Date Updated	Current Status	Grades	Description
Admiral Splash	1983	2006	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	2008	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	2006	Ongoing	Grade 5	A supplement integrated into fifth-grade U.S. History curricula 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.
Conservation Connection: Water and Energy Use in Southern California	2010	-	Ongoing	Grades 5-9	An activity-focused unit designed to engage students in finding solutions to conserve both water and energy at school and home. The curriculum also contains an online water and energy survey for students and their families.

Table 3-9
Conservation Credits Program

Fiscal Year	New Annual Water Savings	Investment
2008 – 2009	134,000	$44.5 million
2007 – 2008	118,000	$15.4 million
2006 – 2007	116,000	$10.6 million

Table 3-10
Conservation Achievements in Metropolitan's Service Area

	Qty	Units
CII Rebated Devices (FY 1990-91 to FY 2008-09)		
Audits/Surveys	6,353	ea
Connectionless Food Steamers	26	ea
Cooling Tower Conductivity Controllers	1,028	ea
Dry Vacuum Pump	20	ea
Toilets	107,265	ea
Urinals	20,084	ea
High Efficiency Washers	35,664	ea
pH Conductivity Controllers	103	ea
Pre-Rinse Spray Heads	17,171	ea
Multi-Stream Rotating Nozzles	77,505	ea
Steam Sterilizers	25	ea
Water Brooms	5,942	ea
Weather Based Irrigation Controllers	12,929	acres
X-Ray Processors	185	ea
High Efficiency Nozzles	19,476	ea
Synthetic Turf	5,570,848	sq. ft.
California Friendly Landscape	295,230	sq. ft.
Residential Rebated Devices (FY 1990-91 to FY 2008-09)		
Aerators	158,814	ea
Audits/Surveys	111,199	ea
High Efficiency Clothes Washers	285,903	ea
Toilets	2,629,047	ea
Multi-Stream Rotating Nozzles	65,960	ea
Showerheads	1,735,436	ea
Weather Based Irrigation Controllers	2,203	acres

3.5 Recycling, Groundwater Recovery, and Desalination

Metropolitan continues to support local resources development including water recycling, groundwater recovery, and seawater desalination to meet its supply reliability and water quality objectives in a cost effective manner.

Water recycling has proven to be a reliable core supply, and it helps local agencies comply with environmental regulations. Metropolitan continues to pursue a 2025 target for combined water recycling, groundwater recovery, and seawater desalination elements totaling 500 TAF per year of committed development and 250 TAF per year of planning buffer to address uncertainties and implementation risks. Currently, more than half of the water recycling in California occurs in Metropolitan's service area. Previous regional planning highlighted that a significant amount of future water recycling will be used for groundwater replenishment and seawater intrusion barrier purposes.

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. Groundwater recovery projects use a variety of treatment technologies to remove undesirable constituents such as nitrates, volatile organic compounds (VOCs), perchlorate, color, and salt. Desalination of brackish groundwater and other local supplies enhances the continued supply reliability of the region by maximizing local groundwater resources. Furthermore, several agencies are progressively pursuing development of seawater desalination projects.

Background

A. Recycling

Local water recycling projects involve further treatment of secondary treated wastewater that is currently discharged to the ocean or streams and lands and use it for direct non-potable uses such as landscape and agricultural irrigation, commercial and industrial purpose and for indirect potable uses such as groundwater recharge, seawater intrusion barriers, and surface water augmentation. This section provides a description of the wastewater sources that potentially could be used for recycled water.

<u>Wastewater Disposal in the Service Area</u>

As part of regional planning that encourages use of recycled water, a database has been developed that include 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. Shown in Table 3-11 are the existing and projected total effluent capacities of the wastewater treatment plants from a database of 89 plants identified within Metropolitan's service area.

Wastewater treatment capacity provides an indication of the amount of wastewater being generated and disposed in Metropolitan's service area. Most wastewater plants in the service area provide secondary treatment, 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

Table 3-11
Existing and Projected Total Effluent Capacity
Wastewater Treatment Plants within Metropolitan's Service Area

Treatment Level	Existing Capacity (MGD)	2040 Capacity (MGD)
Primary	2,120	3,139
Secondary	1,546	2,708
Tertiary	607	1,464
Advanced	34	229

This data was compiled as part of the Southern California Comprehensive Water Reclamation and Reuse Study.

- City of Los Angeles Bureau of Sanitation
- San Diego Metropolitan Wastewater Department
- Eastern Municipal Water District
- Inland Empire Utilities Agency

Many small special-purpose wastewater agencies, dual-purpose (water and wastewater) special districts, and municipal wastewater agencies also provide wastewater treatment and disposal services within Metropolitan's service area.

As a rule, wastewater is collected in a sewer collection system. From there, it flows to a wastewater 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* – Currently, about 308 TAF per year of recycled water is used for 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 such as landscape or agricultural irrigation and industrial applications, however, will require more developed markets.
3. *Live Stream Discharge* – A number of inland plants discharge treated effluent into local streams and rivers. That water is then used downstream for beneficial uses, eventually flowing to 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 cooperation 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 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.

[1] This was the Southern California Comprehensive Wastewater Recycling and Reclamation Project (SCCWRRS).

Metropolitan has identified a potential for more than 1.0 MAF of recycled water to be developed by 2050. The majority of these projects are currently in conceptual planning phases.

Uses of Recycled Water

There are about 335 TAF per year of planned and permitted uses of recycled water throughout Metropolitan's service area. These include landscape irrigation, commercial and industrial use, seawater intrusion barriers, and groundwater recharge applications. It is anticipated that about 458 TAF per year of new recycled water could be developed in Metropolitan's service area by the year 2035. 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.

1. *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 West Basin MWD's service area and the city of Torrance use recycled water. Typical industrial uses include cooling tower makeup water, boiler feed water, paper manufacturing, carpet dying, and process water. In 2009, approximately 15 TAF of recycled water was used for industrial purposes. 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.
2. *Irrigation* – Currently, about 132 TAF per year of recycled water is used to irrigate golf courses, parks, schoolyards, cemeteries, greenbelts, and agricultural purposes 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 scarce.
3. *Indirect Potable* – Indirect Potable Reuse refers to the use of recycled water for groundwater recharge, and surface water reservoir augmentation purposes.
    a. *Groundwater Recharge* – Metropolitan's service area overlies numerous groundwater basins, some of which are over-drafted, 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 intrusion. The use of recycled water for seawater intrusion barrier projects is increasing and is replacing imported water used for this purpose. Increasing the proportion of recycled water can free imported water for direct consumption. Currently, approximately 118 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 38 percent of the recycled water in Metropolitan's service area is used for groundwater replenishment and seawater barriers. Table 3-12 presents a summary of this recycled water use.

Table 3-12
2009 Groundwater Replenishment and Seawater Barrier Injection Projects Using Recycled Water
(TAF per year)

Project	Recycled Water Use
OCWD GWRS	56.0
West Coast Barrier	10.9
Central Basin Spreading	41.8
Alamitos Barrier	2.2
Inland Empire Utilities Agency	2.2
Los Angeles Harbor	2.7
Camp Pendleton and other smaller projects	2.2
Total	**118.0**

Current groundwater recharge regulations require that recycled water be blended with specified percentages of imported water or other local water. With technological advancements, the percentage of recycled water is increasing. It is anticipated that some projects will soon be able to use 100 percent recycled water for seawater barrier and groundwater replenishment projects, thereby increasing recycled water use and further reducing a demand on imported supplies.

Large-scale groundwater replenishment projects utilizing recycled water require case-by-case review by the California Department of Public Health (CDPH). The greater the percentage of recycled water used for replenishment, the more stringent CDPH requirements.

One potential concern related to the use of recycled water for groundwater recharge is adverse impacts to groundwater quality from organic contaminants, metals, and salts. CDPH has proposed regulations for groundwater recharge with recycled water in aquifers used as a domestic supply source. Advanced treatment of recycled water (reverse osmosis, micro/ultra filtration, ultraviolet light, and hydrogen peroxide) is beginning to address many of these concerns and allow for greater flexibility for future recycled water use.

b. *Reservoir Augmentation* – Reservoir augmentation includes use of advanced treated recycled water to augment a surface water reservoir. Blended water from the reservoir is then treated at a conventional water treatment plant for potable purposes. There is currently no Reservoir augmentation with recycled water in Metropolitan's service area. In continuation of its effort, the City of San Diego recently approved construction of a demonstration project to test the feasibility and design requirements of a full-scale reservoir augmentation project.

Technical and Economic Issues of Recycled Water

Recycled water use is growing rapidly in Metropolitan's service area. Further expansion depends 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
- Increasing cooperation between agencies to serve recycled water in other agency service areas

Metropolitan is actively involved with other agencies and organizations such as WateReuse Foundation to support research and to further expand the use of recycled water. Metropolitan is also working with the WateReuse Association and other agencies on legislative and regulatory issues to streamline permitting processes and provide needed funding and support for increased use of the recycled water.

Recycled Water Task Force

Pursuant to AB 331 in 2002, the Department of Water Resources (DWR) convened a Task Force consisting of 40 water and wastewater agency managers, water recycling experts, environmental organizations, public health officials, researchers, and the public to evaluate the framework of State and local rules, regulations, ordinances, and permits to identify the opportunities for and obstacles to increasing the safe use of recycled water. The Task Force provided a list of recommendations and overarching issues discussed below.

1. *Funding* – Capital funding is a significant constraint to increased recycled water project development. Recycled water systems are separate from potable systems, so projects require significant capital investments in treatment and distribution. Variability in demand for recycled water lengthens the time needed to fully develop markets, which can affect project economics by increasing unit costs during early years of operation. Uncertainty of market demands creates a risk to cost recovery required for the repayment of capital debt.

   Estimates show the need for about $4 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's Local Resources Program (LRP) assists member agencies in overcoming this obstacle. In its role as the regional water supplier, Metropolitan provides financial assistance up to $250 per AF to participating projects that displace a demand on its imported water supplies.

   In addition to the 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 USBR's Title XVI program Authorized by congress in 1992 represents another major funding source. To date, approximately $94 million grants has been provided to projects in Metropolitan's service area.

Proposition 50, passed in 2002, includes funding for the development of local projects including water recycling. It is expected to be an important source of funding for local projects.

The proposed bond under the Safe, Clean, and Reliable Drinking Water Supply Act of 2010, if passed by voters in November 2010, could provide an additional one billion dollars of grants and loans for development of water recycling projects.

The State Water Resources Control Board's (SWRCB) State Revolving Fund program continues to provide low interest loans for capital funding of water recycling projects. Loan payment proceeds go back to the Fund to provide loans to other projects.

2. <u>Regulatory Issues</u> – Two state agencies are involved in regulating water recycling projects. The Regional Water Quality Control Board (RWQCB) is the permitting authority and the CDPH oversees public 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. Currently, state regulatory agencies review and determine requirements for recharge projects on a case-by-case basis.

   a. *SWRCB Recycled Water Policy* – SWRCB adopted the State Recycled Water Policy (Policy) in February 2009 after several years of negotiation. The Policy supports the SWRCB 2008-2001 Strategic Plan to promote sustainable local water supplies and establishes a mandate to increase the use of recycled water in California by 200 TAF per year by 2020 and by an additional 300 TAF per year by 2030. The Policy is organized into recycled water goals, roles of agencies, salt and nutrient management plans, landscape irrigation, groundwater recharge, anti-degradation, emerging constituents, and recycled water incentives.

      Due to incomplete knowledge of emerging contaminants analytical methods and public health impacts, the SWRCB has established a technical blue ribbon advisory panel to evaluate the current situation and provide recommendations to the SWRCB.

   b. *SWRCB General Permit for Landscape Irrigation Use of Municipal Recycled Water* – Pursuant to California Water Code § 13552.5, (Assembly Bill 1481, De La Torre, 2007) the SWRCB adopted a general permit for landscape irrigation uses of recycled water for which CDPH has established uniform statewide recycling criteria pursuant to Section 13521. The General Permit for Landscape Irrigation Uses of Municipal Recycled Water allows the use of recycled water for landscape irrigation including uses for parks, greenbelts, playgrounds, cemeteries, commercial landscaping, and freeway and highway landscaping.

The general permit's intent was to develop a uniform interpretation of state standards that ensures the safe, reliable use of recycled water for landscape irrigation uses, consistent with state and federal water quality law. The general permit would be for uses where CDPH has established uniform statewide standards. The general permit is also intended to reduce costs to producers and users of recycled water by streamlining the permitting process for its use in landscape irrigation.

In addition, Metropolitan continue to work with other agencies and provide comments on the proposed revisions to CDPH's Draft Title 22 Code of Groundwater Recharge Regulations, California Department of Housing and Community Development's Graywater standards, and DWR's proposed Dual Plumbing design standards.

Draft Title 22 Groundwater Recharge Reuse Regulations were proposed by the CDPH on August 5, 2009. The regulations proposed changes the level of treatment, retention time, and dilution of groundwater recharge projects. Additional public comments periods are anticipated in 2010.

The emergency graywater regulations, which added Chapter 16A "Nonpotable Water Reuse Systems" into the 2007 California Plumbing Code, were approved by the California Building Standards Commission (CBSC) on July 30, 2009. The emergency regulations were subsequently filed with the Secretary of State on August 4, 2009 and became effective immediately upon filing.

Assembly Bill 371 (Goldberg 2006) and Senate Bill 283 (DeSaulnier, 2009) directed the DWR, in consultation with the State Department of Health Services, to adopt and submit to the California Building Standards Commission regulations to establish a state version of Appendix J (renamed Chapter 16 Part 2) of the Uniform Plumbing Code to provide design standards to safely plumb buildings with both potable and recycled water systems.

On November 18, 2009 the Building Standards Commission unanimously voted to approve the California Dual Plumbing Code that establishes statewide standards for installing both potable and recycled water plumbing systems in commercial, retail, and office buildings, theaters, auditoriums, condominiums, schools, hotels, apartments, barracks, dormitories, jails, prisons, and reformatories. The code is scheduled to be published in July 2010 with an effective date of January 1, 2011.

3. _Institutional Issues_ – Multiple local agencies are often involved in the development of local water recycling projects. For example, recycled water from a single wastewater source may be used by a number of agencies that provide recycled water service, 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 deliver recycled water within a water district's service area. If recycled water is used for groundwater recharge, local agencies must coordinate 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.

4. _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. Several golf courses and other users have complained about the high salt content in recycled water and expressed reluctance to its use on their property or crops. Also, groundwater basin managers are concern with increasing salt load in groundwater due to use of high salinity recycled water. Therefore, agencies, locally and on regional basis, are engaged in addressing the high salinity in recycled water and plan for salinity management control to accommodate the water quality needs of customers and to reduce salt accumulation in underlying groundwater where recycled water is used.

5. <u>Seasonal Storage</u> – 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.) occurs in summer (May through September). Therefore, some projects store surplus 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. Current practice is to use supplement recycled water with potable water or other water to meet peak demand in summer which outpace available recycled water supplies.

6. <u>Public Acceptance</u> – 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 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 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.

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 AF 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 folded into Metropolitan's Local Resources Program, which now includes both recycled water and groundwater recovery projects.

Use of degraded groundwater normally requires high levels of treatment. Membrane processes used to recover the majority of severely degraded water have a high capital cost and incur a high operational cost for power. Once treated, however, recovered groundwater may be integrated to potable water systems.

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 separate and expensive ocean outfalls.

Lastly, most of the groundwater basins in Southern California are regulated by basin managers through adjudication or groundwater management plans. Where recovery of contaminated groundwater exceeds the limitations on production of groundwater specified in the basin adjudication or management plan groundwater recovery projects may include groundwater replenishment with supplemental water.

<u>Brine Disposal</u>

All processes that recover degraded groundwater also produce concentrated waste flows for which disposal can be problematic. Most importantly, membrane processes such as reverse osmosis – the predominant desalting technology used in Southern California – produce significant volumes of brine that can account for about 15 percent of the treated water. In Southern California, brines generated from brackish water desalination are typically disposed through dedicated brine lines to ocean outfalls or sanitary sewers. Advanced wastewater treatment with membrane also generates a high salinity brine.

Brine disposal is a critical issue facing Southern California in the further development of brackish groundwater projects and recycled water supplies, since introducing high-salinity brines into sanitary sewers impacts the ability to recycle waste water. The U.S. Bureau of Reclamation, partnering with Metropolitan and 13 other water, waste water and groundwater agencies, recently completed a study of the Region's brine disposal current and future needs. The Southern California Regional Brine-Concentrate Management Study, Phase I, found that brine generation from brackish groundwater desalters is expected to grow from 15 mgd in 2008 to 76 mgd by 2035. Over the same period, brines produced by advanced treatment of wastewater for recycled uses will grow from 17 mgd in 2008 to 60 mgd by 2035. Total local supplies of about 500 mgd would be supported by brine producing projects and necessary disposal by 2035.

The management of existing regional brine lines and the development of new brine line systems will be a critical factor in the continued growth in brackish groundwater desalination and recycled water supplies in Southern California. The region currently has one operating brine line, the Santa Ana Regional Interceptor (SARI line). The SARI line collects brine from desalters in San Bernardino, Riverside, and Orange counties. A key benefit of the SARI line is that it has allowed inland water agencies to recover impaired groundwater resources which would otherwise be unusable. A second brine line – the Calleguas Regional Salinity Management Project is under construction in Ventura County, and will collect brine from existing and planned groundwater desalters and wastewater treatment plants. A third regional line is in the planning phase in San Diego County. 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.

C. Seawater Desalination

Seawater desalination represents a significant opportunity to diversify the region's water resource mix with a new, locally controlled, reliable potable supply. Like conservation, recycling, and other new local supplies, seawater desalination will increase regional supply reliability by offsetting existing and future demands for imported water. Metropolitan continues to pursue a target for seawater desalination of 150,000 AF per year by 2025, and several local and retail water agencies have identified seawater desalination as an important component of their water supply portfolio in their Urban Water Management Plans.

The implementation of large-scale seawater desalination plants in California offers many opportunities and challenges. In the past decade, advances in energy efficiency and membrane technology have reduced the cost of seawater desalination relative to the costs for imported water supplies and other supply alternatives. Challenges to seawater desalination include high capital and operation costs, pre-treatment design, addressing environmental issues, system integration, and navigating an uncertain permitting process. Metropolitan's member agencies are actively pursuing research into alternative intake and outfall technologies, process designs, and treatment alternatives that could minimize some of the environmental issues and lower unit costs.

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.

Other changes include the following:

- Decreases in the seawater desalination costs;
- Accelerated development of groundwater recovery projects;
- Increases in recycled water use for 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 Metropolitan's local resource targets. Since the inception of the program, Metropolitan has invested more than $347 million and partnered with member agencies on 62 recycling projects and 22 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. The following is a brief summary of the evolution of Metropolitan's investment in water recycling and groundwater recharge implementation.

Water Recycling and Groundwater Recovery

1981 The Local Projects Program (LPP) was initiated and designed to facilitate the development of water reclamation projects. Under the original program, Metropolitan contributed a negotiated amount to help finance project capital costs. Two projects were constructed under this approach for a collective yield of 3,560 AF per year.

1986 The LPP was revised such that Metropolitan contributed its avoided energy costs of State Water Project pumping in the form of a rebate per acre-foot of recycled water delivered to end-use customers. This change was based on the assumption that local projects resulted in the avoidance of water importation pumping costs. Under the 1986 revisions, 14 projects with a combined ultimate yield of 31 TAF per year were approved for LPP assistance.

1990 Metropolitan's Board increased the LPP contribution to $154 per AF, which was calculated based on Metropolitan's avoided capital and operational costs to convey, treat, and distribute water, and included considerations of reliability and service area needs. In 1990, the LPP goal was to achieve an additional 150 TAF of recycled water use by the year 2000.

Attributes of the LPP included a relatively simple program administration where participating agencies could depend on receiving a fixed level of contribution per acre-foot of recycled water delivered, and payments were tied to performance. Disadvantages of the LPP were that fixed contribution payments may not provide sufficient incentives during the early years of a project to encourage development of economical projects. In addition LPP contributions were based on preliminary, feasibility level cost estimates made prior to construction which could result in over payment by Metropolitan.

1991 The Groundwater Recovery Program (GRP) established in 1991, was designed to improve water supply reliability through the recovery of otherwise unusable groundwater that has been degraded by minerals and other contaminants and provide access to the storage assets of the degraded groundwater. An ancillary benefit was maintaining the quality of groundwater resources by reducing the spread of degraded plumes. In 1991, the GRP goal was to implement projects to recover 200 TAF per year of groundwater for domestic purposes.

The GRP was similar to the LPP in that Metropolitan entered into agreements to pay for water produced by each individual project for 20-year terms. However, the GRP contribution was paid based on a sliding scale from $0 to a maximum of $250 per AF. To receive a contribution, project unit costs must have exceeded Metropolitan's non-interruptible treated water rate. When the project unit cost of the GRP project equaled the current applicable Metropolitan water rate, the incentive was zero. Agencies are required to submit annual project costs and production data at the conclusion of each fiscal year of operation in order to determine the appropriate incentive.

The main advantage of the GRP over the LPP was that variable rate contributions provided a greater financial incentive in the early years of project operation, when project unit costs were higher. Further, GRP contributions were based on actual incurred construction, operation and replacement costs, and water production values reported after the end of the fiscal year. These costs and production values are subject to audit. However, program administration under the GRP is more difficult than the LPP because project costs must be verified annually, and discrepancies involving payment adjustments have to be resolved.

1995 During development of the Local Resources Program (LRP), Metropolitan's board allowed the immediate conversion of existing projects under the LPP to include proposed GRP-type incentive terms. The proposal was made to 40 approved LPP projects at the time, of which 37 projects had already executed agreements and three were in the process of final execution. Conversion of projects from the existing LPP to LRP was voluntary and was accomplished through the amendment of existing agreements. The proposal was extended to seven additional LPP projects whose applications were under review at the time.

By June 1999, new agreements were executed that converted 15 LPP projects to include new LRP terms similar to sliding scale incentives paid under the GRP.

1996 Metropolitan's IRP identified goals for a diverse mix of six local and imported water resource elements optimized to meet future supply reliability in a cost-effective manner. The IRP set initial targets for resource development that the region must achieve for water supply reliability through the year 2020. Studies showed reduced long-term costs to the region when local resources were developed due to downsizing or deferral of Metropolitan's capital improvements, reduction in operating costs for importation, treatment and distribution, and reduction in costs for developing alternative regional supplies. Encouraging water recycling and groundwater recovery projects by providing financial assistance was consistent with the IRP goals approved by Metropolitan's board as a strategy to meet future water supply reliability needs of Metropolitan's service area in a cost-effective manner.

1998 Metropolitan established the competitive Local Resources Program, which encourages local development of recycled water and recovered groundwater through a process that emphasizes cost-efficiency to Metropolitan, timing new production according to regional need, and minimizing administrative cost and complexity. The LRP replaced the LPP and GRP with uniform criteria for financial assistance to local projects that contribute to regional water supply reliability. Under the competitive program, agencies requested fixed financial assistance payments up to $250 per AF of production for agreement terms up to 25 years. Proposals that requested lower financial assistance and terms scored higher under the competitive process. Under the LRP, Metropolitan issues a request for proposals for a specified regional quantity of water to achieve production targets identified under the IRP. A review panel evaluates proposals using scoring criteria adopted by Metropolitan's board and identifies the mix of project proposals that best meet the region's needs consistent with the RFP.

In June 1998, Metropolitan issued a Request for Proposals (RFP) for the development of 53,000 AF per year of new water recycling and groundwater recovery projects under the LRP to help achieve regional water supply reliability goals identified by the IRP. Fourteen projects were selected through the competitive process and agreements were executed with the local agencies by April 2000 to provide financial assistance for up to 25 years.

In April 2003, Metropolitan issued the second competitive RFP for the development of an additional 65,000 AF of new recycled water and recovered groundwater under the LRP. Thirteen projects were competitively selected and agreements for ten local projects were executed by December 2005. Three projects did not meet the deadline for inclusion in the LRP.

Under the competitive RFP process the weighted average incentive payment for 27 projects is about $115 per AF of yield, and is below the maximum contribution of $250 per AF. Additionally, some proposals resulted in shorter duration agreements compared to the maximum of 25 years.

2004 The Board approved the IRP Update that refined regional supply development targets based on the identified changed conditions and provided a long-term resources plan to 2025. These targets, specified in five-year intervals, set development schedules needed to ensure regional supply reliability, allowing for compliance with current applicable water code provisions and growth legislation. The IRP Update also established the concept of a 10 percent water supply planning buffer, which set total resource development targets above forecasted water demands for planning purposes, and identified resources in advance of need.

2007 Metropolitan updated the policies and procedures for the LRP and established a goal of financing additional 174 TAF per year of new water recycling and groundwater recovery under the LRP. The program shifts from a competitive selection process to a first-come-first served bases with priorities given to projects that are ready to proceed. Under the new program, LRP incentive are on a sliding scale of up to $250 per AF, calculated annually based on actual project unit cost above Metropolitan's prevailing water rate. Project applications are accepted on a continuous basis until the IRP target is achieved. So far, Metropolitan has approved five projects totaling 57,150 AF per year under the 2007 LRP. Since then, Metropolitan has entered into agreements with local agencies for implementation of five projects with an ultimate yield of 57 TAF of recycled water. Metropolitan is currently reviewing LRP applications for nine water recycling and groundwater recovery projects, which would collectively produce 40 TAF of new water.

Seawater Desalination Program

Metropolitan's Seawater Desalination Program (SDP) was created in 2001 to encourage the development of seawater desalination by local agencies and was modeled after the LRP. Like the LRP, it offers sliding-scale incentives to member and local agencies that provide up to $250 per AF for produced supplies. The incentive is designed accelerate the development of expensive local supply projects by local agencies by lowering their cost. Metropolitan has entered into four SDP agreements, while a fifth potential project is currently on hold.[2] Of the four SDP projects, the Carlsbad Seawater Desalination project is the farthest along. This project has obtained all of the local, State, and Federal permits for necessary to begin construction, though as of May 2010, there are legal challenges to three of the permits. Project proponents anticipate the project will

[2] LADWP's 28,000 AF per year seawater desalination project.

come on-line as early as 2012, providing the region with an additional 56 TAF of new local supplies. Table 3-13 provides a summary of the status of the four SDP projects. Local agencies are also considering three projects independent of the SDP with the potential to produce up to 280,000 AF per year if developed. Table 3-14 provides a summary of these local agency projects.

Table 3-13
Seawater Desalination Program Project Status

Project	Member Agency Service Area	AF per Year	Status	Executed Incentives Contract
Long Beach Seawater Desalination Project	Long Beach Water Department	10,000	Pilot study	Yes
South Orange Coastal Ocean Desalination Project	Municipal Water District of Orange County	16,000-28,000	Pilot study	Yes
Carlsbad Seawater Desalination Project	San Diego County Water Authority	56,000	Permitting	Yes
West Basin Seawater Desalination Project	West Basin Municipal Water District	20,000	Pilot study	Yes
Total: Seawater Desalination Projects		**102,000-114,000**		

Table 3-14
Other Potential Seawater Desalination Projects in Metropolitan's Service Area

Project	Member Agency Service Area	AF per Year	Status
Huntington Beach Seawater Desalination Project	Municipal Water District of Orange County	56,000	Permitting
Camp Pendleton Seawater Desalination Project	San Diego County Water Authority	56,000 to 168,000	Planning
Rosarito Beach Seawater Desalination Feasibility Study	San Diego County Water Authority	28,000 to 56,000[1]	Feasibility study
Total: Other Potential Projects		**140,000 to 280,000**	

[1] Metropolitan's service area would receive a share of the total supply produced by the project.

To promote the development of local seawater desalination projects, Metropolitan provides regional facilitation by supporting member agency projects during permit hearings and other proceedings, coordinating responses to potential legislation and regulations, and working with the member agencies to resolve related issues such as greenhouse gas emission standards and seawater intake regulations that could impact seawater desalination projects. Metropolitan has also formed a special Board Committee to find additional ways to promote potential projects and explore opportunities for developing regional seawater desalination supplies.

Achievements to Date

Metropolitan is committed to providing financial assistance to the development of water recycling projects throughout its service area. Since adopting the IRP in 1996, Metropolitan and its 26 member agencies, have made significant progress in achieving regional targets for recycling and groundwater recovery. Since 1982, Metropolitan executed LRP contracts for 62 recycled water projects, of which 59 produced about 161 TAF in 2009. Local projects not receiving funding from Metropolitan provide an additional 147 TAF of recycled water to the region.

Since 1991, Metropolitan executed GRP and LRP contracts for 23 recovered groundwater projects, of which 22 produced about 62 TAF in 2009. In addition to the projects under Metropolitan's programs, about 35 TAF of degraded groundwater is recovered by agencies in Metropolitan's service area without Metropolitan's financial assistance.

Table 3-15 provides a summary of the current level of regional production from these local projects. To date, Metropolitan has invested $244 million in recycling programs and $102 million for groundwater recovery. Table 3-16 provides a summary of the groundwater and recycled water production and incentive payment under Metropolitan's programs to date.

Metropolitan has continued to develop and refine its programs to encourage the involvement of its member agencies in water recycling, groundwater recovery, and desalination. Developing and managing these programs requires considerable coordination and refinement. Changing conditions over the last five years have reduced the costs of these options and allow Metropolitan to rely on these sources for future water supply.

Table 3-15
2009 Water Production From Recycling and Groundwater Recovery
(TAF)

Type of Project	With Metropolitan Funding	Without Metropolitan Funding	Total
Recycled Water	161	147	308
Groundwater Recovery	62	35	97
Total	**223**	**182**	**405**

Table 3-16
Local Resources Program[1]

	Recovered Groundwater	Recycled Water	Total
Projects			
Planned	22	62	84
In Operation	21	59	80
Ultimate Yield (TAF)	86	335	421
Deliveries (AF)			
FY 2008/2009	62	161	223
Since Inception	545	1,323	1,868
Payments ($ millions)			
FY 20082009	$12.6	$26.7	$39.3
Since Inception	$102.4	$244.3	$346.7

[1]Including Chino II Desalter

3.6 Storage and Groundwater Management Programs: Within the Region

Since the 1950s, local water management in Metropolitan's service area has included the conjunctive use of groundwater and surface water. 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 augmenting seasonal and multiyear shortages.

Storage capacity in the region's groundwater basins allows for conjunctive use programs. In 2000, the Association of Ground Water Agencies (AGWA) published Groundwater and Surface Water in Southern California: A Guide to Conjunctive Use that estimated the potential for dry-year or long term conjunctive use in Metropolitan's service area at approximately 4.0 MAF. In 2007, Metropolitan published the Groundwater Assessment Study that estimated 3.2 MAF of space in groundwater basins available for storage within Metropolitan's service area.

To prepare for supply disruptions, Metropolitan and its member agencies have adopted goals for water storage within the region. Metropolitan has identified in-region storage that should be set aside for use in emergencies, such as a disruption to the California Aqueduct. In addition, Metropolitan's planning process calls for dry-year storage that can be called on at times of supply shortage due to drought.

Background

Metropolitan established general long-term storage guidelines in its WSDM plan. The WSDM plan provides for flexibility during dry years, allowing Metropolitan to use storage for managing water quality, hydrology, SWP, and CRA 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 Metropolitan's resource planning assumes that dry-year surface storage can be used as needed and as available within the WSDM planning framework. Metropolitan had identified an in-region surface water target of 620 TAF of dry-year storage for year 2020. Metropolitan had achieved this target and aims to sustain this level of storage in Diamond Valley Lake (DVL) and in the SWP terminal reservoirs (Castaic and Perris) made available through the Monterey Amendment to the SWP contract.

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 its current planning strategy, Metropolitan's 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.

Implementation Approach

A. Surface Storage

Since the beginning of the Metropolitan's planning 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. DVL holds up to 810 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. In 2005, seismic concerns arose regarding Perris dam. In response, DWR reduced the storage amount at Lake Perris by half until those concerns can be studied and addressed; however, Metropolitan operational storage remained the same. Since then, Metropolitan has continued to withdraw and replace water from the reservoir operating from the lower level. In January 2010, DWR issued a Draft Environmental Impact Report for the repair of the dam at Lake Perris. Discussions are ongoing regarding the ultimate disposition of reservoir as it relates to costs allocated to the SWP contractors.

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 recharging groundwater basins and the recovery of degraded groundwater.

- For many years, flood control agencies within Metropolitan's service area have captured and spread stormwater for groundwater replenishment. Local runoff and reclaimed water have been conserved via 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.
- Growing water quality problems have 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 groundwater water recovery projects discussed in Section 3.5.

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 allows effective management and regulation of the region's major imported supplies from the Colorado River and SWP. 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 water directly to water storage facilities, including spreading sites and injection wells.
- In-lieu deliveries to storage – Metropolitan delivers additional water directly to the member agency's distribution system. The member agency then uses this water rather than pumping the groundwater it otherwise would have taken out of storage. 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. Metropolitan has encouraged storage through its replenishment, cyclic, and conjunctive use storage programs. These programs allow Metropolitan to deliver water into a groundwater basin in advance of agency demands. Discounted replenishment service water is delivered when Metropolitan has surplus imported water supply and is for use after one year. Cyclic storage agreements allowed pre-delivery of surplus imported water for recharge into groundwater basins in excess of an agency's planned and budgeted deliveries. This water is then purchased at a later time when the agency has need for groundwater replenishment deliveries. Conjunctive use agreements provide for storage of imported water that can be called for use by Metropolitan during dry, drought, or emergency conditions. During a dry period, Metropolitan has the option to call water stored in the groundwater basins pursuant to its contractual conjunctive use agreements. At the time of the call, the member agency pays Metropolitan the prevailing rate for that water. Since 2007, Metropolitan has drawn on dry-year supply from cyclic storage accounts with several member agencies, long-term replenishment programs, and ten contractual conjunctive use storage programs to address shortages from the State Water Project.

Achievements to Date

In 2000, Metropolitan entered an agreement with the State of California Department of Water Resources to administer $45 million of Proposition 13 state bond funds for Metropolitan's Southern California Water Supply Reliability Projects Program. Metropolitan paired the $45 million of state funds with $35 million of Metropolitan capital funds to develop nine groundwater storage programs in partnership with member and retail agencies and groundwater basin managers. These nine contractual storage programs combined with one additional conjunctive use program previously developed provide for storage of up to 422 TAF and dry-year yield of up to 117 TAF. These programs are summarized in Table 3-17.

In 2007, Metropolitan prepared the Groundwater Assessment Study Report in collaboration with its member agencies and with groundwater basin managers. The report finds that while there is substantial storage space in service area groundwater basins that could be used for conjunctive use, that there are significant challenges that must be overcome in order to implement additional storage programs. Use of additional storage opportunity requires:

- capture, delivery and recharge of additional local and imported surface supplies;
- improved capability to store available of surplus surface supplies with adequate conveyance and recharge capacity; and
- resolution of constraints including: remediation of contamination, institutional and legal issues, funding for significant investment in capital infrastructure, and incongruity between aquifer capability with overlying demand for water supplies.

To follow up on the findings of the Groundwater Assessment Study Report, Metropolitan initiated a series of seven groundwater workshops beginning in July 2008 among Metropolitan, member agencies, groundwater basin managers, and stakeholders to discuss challenges for increasing conjunctive use and to develop recommendations for addressing the challenges. The workgroup's recommendations were submitted as a Board Report to Metropolitan's Board of Directors and provided as input to Metropolitan's current planning process. The recommendations are as follows:

1. Enhance groundwater recharge with increased storm water and recycled water recharge and imported replenishment water when it is available.
2. Streamline requirements, remove policy constraints, clarify procedures, increase coordination and sharing of information to accomplish recharge goals.
3. Develop flexible regional policies and programs that can be tailored to meet

specific local needs of each groundwater basin.

4. Increase integration of local groundwater and regional water supplies with proposal for a comprehensive modeling study to initiate review of innovative opportunities.
5. Use appropriate price signals to encourage conjunctive use and investments for storage.
6. Increase coordination among Metropolitan, member agencies, basin managers, groundwater producers and stakeholders inclusive of collaboration for legislative, regulatory, and educational efforts in support of specific initiatives and funding needed for sound groundwater management.

As an initial effort toward comprehensive modeling for increased integration of local and regional water supplies recommended in the workshop process, Metropolitan worked with groundwater basin managers to develop groundwater basin modules for five key groundwater basins in its service area. The modules are run with Metropolitan's regional supply model, RPSIM, to evaluate conjunctive use opportunities and changes to groundwater basin water levels under a variety of local and regional supply scenarios.

In 2010, Metropolitan entered into an agreement with the Los Angeles County Sanitation District to conduct a feasibility study for developing a regional recharge project using recycled water.

Other Identified Contractual Groundwater Storage 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 offered discount rates to its member agencies that allowed more storage of surplus imported water supplies than previously planned. The stored water was produced at Metropolitan's call in 2008-09 and 2009-10 to offset imported water demands. Identified potential programs include:

- Chino Basin Storage Program Expansion
- Orange County Basin Storage Program Expansion
- Pasadena Groundwater Storage Program
- 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 3-17
Contractual Conjunctive Groundwater Projects

Project and Project Proponents	Storage Capacity (TAF)	Dry-Year Yield (TAF/Year)	Balance as of July 1, 2007 (TAF)	Storage Account Balance as of 12/31/2009 (TAF)
LOS ANGELES COUNTY				
Long Beach Conjunctive Use Project Long Beach	13.0	4.3	13.0	6.4
Foothill Area GW Storage Project Foothill MWD	9.0	3.0	3.3	0.6
Long Beach CUP: Expansion in Lakewood Long Beach	3.6	1.2	1.8	1.8
City of Compton Conjunctive Use Program City of Compton	2.3	0.8	1.1	0
Upper Claremont Heights Conjunctive Use Three Valleys MWD	3.0	1.0	0	0
ORANGE COUNTY				
Orange County GW Conjunctive Use Program OCWD, MWDOC	66.0	22.0	47.9	8.6
SAN BERNARDINO COUNTY				
Chino Basin Programs IEUA, TVMWD, Chino Basin Watermaster	100.0	33.0	80.6	23.0
Live Oak Basin Conjunctive Use Project Three Valleys MWD	3.0	1.0	0.70	0.7
RIVERSIDE COUNTY				
Elsinore Groundwater Storage Program Western MWD, Elsinore Valley MWD	12.0	4.0	0.4	0
VENTURA COUNTY				
North Las Posas Groundwater Storage Program Calleguas MWD	210.0	47.0	60.6	43.5
Total	**421.9**	**117.3**	**209.4**	**84.6**

3.7 20x2020 Water Reduction Target

In November 2009, Governor Arnold Schwarzenegger signed the Water Conservation Act of 2009 (SB 7) into law as part of the historic comprehensive water package designed to address the State's growing water challenges. The Act represented the culmination of efforts by water industry leaders (including Metropolitan), the environmental community, and the Legislature to enact legislation that would answer the governor's call for the state to reduce per capita water use 20 percent by the year 2020 (referred to as "20x2020") as part of a larger effort to ensure reliable water supplies for future generations and restore the Bay-Delta.

The 20X2020 legislation requires urban retail water suppliers to develop urban water use targets to help meet the 20 percent reduction in water use by 2020, with interim targets for 2015. The legislation provides flexibility in how targets are established and achieved. Per capita reductions can be accomplished through any combination of increased water conservation, improved water use efficiency, and increased use of recycled water to offset potable demand. Potable demand offsets can occur through direct reuse of recycled water, such as for irrigation, or indirect potable reuse through groundwater recharge and reservoir augmentation. Retail water suppliers receive partial credit for past efforts in conservation and recycled water; therefore, not all agencies need to reduce demand by 20 percent in order to comply with the new law.

The legislation provides additional flexibility by allowing compliance on an individual agency basis or through collaboration with other agencies in a region. Based on Metropolitan's analysis of population and demand and the methodologies for setting targets described in the legislation, compliance with 20x2020 on an individual agency basis throughout the region would result in reduced potable demand of 380 TAF in 2020. The additional conservation and/or recycling that local water agencies would implement at the retail level to attain the 380 TAF target in 2020 and an interim target of 190 TAF by 2015 are reflected in the 2010 RUWMP demand projections.

Achieving regional consistency with the legislative goal – a 20 percent reduction for the region as a whole – would result in additional savings of 200 TAF for a total of 580 TAF. This additional 200 TAF savings target for 2020 could be an important part of the region's future supplies and is included in the Programs under Development in the water supply forecast tables presented in Appendix A.3. For the region, the baseline water demand is estimated to be 178 gallons per capita per day (GPCD). A 20 percent reduction would reduce this to 142 GPCD. Achieving an annual demand reduction of 580 TAF by 2020 will require additional local and regional investments in both conservation and recycled water.

The policies and programs to address the water reduction target will be consistent to Metropolitan's conservation measured described in Sections 3.4 and the water recycling efforts described in Section 3.5.

Metropolitan's 2004 IRP Update includes a goal of 10 TAF per year for active water conservation programs and a recycling goal of 135 TAF of annual recycled water. These two goals combined with measures taken by retail water agencies would be the means to achieve the regional 20x2020 goal.

Over the next five years, Metropolitan will periodically assess water supply conditions and trends in per capita demand within its service area and evaluate potential programs to ensure attainment of the goal. Metropolitan also continues to provide support for retail agency efforts through technical assistance, legislation, code and standards updates, and potential financial incentives where needed for market transformation to increase water use efficiency.

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Water Quality 4

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 protecting the quality of the source water and developing water management programs that maintain 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 and safety margins. In addition, Metropolitan has developed enhanced security practices and policies in response to national security concerns.

Background

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 major sources of water: the Colorado River and the State Water Project (SWP). Groundwater inflows are also received into the SWP through groundwater banking programs in the Central Valley. Each source has specific quality issues, which are summarized in this section. To date, Metropolitan has not identified any water quality risks that cannot be mitigated. As described in this section, the only potential effect of water quality on the level of water supplies based on current knowledge 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 a significant issue associated with Colorado River supplies. In addition, Metropolitan has been engaged in efforts to protect its Colorado River supplies from threats of uranium, perchlorate and Chromium VI, which are discussed later in this chapter. Metropolitan has also been active in efforts to protect these supplies from potential increases in nutrient loading due to urbanization, as well as investigating the sources and occurrence of constituents of emerging concern, such as N-nitrosodimethylamine (NDMA) and pharmaceuticals and personal care products (PPCPs). Metropolitan fully expects its source water 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 SWP supplies to meet the adopted salinity standards.

State Water Project

The key water quality issues on the SWP are disinfection byproduct precursors, in particular, total organic carbon and bromide. 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. Disinfection byproducts result from total organic carbon and bromide in the source water reacting with disinfectants at the water treatment plant, and they may place some near term restrictions on Metropolitan's ability to use SWP water. Metropolitan expects these treatment restrictions to be overcome through the addition of ozone disinfection at its treatment plants. Arsenic is also of concern in some groundwater storage programs. Groundwater inflows into the California Aqueduct are managed to comply with regulations and protect downstream water quality while meeting supply targets. Additionally, nutrient levels are significantly higher in the SWP system than within the Colorado River, leading to the potential for algal related concerns that can affect water management strategies. Metropolitan is engaged in efforts to protect the quality of SWP water from potential increases in nutrient loading from wastewater treatment plants. Also, as in the Colorado River watershed, Metropolitan is active in studies on the occurrence, sources, and fate and transport of constituents of emerging concern, such as NDMA and PPCPs.

Local Agency Supplies and Groundwater Storage

New standards for contaminants, such as arsenic, and other emerging standards 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 that many of these water quality issues could have on local agency supply availability. There have, however, been some investigations into the supply impacts of perchlorate groundwater contamination as indicated later in this section.

In summary, the major regional concerns include the following:

- Salinity
- Perchlorate
- Total organic carbon and bromide (disinfection byproduct precursors)
- Nutrients (as it relates to algal productivity)
- Arsenic
- Uranium
- Chromium VI
- N-nitrosodimethylamine (NDMA)
- Pharmaceuticals and personal care products (PPCPs)

Metropolitan has taken several actions and adopted programs to address these contaminants and ensure a safe and reliable water supply. These actions, organized by contaminant, are discussed below. Another constituent previously identified in the 2005 RUWMP as a regional concern, methyl tertiary-butyl ether (MTBE), is now a decreasing concern due to the elimination of this chemical as a gasoline additive in California. This is also further discussed below, along with other water quality programs that Metropolitan has been engaged in to protect its water supplies.

Issues of Concern

Salinity

Imported water from the Colorado River has high salinity levels, so it must be blended (mixed) with lower-salinity water from the SWP to meet salinity management goals. 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 an imported water salinity goal because higher salinity could increase costs and reduce operating flexibility. For example,

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 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.[1] 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. The Salinity Management Policy is further discussed later in this section.

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 salinity issues relevant to each of Metropolitan's major supply sources.

<u>Colorado River</u>

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 U. S. Environmental Protection Agency (USEPA) 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,

[1] Metropolitan Water District of Southern California and U.S. Bureau of Reclamation, Salinity Management Study: Final Report (June 1999)

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.

By some estimates, concentrations of salts in the Colorado River cause approximately $353 million in quantified damages in the lower Basin each year. The salinity control program has proven to be very successful and cost-effective. Salinity control projects have reduced salinity concentrations of Colorado River water on average by over 100 mg/L or $264 million per year (2005 dollars) in avoided damages.

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. TDS in Lake Havasu was measured at 628 mg/L in November 2009.

<u>State Water Project</u>

Water supplies from the SWP have significantly lower TDS concentrations than the Colorado River, averaging approximately 250 mg/L in water supplied through the East Branch and 325 mg/L on the West Branch over the long-term, with short term variability as a result of hydrologic conditions.[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.

As indicated above, the TDS concentrations of SWP water can 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.

A federal court ruling and a resulting biological opinion issued through consultation with U.S. Fish and Wildlife Service addressing the effects of the water supply pumping operations on Delta smelt has limited SWP exports at specified times of the year since December 2007. These restrictions have increased reliance on higher salinity Colorado River water, impacting the ability at times to meet Metropolitan's goal of 500 mg/L TDS at its blend plants. Drought conditions leading to lower SWP water supply allocations in recent years also affects Metropolitan's ability to meet its salinity goal.

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, or by placing operable gates in

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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.

strategic locations to impede transport of seawater derived salt.

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 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.

In May 2009, the State Water Resources Control Board (SWRCB) adopted a Recycled Water Policy[3] to help streamline the permitting process and help establish uniform statewide criteria for recycled water projects. This policy promotes the development of watershed- or basin-wide salt management plans (to then be adopted by the respective Regional Boards) to meet water quality objectives and protect beneficial uses, rather than imposing project-by-project restrictions. The Recycled Water Policy identifies several criteria to guide recycled water irrigation or groundwater recharge project proponents in developing a salt (and nutrient) management plan.

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 3.0 MAF 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.

[3] http://www.swrcb.ca.gov/water_issues/programs/water_recycling_policy/docs/recycledwaterpolicy_approved.pdf

Table 4-1 shows the salinity from existing productive groundwater wells within the region, and Figure 4-1 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.

Metropolitan has participated with water and wastewater agencies and the Santa Ana Regional Water Quality Control Board (Regional Board) in a coordinated program to develop water quality data for local and imported supplies used to recharge groundwater basins in the Santa Ana River watershed.[4] In January 2008, this workgroup submitted its "Cooperative Agreement to Protect Water Quality and Encourage the Conjunctive Uses of Imported Water in the Santa Ana River Basin" to the Santa Ana Regional Board. This initial agreement addresses nitrogen and TDS and includes the following tasks:

1. Prepare a projection of ambient water quality in each groundwater management zone at six-year intervals for the subsequent 20 years.
2. Determine the impacts of foreseeable recharge projects and compare to baseline ambient water quality with salinity objectives.
3. Compare current water quality in each groundwater management zone with the ambient water quality projection made six years earlier, together with an evaluation of the reason(s) for any differences.

The Salinity Management Policy

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, SWP water supplies are blended with Colorado River supplies. 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.

Table 4-1
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.

4 http://www.swrcb.ca.gov/rwqcb8/board_decisions/adopted_orders/orders/2008/08_019.pdf

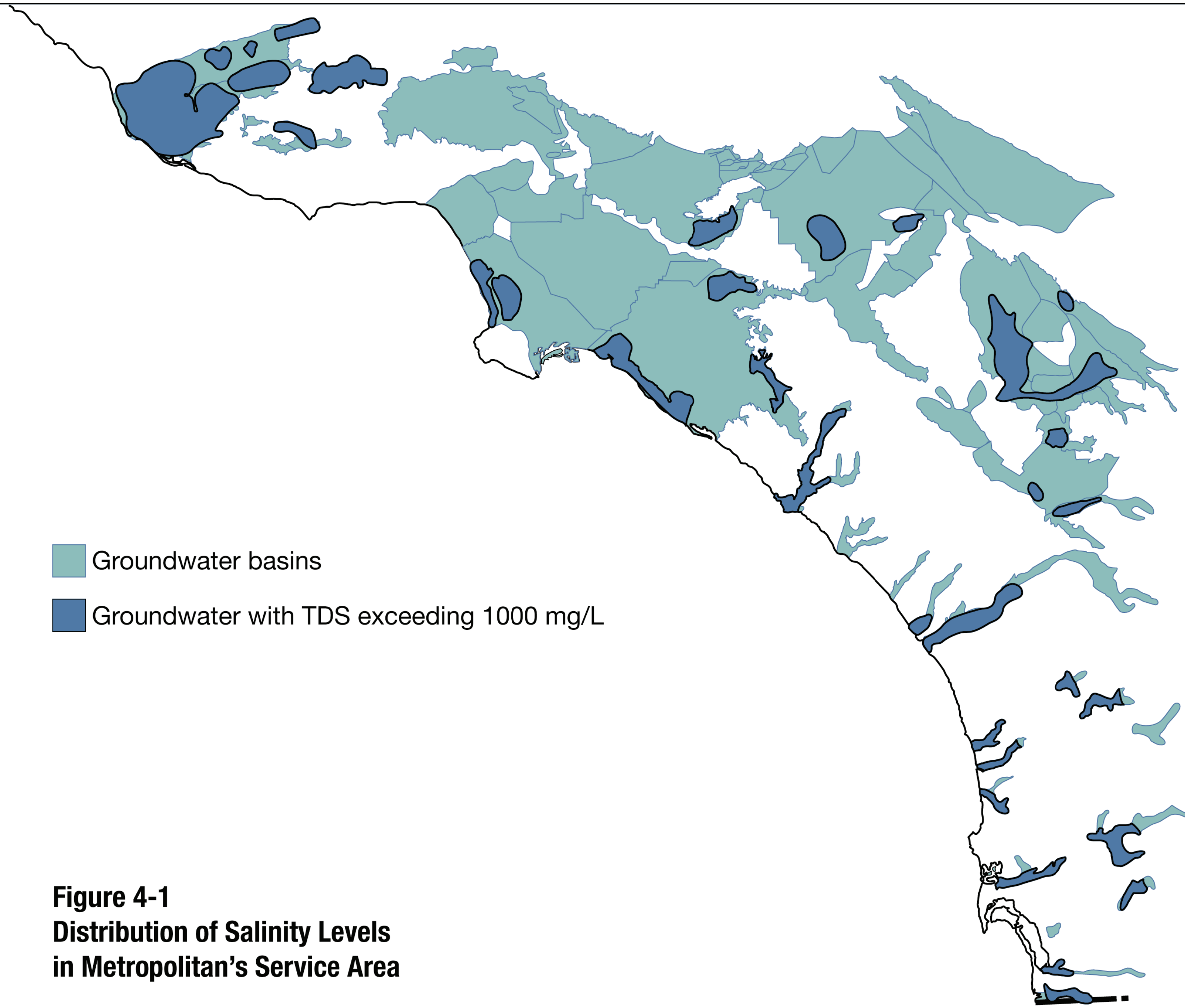

Figure 4-1
Distribution of Salinity Levels in Metropolitan's Service Area

Perchlorate

Perchlorate compounds are used as a main component in solid rocket propellant, and are also found in some types of munitions and fireworks. Perchlorate compounds quickly dissolve and become highly mobile in groundwater. Unlike many other groundwater contaminants, perchlorate neither readily interacts with the soil matrix nor degrades in the environment. Conventional drinking water treatment (as utilized at Metropolitan's water treatment plants) is not effective in removing perchlorate.

The primary human health concern related to perchlorate is its effects on the thyroid. Perchlorate interferes with the thyroid's ability to produce hormones required for normal growth and development. Pregnant women who are iodine deficient and their fetuses, infants and small children with low dietary iodide intake and individuals with hypothyroidism may be more sensitive to the effects of perchlorate.

The California Department of Public Health (CDPH) established a primary drinking water standard for perchlorate with an MCL of 6 micrograms per liter (μg/L)[5] effective October 18, 2007. There is currently no federal drinking water standard for perchlorate, but the USEPA is in the process of making its final regulatory determination for this contaminant. A regulatory determination would be the first step toward developing a national drinking water standard. Metropolitan has offered comments to USEPA during this regulatory process, focusing on the need to protect the Colorado River and to address cleanup of impacted water supplies as a result of federal institutions within its service area. In essence, Metropolitan urged for necessary actions to ensure expedited cleanup in areas that a California drinking water standard could not be enforced.

Perchlorate was first detected in Colorado River water in June 1997 and was traced back to Las Vegas Wash. The source of contamination was found to be emanating from a chemical manufacturing facility in Henderson, Nevada, now owned by Tronox, Inc. Tronox is currently responsible for the ongoing perchlorate remediation of the site. Another large perchlorate groundwater plume is also present in the Henderson area from a second industrial site, and although not known to have reached Las Vegas Wash yet, remediation activities are ongoing for cleanup of that plume by American Pacific Corporation (AMPAC).

Following the detection of perchlorate in the Colorado River, Metropolitan, along with USEPA and agencies in Nevada including the Nevada Division of Environmental Protection (NDEP), organized the forces necessary to successfully treat and decrease the sources of perchlorate loading. Under NDEP oversight, remediation efforts began in 1998 and treatment operations became fully operational in 2004. These efforts have reduced perchlorate loading into Las Vegas Wash from over 1000 lbs/day (prior to treatment) to 60-90 lbs/day since early 2007. This has resulted in over 90 percent reduction of the perchlorate loading entering the Colorado River system. In January 2009, Tronox filed for Chapter 11 bankruptcy protection citing significant environmental liabilities taken from the previous site owner. Tronox has continued operating its remediation system during the bankruptcy proceedings.

Perchlorate levels in Colorado River water at Lake Havasu have decreased significantly in recent years from its peak of 9 μg/L in May 1998 as a result of the aggressive clean-up efforts. Levels have remained less than 6 μg/L since October 2002, and have been typically less than 2 μg/L since June 2006. Metropolitan routinely monitors perchlorate at 34 locations within its system and levels currently remain at non-detectable levels (below 2 μg/L). Metropolitan has not detected perchlorate in the SWP since monitoring began in 1997.

[5] 1 microgram per liter is equivalent to 1 part per billion

Perchlorate has also been found in groundwater basins within Metropolitan's service area, largely from local sources. The vast majority of locations where perchlorate has been detected in the groundwater are associated with the manufacturing or testing of solid rocket fuels for the Department of Defense and the National Aeronautics and Space Administration (NASA), or with the manufacture, storage, handling, or disposal of perchlorate (such as Aerojet in Azusa in the Main San Gabriel Basin and the Jet Propulsion Laboratory/NASA in the Raymond Basin). Past agricultural practices using fertilizers laden with naturally occurring perchlorate have also been implicated in some areas.

Metropolitan has conducted several surveys to determine the impact of perchlorate on its member and retail agencies. As of October 2007, 18 member agencies have detected perchlorate in their service areas at levels greater than 4 μg/L, while 11 have detected levels greater than 6 μg/L in at least 101 out of 1337 wells (7.6 percent). Member and retail agencies have shut down 32 wells over the years due to perchlorate contamination, losing more than 52.5 TAF per year of their groundwater production. Many of these agencies have built new wells, blended their water, or installed ion exchange treatment systems to reduce perchlorate levels, thus lowering their potential additional demand for Metropolitan water supplies to about 15 TAF per year.

Metropolitan has investigated 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 biological treatment through fluidized bed reactors (FBR) in Rancho Cordova and is re-injecting the treated water into the ground. Tronox also utilizes an FBR process train for the cleanup of their Henderson site. A number of sites in Southern California have successfully installed ion exchange systems to treat perchlorate impacted groundwater. The city of Pasadena has been using ion exchange treatment at one well site and, in November 2009, completed a study of biological treatment for perchlorate removal in groundwater. Funding for this study was provided through a Congressional mandate from USEPA to Metropolitan.

Treatment options are available to recover groundwater supplies contaminated with perchlorate. However, it is very difficult to predict whether treatment will be pursued to recover all lost production because local agencies will make 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

Disinfection byproducts (DBPs) form when source water containing high levels of total organic carbon (TOC) and bromide is treated with disinfectants such as chlorine or ozone. 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. While many DBPs have been identified and some are regulated under the Safe Drinking Water Act, there are others that are not yet known. Even for those that are known, the potential adverse health effects may not be fully characterized.

Water agencies began complying with new regulations to protect against the risk of DBP exposure in January 2002. This rule, known as the Stage 1 Disinfectants and Disinfection Byproducts (D/DBP) Rule, required water systems to comply with new MCLs and a treatment technique to improve control of DBPs. USEPA then promulgated the Stage 2 D/DBP Rule in January 2006 that makes regulatory compliance more challenging as compliance is based on a locational basis, rather than on a distribution system-wide basis.

Existing levels of TOC and bromide in Delta water supplies present significant concern for Metropolitan's ability to maintain safe drinking water supplies and comply with regulations. 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. Source water protection of SWP water supplies is a necessary component of meeting these requirements cost effectively.

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.

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 SWP and Colorado River water. In 2003 and 2005, Metropolitan completed upgrades to its SWP-exclusive water treatment plants, Mills and Jensen, respectively, to utilize ozone as its primary disinfectant. This ozonation process avoids the production of certain regulated disinfection byproducts that would otherwise form in the chlorine treatment of SWP water. The non-ozone plants utilizing blended water have met federal guidelines for these byproducts through managing the blend of SWP and Colorado River water. To maintain the byproducts at a level consistent with federal law, Metropolitan limits the percentage of water from the SWP used in each plant. In mid 2010, Metropolitan anticipates ozone at the Skinner water treatment plant to come online. Metropolitan's Board has also adopted plans to install ozonation at its other two blend plants with a total estimated ozone retrofit program cost of $1.2 billion for all five plants.

Nutrients

Elevated levels of nutrients (phosphorus and nitrogen compounds) can stimulate nuisance algal and aquatic weed growth that affects consumer acceptability, including the production of noxious taste and odor compounds and algal toxins. In addition to taste and odor toxin concerns, increases in algal and aquatic weed biomass can impede flow in conveyances, shorten filter run times and increase solids production at drinking water treatment plants, and add to organic carbon loading. Further, nutrients can provide an increasing food source that may lead to the proliferation of quagga and zebra mussels, and other invasive biological species. Studies have shown phosphorus to be the limiting nutrient in both SWP and Colorado River supplies. Therefore, any increase in phosphorus loading has the potential to stimulate algal growth, leading to the concerns identified above.

SWP supplies have significantly higher nutrient levels than Colorado River supplies. Wastewater discharges, agricultural drainage, and nutrient-rich soils in the Delta are primary sources of nutrient loading to the SWP. Metropolitan and other drinking water agencies receiving Delta water have been engaged in efforts to minimize the effects of nutrient loading from Delta wastewater plants. Metropolitan reservoirs receiving SWP water have experienced numerous taste and odor episodes in recent years. For example, in 2005, Metropolitan reservoirs experienced 12 taste and odor events requiring treatment. A taste and odor event can cause a reservoir to be bypassed and potentially have a short-term effect on the availability of that supply. Metropolitan has a comprehensive program to monitor and manage algae in its source water reservoirs. This program was developed to provide an early warning of algae related problems and taste and odor events to best manage water quality in the system.[6]

Although phosphorus levels are much lower in the Colorado River than the SWP, this nutrient is still of concern. Despite relatively low concentrations (Colorado River has been considered an oligotrophic, or low-productivity, system), any additions of phosphorus to Colorado River water can result in increased algal growth. In addition, low nutrient Colorado River water is relied upon by Metropolitan to blend down the high nutrient SWP water in Metropolitan's blend reservoirs. With population growth expected to continue in the future (e.g., Las Vegas area), ensuring high levels of treatment at wastewater treatment plants to maintain existing phosphorus levels will be critical in minimizing the operational, financial, and public health impacts associated with excessive algal growth and protect downstream drinking water uses. In addition, Metropolitan continues its involvement with entities along the lower Colorado River seeking to enhance wastewater management (and therefore better manage nutrient impacts) within river communities.

Although current nutrient loading is of concern for Metropolitan and is anticipated to have cost implications, with its comprehensive monitoring program and response actions to manage algal related issues, there should be no impact on availability of water supplies. Metropolitan's source water protection program will continue to focus on preventing increases in future nutrient loading as a result of urban and agricultural sources.

Arsenic

Arsenic is a naturally occurring element found in rocks, soil, water, and air. It is used in wood preservatives, alloying agents, certain agricultural applications, semi-conductors, paints, dyes, and soaps. Arsenic can get into water from the natural erosion of rocks, dissolution of ores and minerals, runoff from agricultural fields, and discharges from industrial processes. Long-term exposure to elevated levels of arsenic in drinking water has been linked to certain cancers, skin pigmentation changes, and hyperkeratosis (skin thickening).

The MCL for arsenic in domestic water supplies was lowered to 10 µg/L, with an effective date of January 2006 in the federal regulations, and an effective date of November 2008 in the California regulations. The standard impacts both groundwater and surface water supplies. Historically, Metropolitan's water supplies have had low levels of this contaminant and would not require treatment changes or capital investment to comply with this new standard. However, some of Metropolitan's water supplies from groundwater storage programs are at levels near the MCL. These groundwater storage projects are called upon to supplement flow only during low SWP allocation years. Metropolitan has had to restrict flow from one program to limit arsenic increases in the SWP. Implementation of a pilot arsenic treatment facility by one groundwater banking partner has also resulted in increased cost. Moreover, Metropolitan has invested in solids handling facilities and implemented operational changes to manage arsenic in the solids resulting from the treatment process.

In April 2004, California's Office of Environmental Health Hazard Assessment (OEHHA) set a public health goal for arsenic

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[6] William D. Taylor et al., *Early Warning and Management of Surface Water Taste-and-Odor Events*, Project No. 2614 (Denver, CO: American Water Works Association Research Foundation, 2006)

of 0.004 µg/L, based on lung and urinary bladder cancer risk. Monitoring results submitted to CDPH in 2001-2003 showed that arsenic is ubiquitous in drinking water sources, reflecting its natural occurrence. They also showed that many sources have arsenic detections above the 10 µg/L MCL. Southern California drinking water sources that contain concentrations of arsenic over 10 µg/L include San Bernardino (64 sources), Los Angeles (48 sources), Riverside (26 sources), Orange (4 sources), and San Diego (5 sources).[7]

The state detection level for purposes of reporting (DLR) of arsenic is 2 µg/L. Between 2001 and 2008, arsenic levels in Metropolitan's water treatment plant effluents ranged from not detected (< 2 µg/L) to 2.9 µg/L. For Metropolitan's source waters, levels in Colorado River water have ranged from not detected to 3.5 µg/L, while levels in SWP water have ranged from not detected to 4.0 µg/L. Increasing coagulant doses at water treatment plants can reduce arsenic levels for delivered water.

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.[8] Water supplies imported by the Los Angeles Department of Water and Power may also contain arsenic above the MCL. The cost of arsenic removal from these supplies could vary significantly.

Uranium

A 16-million-ton pile of uranium mill tailings near Moab, Utah lies approximately 750 feet from the Colorado River. Due to the proximity of the pile to the Colorado River, there is a potential for the tailings to enter the river as a result of a catastrophic flood event or other natural disaster. In addition, contaminated groundwater from the site is slowly seeping into the river. The U.S. Department of Energy (DOE) is responsible for remediating the site, which includes removal and offsite disposal of the tailings and onsite groundwater remediation.

Previous investigations have shown uranium concentrations contained within the pile at levels significantly above the California MCL of 20 picocuries per liter (pCi/L). Metropolitan has been monitoring for uranium in the Colorado River Aqueduct and at its treatment plants since 1986. Monitoring at Lake Powell began in 1998. Uranium levels measured at Metropolitan's intake have ranged from 1-6 pCi/L, well below the California MCL. Conventional drinking water treatment, as employed at Metropolitan's water treatment plants, can remove low levels of uranium, however these processes would not be protective if a catastrophic event washed large volumes of tailings into the Colorado River. Public perception of drinking water safety is also of particular concern concerning uranium.

Remedial actions at the site since 1999 have focused on removing contaminated water from the pile and groundwater. Through 2009, over 2,700 pounds of uranium in contaminated groundwater have been removed. In July 2005, DOE issued its Final Environmental Impact Statement with the preferred alternative of permanent offsite disposal by rail to a disposal cell at Crescent Junction, Utah, located approximately 30 miles northwest of the Moab site.

Rail shipment and disposal of the uranium mill tailings pile from the Moab, Utah site began in April 2009. Through March 2010, DOE has shipped over 1 million tons of mill tailings to the Crescent Junction disposal cell. Using American Recovery and Reinvestment Act (ARRA) 2009 funding, DOE has increased shipments in order to meet its ARRA project

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[7] From the CDPH web site: http://www.cdph.ca.gov/certlic/drinkingwater/Pages/Arsenic.aspx . Note that the numbers reported there may change because the website is frequently updated.

[8] *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.

commitment to ship an additional 2 million tons of mill tailings by September 2011 and accelerate overall clean-up of the site. DOE estimates completing movement of the tailings pile by 2025, with a goal of 2019 should additional funding be secured. Metropolitan continues to track progress of the remediation efforts, provide the necessary legislative support for rapid cleanup, and work with Congressional representatives to support increased annual appropriations for this effort.

Another uranium-related issue began receiving attention in 2008 due to a renewed worldwide interest in nuclear energy and the resulting increase in uranium mining claims filed throughout the western United States. Of particular interest were thousands of mining claims filed near Grand Canyon National Park and the Colorado River. Metropolitan has since sent letters to the Secretary of Interior to highlight source water protection and consumer confidence concerns related to uranium exploration and mining activities near the Colorado River, and advocate for close federal oversight over these activities. In 2009, Secretary of Interior Ken Salazar announced the two-year hold on new mining claims on 1 million acres adjacent to the Grand Canyon to allow necessary scientific studies and environmental analyses to be conducted. In 2009, H.R. 644 – Grand Canyon Watersheds Protection Act was introduced and if enacted, would permanently withdraw areas around the Grand Canyon from new mining activities.

Chromium VI

Chromium is a naturally occurring element found in rocks, soil, plants, and animals. Chromium III is typically the form found in soils and is an essential nutrient that helps the body use sugar, protein, and fat. Chromium VI is used in electroplating, stainless steel production, leather tanning, textile manufacturing, dyes and pigments, wood preservation and as an anti-corrosion agent. Chromium occurs naturally in deep aquifers and can also enter drinking water through discharges of dye and paint pigments, wood preservatives, chrome plating liquid wastes, and leaching from hazardous waste sites. In drinking water, Chromium VI is very stable and soluble in water, whereas chromium III is not very soluble. Chromium VI is the more toxic species and is known to cause lung cancer in humans when inhaled, but the health effects in humans from ingestion are still in question. There is evidence that when Chromium VI enters the stomach, gastric acids may reduce it to chromium III. However, recent studies conducted by the National Toxicology Program have shown that Chromium VI can cause cancer in animals when administered orally.

Currently, there are no drinking water standards for Chromium VI. Total chromium (including chromium III and Chromium VI) is regulated in California with an MCL of 50 μg/L. On August 20, 2009, OEHHA released a draft public health goal (PHG) of 0.06 μg/L for Chromium VI in drinking water. The PHG is a health-protective, non-regulatory level that will be used by CDPH in its development of an MCL. CDPH will set the MCL as close to the PHG as technically and economically feasible.

Metropolitan utilizes an analytical method with a minimum reporting level of 0.03 μg/L, which is less than the State detection level for purposes of reporting (DLR) of 1 μg/L. The results from all of Metropolitan's source and treated waters are less than the State DLR of 1 μg/L (except for one detection of 1 μg/L at the influent to the Mills water treatment plant). The following summarizes Chromium VI levels found in Metropolitan's system:

- In the past 10 years, results of source and treated water monitoring for Chromium VI indicate: Levels in Colorado River water are mostly not detected (<0.03 μg/L) but when detected range from 0.03 – 0.08 μg/L. SWP levels range from 0.03 – 0.8 μg/L. Treated water levels range from 0.03 – 0.7 μg/L.

- There is a slight increase in Chromium VI in the treated water from the oxidation (chlorination and ozonation) of natural background chromium (total) to Chromium VI.
- Colorado River monitoring results upstream and downstream of the Topock site (discussed below) have ranged from not detected (<0.03 μg/L) to 0.06 μg/L.
- Chromium VI in Metropolitan's groundwater pump-in storage programs in the Central Valley has ranged from not detected (< 1 μg/L) to 9.1 μg/L with the average for the different programs from 1.4 to 5.0 μg/L.
- Chromium VI has been detected in a groundwater aquifer on the site of a Pacific Gas and Electric (PG&E) gas compressor station located along the Colorado River near Topock, Arizona.

PG&E used Chromium VI as an anti-corrosion agent in its cooling towers from 1951 to 1985. Wastewater from the cooling towers was discharged from 1951 to 1968 into a dry wash next to the station. Monitoring wells show the plume concentration has peaked as high as 16,000 μg/L. PG&E operates an interim groundwater extraction and treatment system that is protecting the Colorado River. Quarterly monitoring of the river has shown levels of Chromium VI less than 1 μg/L, which are considered background levels. The California Department of Toxic Substances Control and the U. S. Department of Interior are the lead state and federal agencies overseeing the cleanup efforts. Metropolitan participates through various stakeholder workgroups and partnerships that include state and federal regulators, Indian tribes, and other stakeholders (e.g., Colorado River Board) involved in the corrective action process. In 2010, it is anticipated that a final treatment alternative will be selected, and an Environmental Impact Report will be released for the recommended cleanup alternative.

The federal- and state-approved technologies for removing total chromium from drinking water include coagulation/ filtration, ion exchange, reverse osmosis, and lime softening. Potential treatment technologies for Chromium VI in drinking water may include reduction/chemical precipitation, an ion exchange, or reverse osmosis. For several years, the cities of Glendale, Burbank, and Los Angeles have been voluntarily limiting Chromium VI levels in their drinking water to 5 μg/L, an order of magnitude lower than the current statewide total chromium standard of 50 μg/L. The experience of these agencies in the treatment of water containing Chromium VI will be helpful in CDPH's evaluations of treatment technologies and associated costs, which are required as part of a proposed MCL regulation package.

N-Nitrosodimethylamine

N-Nitrosodimethylamine (NDMA) is part of a family of organic chemicals called nitrosamines and is a byproduct of the disinfection of some natural waters with chloramines. Metropolitan utilizes chloramines as a secondary disinfectant at its treatment plants. Wastewater treatment plant effluent and agricultural runoff can contribute organic material into source waters which react to form NDMA at water treatment plants. Certain polymers can also contribute NDMA precursor materials. Some NDMA control measures or removal technologies may be required to avoid adverse impacts on Southern California drinking water supplies. Metropolitan is involved in several projects to understand the watershed sources and occurrence of NDMA precursors in Metropolitan source waters, and to develop treatment strategies to minimize NDMA formation in drinking water treatment plants and distribution systems. Special studies conducted at Metropolitan have shown removal of NDMA using advanced oxidation processes. Other treatment process such as biological, membrane, and carbon adsorption need to be evaluated for NDMA removal.

USEPA considers NDMA to be a probable human carcinogen. USEPA placed NDMA in the Unregulated Contaminant Monitoring

Regulation 2 (UCMR2) and on the Contaminant Candidate List 3 (CCL3). CDPH also considers NDMA to be a probable human carcinogen. CDPH has not established a MCL for NDMA. However, in 1998 CDPH established a notification level of 0.01 μg/L. Occurrences of NDMA in treated water supplies at concentrations greater than 0.01 μg/L are recommended to be included in the utility's annual Consumer Confidence Report. In December 2006, OEHHA set a public health goal for NDMA of 0.003 μg/L. Metropolitan has monitored its source waters (at treatment plant influents) and treated waters on a quarterly basis since 1999. Test results for the presence of NDMA in Metropolitan's system have ranged from non-detect (reporting limit of 0.002 μg/L) to 0.014 μg/L. Preliminary data from UCMR2 confirm that the presence of NDMA is not limited to Metropolitan waters, but is widespread. NDMA, or a broader class of nitrosamines, may likely be the next disinfection byproduct(s) to be regulated by USEPA.

Pharmaceuticals and Personal Care Products

Pharmaceuticals and personal care products (PPCPs) are a growing concern to the water industry. Numerous studies have reported the occurrence of these emerging contaminants in treated wastewater, surface water, and sometimes, in finished drinking water in the United States and around the world. The sources of PPCPs in the aquatic environment include (but may not be limited to) treated wastewater and industrial discharge, agricultural run-off, and leaching of municipal landfills. Currently, there is no evidence of human health risks from long-term exposure to the low concentrations (low ng/L; parts per trillion) of PPCPs found in some drinking water. Furthermore, there are no regulatory requirements for PPCPs in drinking water. In October 2009, USEPA included 13 PPCPs on the CCL3; however, currently there are no standardized analytical methods for these compounds.

In 2007, Metropolitan implemented a monitoring program to determine the occurrence of PPCPs and other organic wastewater contaminants in Metropolitan's treatment plant effluents and selected source water locations within the Colorado River and SWP watersheds. Some PPCPs have been detected at very low ng/L levels, which is consistent with reports from other utilities. However, analytical methods are still being refined and more work is required to fully understand occurrence issues. Metropolitan has been actively involved in various studies related to PPCPs, including analytical methods improvements, and characterization of drinking water sources in California.

Metropolitan has participated with water and wastewater agencies and the Santa Ana Regional Board in a coordinated program to address emerging constituents relevant to local and imported supplies used to recharge groundwater basins in the Santa Ana River watershed. As part of the Regional Board-adopted "Cooperative Agreement to Protect Water Quality and Encourage the Conjunctive Uses of Imported Water in the Santa Ana River Basin", there are provisions for the workgroup to initiate development of monitoring for emerging unregulated constituents. Metropolitan, Orange County Water District, and the National Water Research Institute provided substantial input to the workgroup through its two-year monitoring study of emerging constituents in waters found throughout watersheds of the SWP, Colorado River, and Santa Ana River. In April 2009, the workgroup completed its Phase I Report summarizing its findings and recommendations regarding investigation into emerging constituents in water supplies. In December 2009, the workgroup submitted its proposed 2010/11 plan for monitoring of emerging constituents in imported and local waters. The workgroup also provided input to a Blue Ribbon Panel convened by the State Water Resources Control Board to review the emerging science of unregulated chemicals as it relates to the use of recycled water for irrigation and groundwater recharge.

Decreasing Concerns

Methyl Tertiary-Butyl Ether

Methyl tertiary-butyl ether (MTBE) was the primary oxygenate in virtually all the gasoline used in California, prior to the discovery that MTBE had contaminated groundwater supplies and was also found in surface water supplies. MTBE was banned in California as of December 31, 2003, although the concentration of MTBE in gasoline blends was voluntarily reduced beginning in January 2003. MTBE has subsequently been replaced by ethanol which is now the primary oxygenate in use. CDPH has adopted a primary MCL of 13 μg/L for MTBE based on carcinogenicity studies in animals. MTBE also has a California secondary MCL of 5 μg/L, which was established based on taste and odor concerns.

MTBE was introduced into surface water bodies from the motor exhausts of recreational watercraft. At Diamond Valley Lake and Lake Skinner, Metropolitan has taken steps to reduce the potential for MTBE contamination. In 2003, Metropolitan's 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 regularly monitors its water supply for contamination from MTBE and other oxygenates. In recent years, MTBE testing results in source waters have remained at non-detectable levels (below 3 μg/L).

MTBE still presents a significant problem to local groundwater basins. Leaking underground storage tanks and poor fuel-handling practices in the past at local gas stations may provide a large source of MTBE. MTBE is very soluble in water and has low affinity for soil particles, so it moves quickly into the groundwater. Within Metropolitan's service area, local groundwater producers have been forced to close some of their wells due to MTBE contamination. MTBE is also resistant to chemical and microbial degradation in water, making treatment more difficult than the treatment of other gasoline components. 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.

Although some groundwater supplies remain contaminated with this highly soluble chemical, contamination of Metropolitan's surface water supplies are no longer a problem. Further, improved underground storage tank requirements and monitoring, and the phase-out of MTBE as a fuel additive, will decrease the likelihood of MTBE groundwater problems in the future.

Other Water Quality Programs

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 the first step in a multi-barrier approach to provide safe and reliable drinking water. In accordance with California's Surface Water Treatment Rule, Title 22 of the California Code of Regulations, CDPH requires large utilities delivering surface water to complete a Watershed Sanitary Survey every five years to identify possible sources of drinking water contamination, evaluate source and treated water quality, and recommend watershed management activities that will protect and improve source water quality. The most recent sanitary surveys for Metropolitan's water sources were completed in 2005 and 2006.[9] The next Sanitary Surveys for the watersheds of the

9 Metropolitan Water District of Southern California, *Colorado River Watershed Sanitary Survey, 2005 Update*. For the State Water Project, the sanitary survey report was prepared on behalf of the State Water Project Contractors Authority, in 2006, and was titled *California State Water Project Watershed Sanitary Survey, 2006 Update*.

Colorado River and the SWP will report on water quality issues and monitoring data through 2010. Metropolitan has an active source water protection program and continues to advocate on behalf of numerous SWP and Colorado River water quality protection issues.

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. In addition, Metropolitan has supported the expansion of DWR's Municipal Water Quality Investigations Program beyond its Bay-Delta core water quality monitoring and studies to include enhanced water quality monitoring and forecasting of the Delta and SWP. These programs are designed to provide early warning of water quality changes that will affect treatment plant operations both in the short-term (hours to weeks) and up to seasonally. The forecasting model is currently suitable for use in a planning mode. It is expected that with experience and model refinement, it will be suitable to use as a tool in operational decision making.

Water Quality Exchanges

Metropolitan has implemented selective withdrawals from the Arvin-Edison storage program and exchanges with 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. Although elevated arsenic levels has been a particular concern in one groundwater banking program, there are also short-term water quality benefits that can be realized through other storage programs, such as groundwater pump-ins into the California Aqueduct with lower TOC levels (as well as lower bromide and TDS, in some programs).

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 (Metropolitan now conducts over 300,000 analytical tests on samples collected within our service area and source waters), as well as contingency plans that coordinate with the Homeland Security Office's multicolored tiered risk alert system.

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Public Outreach 5

Integrated Resources Plan Process Outreach Component

The Integrated Resources Plan is Metropolitan's blueprint for long-term water reliability. It was first adopted in the early 1996 and is updated periodically to reflect Metropolitan's planning strategies. Because of the diverse needs, interests, and institutional entities within the region, Metropolitan's planning goals are achieved through an open and participatory process that involves the major stakeholders. The collaborative planning process sought input from member agencies, retail water agencies, other water and wastewater managers, policy decision-makers, interest groups, environmental, business and community interests. Each interest group provided valuable input and guidance regarding the preferred water resource strategy and carefully reviewed the technical analyses supporting the decision-making process. Collectively, Metropolitan and the regionwide stakeholders analyzed available resources and updated the preferred strategy for resource development. The overall process involved two main components - a technical component (discussed in Section 2 of this report) and an outreach component.

During September and October 2008, Metropolitan's executive management, Board, member agency managers, elected officials, and community groups collectively discussed strategic direction and regional water solutions at these forums. Nearly 600 stakeholders participated in the first round of forums. Similar types of ideas and issues were raised by the participants at all the forums, emphasizing the importance of local resources development and resolving issue with the Bay-Delta. Participants suggested that Metropolitan should take a leadership position in several areas including:

- Outreach to legislators concerning needs for water supply reliability and quality improvements.
- Development of brine lines to enhance recycled water use.
- Foster partnerships with energy utilities.
- Build relationships with environmental community.
- Research and development in new technologies.
- Assist retail agencies in designing "correct" tiered rate structures.
- Review the achievements of the 1996 IRP and 2004 Update.
- Identify changing conditions affecting water resource development.
- Update resource development targets through 2035.

During a second round of workshops in October 2009, participants discussed technical assessments of various resource options, alternate approaches to water supply reliability, recommendations of a preferred approach, and implementation strategies.

In order to have a cooperative and effective outreach effort between Metropolitan, its member agencies, and the interested general public, Metropolitan staff made presentations to city and local governments, associations, and other parties throughout the region. This open and participatory process has allowed for valuable input, guidance and data exchange in which statewide business, environmental, community, agricultural and water interests were represented. Table 5-1 lists the major meetings comprising the 2009 IRP Update outreach process.

Table 5-1
Stakeholder Participation in IRP Update

Year	Month	Meeting
2008	June	IRP Board Workshop: Review and discuss IRP Update process
	July	IRP Steering Committee: Review June Board Workshop and discuss Committee objectives and responsibilities.
	August	IRP Steering Committee: Prepare for September IRP Stakeholder Forums.
	September	IRP Stakeholder Forums: Review and discuss IRP goals and prior resource targets, breakout discussion groups with stakeholders IRP Stakeholder Forum #1 – Newport Beach IRP Stakeholder Forum #2 – Ontario IRP Stakeholder Forum #3 – Los Angeles IRP Steering Committee: Mid-point status briefing of IRP Stakeholder Forums
	October	IRP Stakeholder Forums Continued: Review and discuss IRP goals and prior resource targets, breakout discussion groups with stakeholders IRP Stakeholder Forum #4 – San Diego IRP Technical Oversight Committee: Review of IRP Update process, role of IRP Technical Workgroups, current status of existing and planned projects/programs, and draft evaluation criteria
	December	Stormwater/Urban Runoff Technical Workgroup: Review IRP process and begin work on Stormwater Issue Paper Desalination Technical Workgroup: Review IRP Update process and begin work on Seawater Desalination Issue Paper Conservation Technical Workgroup: Review IRP Update process and begin work on Conservation Issue Paper Graywater Technical Workgroup: Review IRP Update process and begin work on Graywater Issue Paper Recycled Water Technical Workgroup: Review IRP Update process and begin work on Recycled Water Issue Paper

Table 5-1 (Contd)
Stakeholder Participation in IRP Update

Year	Month	Meeting
2009	January	Stormwater/Urban Runoff Technical Workgroup: Review work on draft Stormwater Issue Paper. Graywater Technical Workgroup: Review work on draft Graywater Issue Paper. Recycled Water Technical Workgroup: Review work on draft Recycled Water Issue Paper. IRP Technical Oversight Committee: Review IRP Update schedule, draft evaluation criteria, Technical Workgroup activities, and analytical approach for modeling uncertainty
	February	Stormwater/Urban Runoff Technical Workgroup: Review draft Stormwater Issue Paper Conservation Technical Workgroup: Review draft Conservation Issue Paper Recycled Water Technical Workgroup: Review draft Recycled Water Issue Paper IRP Technical Oversight Committee: Review and discuss updated IRP evaluation criteria
	March	Conservation Technical Workgroup: Review and discuss draft Conservation Issue Paper. Recycled Water Technical Workgroup: Review and discuss draft Recycled Water Issue Paper Stormwater/Urban Runoff Technical Workgroup: Review and discuss draft Stormwater Issue Paper Graywater Technical Workgroup: Review and discuss draft Graywater Issue Paper IRP Steering Committee: Review and discuss status of technical workgroups and IRP schedule
	April	Recycled Water Technical Workgroup: Review and discuss draft Recycled Water Issue Paper Conservation Technical Workgroup: Review and discuss draft Conservation Issue Paper. Graywater Technical Workgroup: Review and discuss draft Graywater Issue Paper Groundwater Study Meeting: Review and discuss groundwater modeling in Orange County Basin Synergy Workshop: Discussion between stakeholders from the groundwater, stormwater and recycled water IRP Update technical workgroups IRP Technical Oversight Committee: Review and discuss IRP Update schedule and status of IRP Update technical workgroups, preliminary supply and demand estimates, climate change data, and analytical models

Table 5-1 (Contd)
Stakeholder Participation in IRP Update

Year	Month	Meeting
2009	May	Member Agency Managers Meeting: Update on activities of the IRP Update technical workgroups, Technical Oversight Committee IRP Steering Committee: Review and discuss IRP Update schedule, supply and demand estimates, and technical workgroup findings
	June	IRP Technical Oversight Committee and Member Agency Managers Meeting: Review and discuss IRP Update schedule, gap analysis, technical workgroup findings, and the Robust Decision Making (RDM) analytical approach
	July	IRP Board Workshop: Review and discuss status of resource development and IRP policy alternatives and provided board members with Issue Paper 1 - IRP Implementation Status and Potential Development Needs and Issue Paper 2 - Metropolitan Involvement in Water Resources Development
	August	Board Transmittal - Supplemental Tables for IRP Issue Paper with the following attachments: 1. Identified project list for recycling and groundwater recovery 2. Tables on CRA supplies 3. Table showing balance of groundwater programs Seawater Desalination Technical Workgroup: Review and discuss draft of the desalination IRP Issue Paper Strategic Policy Review Board Workshop: Review and discuss IRP Update process and schedule, guiding principles and evaluation criteria, and alternatives for new regional supplies
	September	Stormwater/Urban Runoff Technical Workgroup: Review and discuss Stormwater Issue Paper IRP Steering Committee: Review and discuss IRP Update process and schedule, potential policy approaches, and work schedule
	October	Strategic Policy Review Board Workshop: Review and discuss evaluation criteria and alternatives and presentation of the dynamic gap
	November	Strategic Policy Review Board Workshop: Review and discuss cost and reliability under various approaches and key policy questions
2010	February	IRP Steering Committee: Strategic Policy Review, IRP Adaptive Management Approach and Adaptive Resource Options – Conservation
	April	IRP Steering Committee: Adaptive Resource Options - Groundwater and Stormwater IRP Steering Committee: Adaptive Resource Options – Graywater and Recycled Water

Table 5-1 (Contd)
Stakeholder Participation in IRP Update

Year	Month	Meeting
2010	May	IRP Steering Committee: Adaptive Resource Options - Seawater Desalination, overview of minimum/no regrets actions in each adaptive resource area
	June	IRP Steering Committee: Member agency panel discussion on resource options for the future, review of 2010 Update schedule and preliminary overview of Draft IRP Update
	July	IRP Steering Committee, Member Agency Managers Meeting and Board Workshop: Overview of Draft IRP Update
	August	IRP Stakeholder Forums: Review and discuss Draft IRP Update IRP Stakeholder Forum #1 – Orange IRP Stakeholder Forum #2 – Ontario IRP Stakeholder Forum #3 – San Diego IRP Stakeholder Forum #4 – Los Angeles

Groundwater Outreach Component

In 2007, Metropolitan prepared the Groundwater Assessment Study Report in collaboration with its member agencies and with groundwater basin managers. This study evaluated the potential for groundwater storage and identified the challenges in developing additional storage programs. To follow up on the findings of the Groundwater Assessment Study Report, Metropolitan initiated a series of seven groundwater workshops in July 2008 among Metropolitan, member agencies, groundwater basin managers, and stakeholders to discuss challenges for increasing conjunctive use and to develop recommendations for addressing the challenges. Summarized in Table 5-2 are the workshops and meetings which comprised the outreach components for the groundwater strategic process.

Table 5-2
Stakeholder Participation in Groundwater Process

Year	Month	Meeting
2008	July	Groundwater Workshop #1– Initiate process, set ground rules and identify discussion topics
	August	Groundwater Workshop #2 – Review IRP context, review availability of surplus imported water for groundwater recharge
	September	Groundwater Workshop #3 – Continued review of availability of surplus imported water for groundwater recharge; discussion of groundwater basin production capabilities
	October	Groundwater Workshop #4 – Continued discussion of groundwater basin production capabilities
	December	Groundwater Workshop #5 – Review of opportunities; discussion of Groundwater Workgroup policy recommendations for IRP Update
2009	February	Groundwater Workshop #6 – Continued discussion of policy recommendations for IRP Update
	April	Synergy Workshop among Groundwater, Stormwater, and Recycled Water Technical Workgroups Groundwater Basin Module Meeting with Orange Co Basin
	September	Groundwater Basin Module Meeting with Orange Co Basin Groundwater Basin Module Meeting with Central and West Coast basins
	November	Groundwater Basin Module Meeting with Main San Gabriel Basin Groundwater Basin Module Meeting with Chino Basin
2010	January	Groundwater Workshop #7 – Review initial modeling outcomes using groundwater basin modules; Finalize Groundwater Workgroup policy recommendations for the IRP Update
	March	Groundwater Basin Module Meeting with Main San Gabriel Basin

Regional Urban Water Management Program Outreach Component

Public involvement in Metropolitan's planning process continues to be an integral part of the development of this UWMP report. In October 2009, Metropolitan kicked off the update of its Regional Urban Water Management Plan with a meeting at Metropolitan's headquarters. 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 numerous coordination meetings, workshops, and conference calls with the member agencies to review the initial draft data set and address various issues associated with the report preparation. Based on these meetings, Metropolitan finalized the draft data set and developed the draft RUWMP. Simultaneously, Metropolitan developed preliminary estimates of its existing and planned water sources in five-year increments under single-dry, multi-dry, and 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 June 8, 2010. Following the distribution, Metropolitan sponsored a workshop on June 21, 2010, with the member agencies and sanitation districts within the service area to discuss the contents of the draft RUWMP. Table 5-3 lists all the meetings and workshops held during the preparation of the 2010 RUWMP report.

The public review draft was posted prominently on Metropolitan's website on August 9, 2010. The notice of availability of the document was sent to the member agencies, as well as cities and counties in the Metropolitan service area. The announcement is in compliance with Water Code § 10621(b)), which requires that every urban water supplier preparing a plan give at least 60 days advance notice prior to the public hearing on the UWMP to any city or county within which the supplier provides water supplies to allow opportunity for consultation on the proposed plan. Included in this chapter is a copy of the letter of notification sent to cities and counties in Metropolitan's service area. Also included is a copy of the Public Notice advertising the meeting as published in six Southern California newspapers on August 9 and 16, 2010.

Metropolitan held the publicly-noticed meeting, as required by the Act, as part of the Water Planning and Stewardship Committee Meeting of its Board of Directors held on October 11, 2010. On November 9, 2010, Metropolitan's Board determined that the 2010 RUWMP is consistent with the Act and an accurate representation of the water resources plan for the Metropolitan service area. As prescribed in Resolution 9117, the Board approved the 2010 RUWMP for submission to the State of California. Included in this section is a copy of Resolution 9117 approved by the Metropolitan Board.

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.

Website Posting: The public review draft was posted prominently on Metropolitan's website on August 9, 2010.

Table 5-3 summarizes the workshops and meetings held to satisfy the outreach requirement for completing the 2010 Regional Urban Water Management Plan.

Table 5-3
Stakeholder Participation and Outreach for the 2010 Regional Urban Water Management Plan

Year	Month	Meeting
2009	October	*RUWMP Kick-off Meeting*: Start of the 2010 RUWMP process, discuss schedule and milestones to complete the report, and distribute data on demographics, total demands after conservation, local supplies, and demands on Metropolitan
2010	January	*Coordination Meeting with Inland Empire Utilities Agency:* Review and refinement of demand projections *Coordination Meeting with San Diego County Water Authority:* Review and refinement of demand projections *Coordination Meeting with Eastern MWD:* Review and refinement of demand projections
	February	*Coordination Meeting with City of Santa Monica:* Review and refinement of demand projections *Conference call with Calleguas MWD:* Discuss RUWMP issues, impacts of new legislation, report outline, schedule, and milestones *Coordination Meeting with Calleguas MWD:* Review of demographic assumptions and refine demand projections *Coordination Meeting with City of Pasadena*
	May	RUWMP presentation at the Member Agency Managers Meeting
	June	RUWMP Coordination Workshop with Member Agencies and Sanitation Districts *RUWMP Presentation:* Discussion of the status, contents, and assumptions of the Draft RUWMP at the Member Agency Managers Meeting.
	August	Notification (60-day) for Public Hearing to local publications Sent letters to Cities and Counties within Metropolitan service area RUWMP presentation at the Metropolitan Board of Directors meeting of the Water Planning and Stewardship Committee *Co-hosted Meeting of Southern California Water Committee Urban Task Force*: Discussion of technical and legal aspects of preparing an Urban Water Management Plan with various agencies and stakeholders in Southern California *Coordination Meeting*: Discussion of RUWMP and IRP with Orange County member and retail agencies
	October	*Public Hearing:* Public review and comments on the 2010 Regional Urban Water Management Plan held as part of the Water Planning and Stewardship Committee meeting of Metropolitan's Board of Directors.
	November	*Metropolitan Board of Director's Meeting:* Adopt 2010 Regional Urban Water Management Plan

Letter Notifying Cities and Counties

July 30, 2010

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 and Stewardship Committee Board meeting to receive input on the draft 2010 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 2010 RUWMP.

Public Hearing will be held on:
Monday, October 11, 2010
Committee Room US 2-456 at 1:30 p.m.
Metropolitan Water District Headquarters Building
700 North Alameda Street
Los Angeles, Ca 90012

The draft Plan will be posted on Metropolitan's web site at www.mwdh2o.com beginning August 9, 2010. Please check on the website for updated room and time information. Written comments are due by **October 11, 2010**. Please send comments to:

Metropolitan Water District
700 North Alameda Street
Los Angeles, Ca 90012
Attn: Edgar Fandialan

If you would like more information or have any questions, please contact Edgar Fandialan at (213) 217-6764 or via email at efandialan@mwdh2o.com.

Very Truly Yours,

Devendra Upadhyay
Manager, 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 11, 2010** to receive comments on the draft 2010 Regional Urban Water Management Plan (RUWMP).

The hearing will be held at 1:30 p.m. in the Committee Room US 2-456 of Metropolitan's Headquarters Building at 700 North Alameda Street, Los Angeles, California before the Water Planning and Stewardship 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 2010 RUWMP. In addition to the public hearing, Metropolitan will accept written comments on the draft plan. All written comments must be received by **October 11, 2010** to:

The Metropolitan Water District of Southern California
P.O. Box 54153
Los Angeles, CA 90054-0153
Attn: Edgar Fandialan

For more information on the draft RUWMP, please call Edgar Fandialan of Metropolitan's Water Resource Management Group at (213) 217-6764.

RESOLUTION 9117

RESOLUTION
OF THE BOARD OF DIRECTORS
OF THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA
ADOPTING THE 2010 REGIONAL URBAN WATER MANAGEMENT PLAN

WHEREAS, the California Urban Water Management Planning Act requires urban water suppliers 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 every five years; 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 2010 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 November 9, 2010 this District hereby adopts this 2010 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 November 9, 2010.

Dawn Chin

Board Executive Secretary
The Metropolitan Water District
of Southern California

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APPENDIX A.1
Demand Forecast

A.1 DEMAND FORECAST

Forecast Overview

Retail Municipal and Industrial (M&I) demands represent the full spectrum of urban water use within a region, including residential, commercial, industrial, institutional and unmetered uses. Within the water industry, numerous approaches exist for projecting future retail M&I water demands. These 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 framework, an implementation of the original IWR-MAIN Water Use Forecasting Model. The MWD-MAIN framework includes statistical models that have been adapted to conditions in Southern California. The model incorporates projections of demographic and economic variables developed by Southern California's two regional planning agencies – the Southern California Association of Governments (SCAG) and the San Diego Association of Governments (SANDAG) – into statistical models of water demand, yielding forecasts of gross retail urban M&I water demand. This estimate of gross retail demand is then adjusted for conservation savings and local agency supplies to obtain an estimate of retail demands needing to be met by Metropolitan.

The MWD-MAIN framework uses separate models for each of three sectors—single-family residential, multi-family residential, and nonresidential. Demand forecast for the two residential sectors are obtained by multiplying model-based estimates of water demand per occupied dwelling unit by SCAG and SANDAG estimates of the future number of occupied units. For the non-residential sector, water use per employee is multiplied by estimates of future employment patterns. The basic relationships involved are shown in Table A.1-1.

In addition to accounting for future demographic trends, Metropolitan's water demand forecasts also account for conservation savings. As a signatory to the 1991 *Memorandum of Understanding (MOU) Regarding Urban Water Conservation*,[1] Metropolitan's efforts to promote water use efficiency are largely informed by the California Urban Water Conservation Council's "Best Management Practices" (BMPs) concerning urban water conservation.[2]

The range of activities intended to promote water conservation within Metropolitan's service area are accounted for in Metropolitan's Conservation Model. This model distinguishes between the following components of regional conservation:

- *Code-Based Conservation* – Water saved as a result of legislative changes in water efficiency requirements as reflected in more efficient plumbing codes and water using devices.

[1] A copy of the MOU can be found at http://www.cuwcc.org/.

[2] Section 3.1 contains a more complete accounting of Metropolitan's efforts in this area.

- *Active Conservation* – Water saved directly as a result of conservation programs funded by water agencies (includes implementation of the Best Management Practices). The form and extent of such conservation is unlikely to result without agency encouragement.
- *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 motivate consumers to participate in one or more active conservation programs
- *Reductions in Distribution System Losses* – To the extent that conservation efforts result in less water traveling through the distribution system, system losses will be reduced.

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

Estimates obtained from Metropolitan's Conservation Model are subtracted from gross estimates of retail urban water demand. Following this, adjustments are made for local agency supplies, system losses, and price effects. This results in an estimate of total regional M&I demands facing Metropolitan.

Trends in Southern California

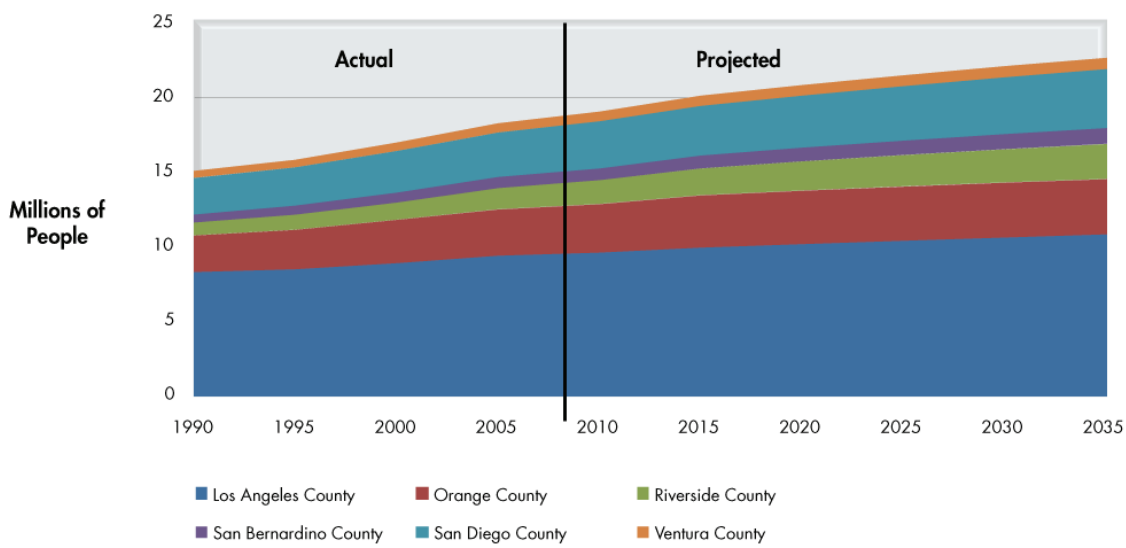
Population

According to SCAG and SANDAG estimates, the population in Metropolitan's service area will reach 18.9 million in 2010, 21.3 million in 2025, and 22.5 million by 2035.[3] While

[3] The most recent calendar year for which actual data are available is 2008. Data for 2009 and later are model-based estimates.

Los Angeles County leads in total population, the inland areas of Riverside and San Bernardino counties are projected to grow at the fastest rates over the next ten years. Generally speaking, however, annual growth rates will slow for all counties between 2010 and 2035. In part this is due to changing patterns of migration. It also reflects the effects of the recession of the late 2000s and the ongoing restructuring of the Southern California economy.

Figure A. 1-1 Actual and Projected Population



Employment

Economic trends are important drivers of water demand. Metropolitan captures economic trends by tracking regional employment growth and the changing mix of industries comprising the Southern California economy.

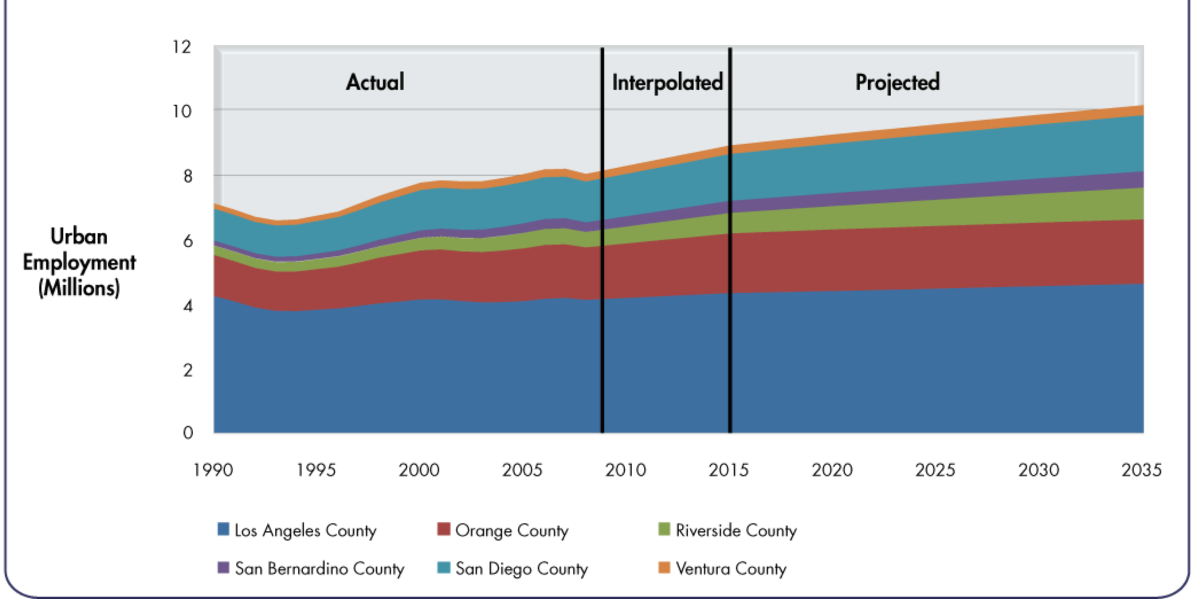
Recession during the 1990s cost Southern California around 400,000 jobs and caused a major shift in the region's industry base. Almost 300,000 manufacturing jobs were lost by 1995, many of them in the aerospace and defense industries. Los Angeles and Orange counties were especially hard hit by these changes. 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 economy. Job growth in the late 1990s approached levels of the late 1980s. But regional job growth slowed once again during the early 2000s as the result a mild economic downturn and then fell again in response to the economic recession beginning in 2007. Southern California suffered more than most regions during this period due to the combination of housing and economic declines occurring during the post-2007 period.

Within Metropolitan's service area, employment growth is likely to occur unevenly across the six counties. Over the 25-year period between 2010 and 2035, the greatest employment increases are expected to occur in Riverside, San Diego, and Los Angeles counties with estimated increases of 469,000 TAF, 461,000 TAF, and 432,000 TAF jobs respectively. Relative to existing employment, Riverside and San Bernardino counties are expected to have the highest rates of employment growth.

Figure A.1-2 and Table A.1-3 summarize the projected growth 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 8.3 million in 2010 to about 10.2 million in 2035. This increase of about 23 percent is greater than the projected population increase (19 percent), suggesting that an increased share of the population will be employed over time.

Figure A. 1-2 Actual and Projected Urban Employment



Residential Consumers

Southern California's regional planning agencies have forecast residential housing growth in all parts 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 19 percent between 2010 and 2035, growing from 6.1 to around 7.3 million housing units. Much of this growth will likely occur in hotter inland areas of Southern California. Although small changes in geographic service area are expected to occur as the results of annexations, no major increase in the total geographic service area is expected. Within the service territory, the household occupancy size (household population divided by total occupied dwelling units) is projected to decline slightly from about 3.05 persons per unit currently to 3.03 persons per unit by 2035.

Permits for new residential housing construction are another indicator of the future growth in water demand. Figure A.1-4 shows the pattern of historical growth in residential housing permits between 1970 and 2009.[4]

[4] 2009 is the last year for which complete data are available.

Figure A. 1-3 Actual and Projected Households

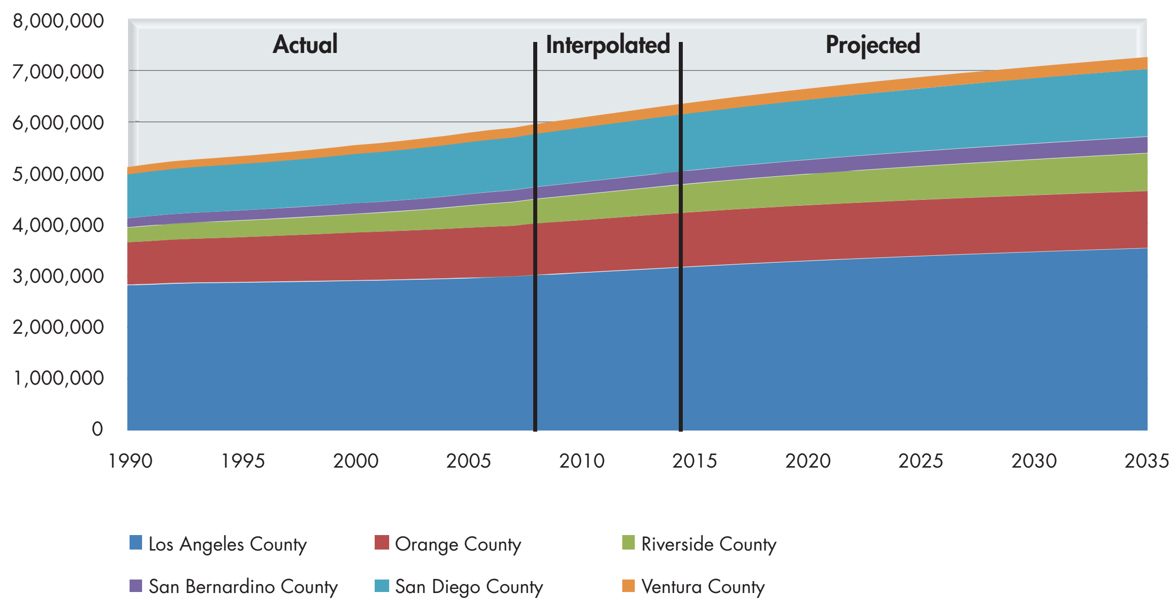
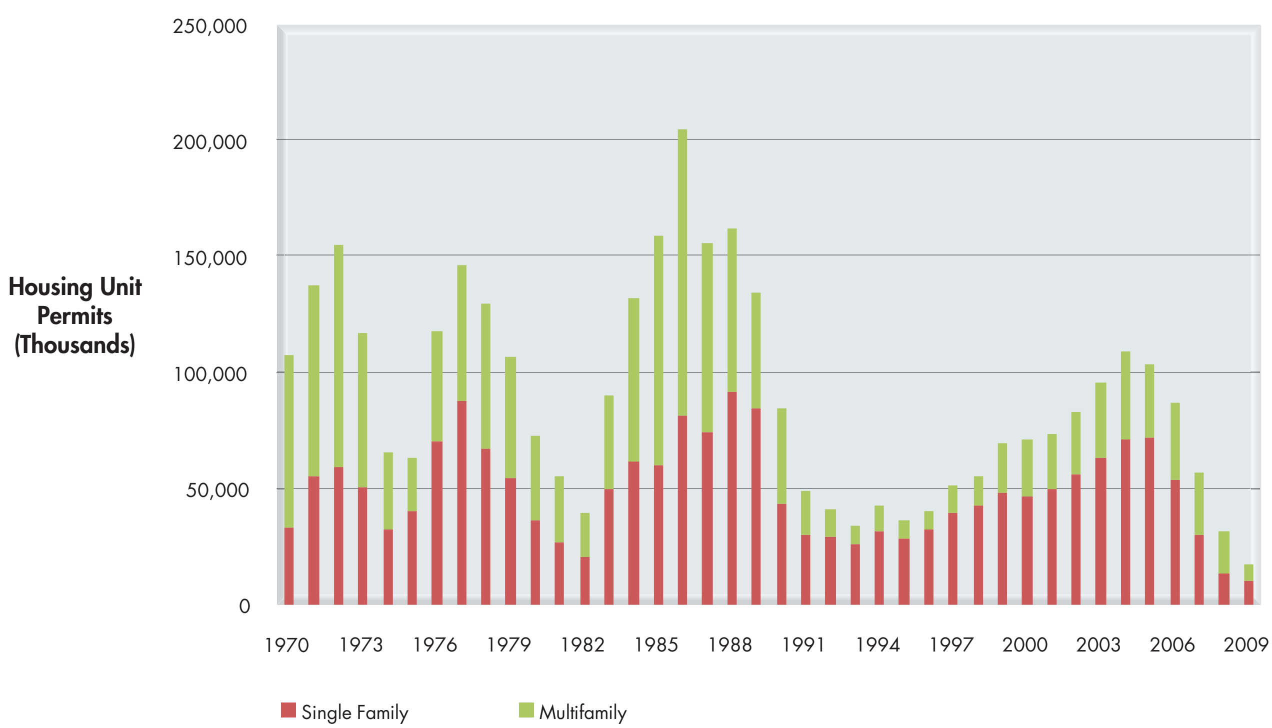


Figure A. 1-4 Residential Housing Permits in Six-County Region



The effect of economic cycles can clearly be seen over time with the precipitous fall in housing construction accompanying the 2007 recession being most notable.

Water Demands

As shown in Figure A.1-5 and Table A.1-5, actual retail water demands within Metropolitan's service area have increased from 3.1 million acre-feet (MAF) in 1980 to a projected 4.0 MAF in 2010.[5] This represents an estimated annual increase of about 1.0 percent. A similar gradual increase in estimated total retail water demand is expected between 2010 and 2035.

Of the estimated 4.0 MAF of total retail water use in 2010, 93 percent is due to M&I use with agriculture accounting for the other 7 percent. The relative share of M&I water use has increased over time at the expense of agricultural use which has declined due to urbanization and market factors. By 2035, it is estimated that agriculture will account for only about 4 percent of total Metropolitan retail demands.

Retail Demand

It is estimated that total M&I water use will grow from an annual average of 4.0 MAF in 2010 to 4.7 MAF in 2035. All water demand projections assume normal weather conditions. Future changes in estimated water demand assume continued water savings due to conservation measures such as water savings resulting from plumbing codes, price effects, and the continuing implementation of utility-funded conservation BMPs.

By County

M&I water demand is not expected to grow uniformly across counties. Consistent with the general pattern of future demographic distributions, the largest absolute increases in urban water demands are expected to occur in Los Angeles and Riverside counties, with respective estimated increases of about 178,300 and 230,700 AF per year between 2010 and 2035.

By Sector

Water use can also be broken down by sector. Between 2010 and 2035, single-family residential water use is expected to increase by 17.5 percent (Table A.1-8), while multifamily water use is estimated to increase by 29.4 percent (Table A.1-9). In contrast, Table A.1-10 shows a relatively flat trend in estimated nonresidential water use between 2010 and 2035.

Residential Water Use

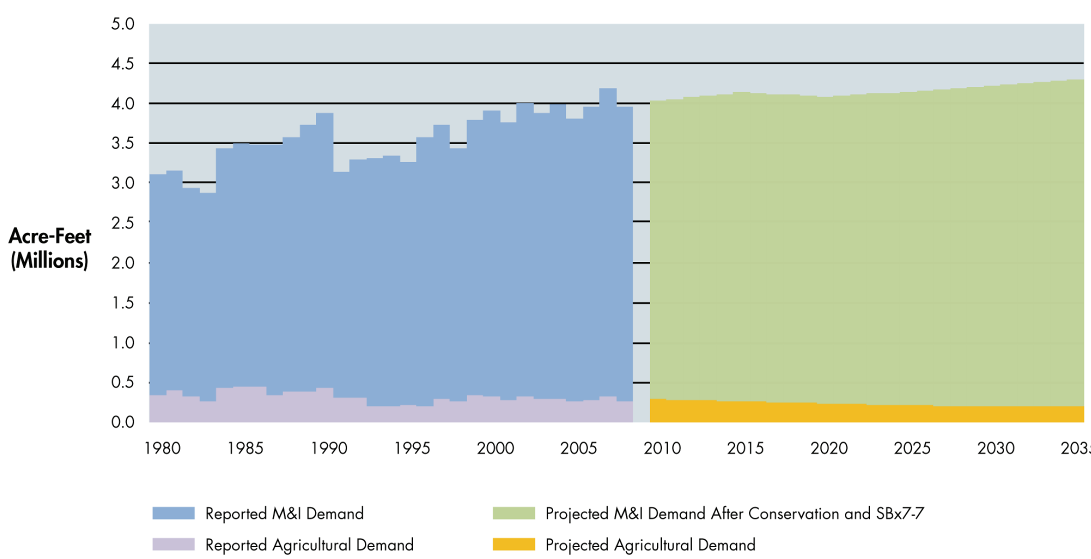
While single-family homes are estimated to account for about 61 percent of the total occupied housing stock in 2010, they are responsible for about 74 percent of total residential water demands (Tables A.1-8 and A.1-9). This is consistent with the fact that single-family households are known to use more water than multifamily households (e.g., those residing in duplexes, triplexes, apartment buildings and condo developments) on a per housing-unit basis. This is because 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.

Nonresidential Water Use

Nonresidential water use represents an approximately 25 percent of the total M&I demands in Metropolitan's service area (Table A.1-10). This includes 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

[5] Complete information for 2010 are not available. The figure given is a model-based estimate.

Figure A. 1-5 Actual and Projected Retail Water Demand



water users include schools, hospitals, hotels, amusement parks, colleges, laundries, and restaurants. In Southern California, 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 shows estimated conservation savings resulting from active conservation programs ("Active"), ongoing conservation from natural replacement of plumbing fixtures ("Code-Based"), and conservation induced by projected increases in the real price of water ("Price"). Code-Based savings account for the largest share of total conservation. However, aggressive utility-funded conservation programs have made a significant contribution in this area. For example, Metropolitan-assisted programs were responsible for an estimated 134,000 acre-feet in savings during FY 2008/09 and nearly 1.3 MAF in cumulative conservation savings since FY 1990/91.[6]

Projected M&I Demand by Sector

Table A.1-13 provides a summary of municipal and industrial demands, broken down by sector, along with each sector's share of total retail demand. In 2010, residential use accounted for about two-thirds (68 percent) of total projected M&I demand while non-residential use constituted nearly one-fourth (24 percent) of projected M&I demand. These shares are expected to change slightly in 2035 with estimated residential use at 71 percent and non-residential use accounting for approximately 21 percent of total M&I use. System losses and unmetered use are expected to remain relatively constant over this period at about 8.1 percent.

[6] Metropolitan Water District of Southern California. Annual Progress Report to the California State Legislature: Achievements in Conservation, Recycling and Groundwater Recharge. February 2010.

Table A.1-2 Population Growth in Metropolitan' s Service Area (July)

(Persons)

	Actual					Projected				
County	1990	1995	2000	2005	2010*	2015	2020	2025	2030	2035
Los Angeles County	8,268,000	8,458,000	8,860,000	9,364,000	9,567,000	9,900,000	10,132,000	10,356,000	10,574,000	10,781,000
Orange County	2,412,000	2,604,000	2,863,000	3,057,000	3,205,000	3,452,000	3,534,000	3,586,000	3,630,000	3,654,000
Riverside County	851,000	994,000	1,129,000	1,381,000	1,559,000	1,756,000	1,909,000	2,049,000	2,173,000	2,292,000
San Bernardino County	565,000	637,000	707,000	792,000	832,000	915,000	968,000	1,020,000	1,070,000	1,117,000
San Diego County	2,407,000	2,519,000	2,737,000	2,934,000	3,109,000	3,274,000	3,439,000	3,599,000	3,759,000	3,899,000
Ventura County	451,000	478,000	542,000	588,000	624,000	659,000	683,000	702,000	720,000	731,000
Metropolitan's Service Area	**14,954,000**	**15,690,000**	**16,838,000**	**18,116,000**	**18,896,000**	**19,956,000**	**20,665,000**	**21,312,000**	**21,926,000**	**22,474,000**

Source: US Census, CA Department of Finance, SCAG RTP-07, SANDAG Series 12 2050 Regional Growth Forecast (Feb 2010)

* Interpolated

Table A.1-3 Urban Employment Growth in Metropolitan' s Service Area (July)

	Actual					Projected				
County	1990	1995	2000	2005	2010*	2015	2020	2025	2030	2035
Los Angeles County	4,236,000	3,820,000	4,135,000	4,082,000	4,179,000	4,328,000	4,389,000	4,461,000	4,538,000	4,611,000
Orange County	1,260,000	1,240,000	1,500,000	1,616,000	1,671,000	1,830,000	1,890,000	1,925,000	1,953,000	1,974,000
Riverside County	277,000	297,000	373,000	465,000	507,000	622,000	714,000	804,000	895,000	976,000
San Bernardino County	164,000	186,000	246,000	308,000	334,000	387,000	411,000	438,000	469,000	510,000
San Diego County	1,001,000	1,017,000	1,254,000	1,288,000	1,318,000	1,446,000	1,529,000	1,601,000	1,665,000	1,728,000
Ventura County	151,000	156,000	218,000	229,000	235,000	255,000	269,000	281,000	291,000	300,000
Metropolitan's Service Area	**7,089,000**	**6,716,000**	**7,726,000**	**7,988,000**	**8,244,000**	**8,868,000**	**9,202,000**	**9,510,000**	**9,811,000**	**10,099,000**

Source: US Census, CA Department of Finance, SCAG RTP-07, SANDAG Series 12 2050 Regional Growth Forecast (Feb 2010)

* Interpolated

Table A.1-4 Occupied Housing Growth in Metropolitan's Service Area
(Households)

	Actual					Projected				
County	**1990**	**1995**	**2000**	**2005**	**2010***	**2015**	**2020**	**2025**	**2030**	**2035**
Los Angeles County	2,825,000	2,875,000	2,911,000	2,961,000	3,064,000	3,185,000	3,299,000	3,389,000	3,475,000	3,545,000
Orange County	832,000	881,000	938,000	981,000	1,027,000	1,072,000	1,088,000	1,102,000	1,111,000	1,118,000
Riverside County	283,000	322,000	357,000	427,000	496,000	552,000	605,000	650,000	692,000	733,000
San Bernardino County	175,000	190,000	203,000	216,000	234,000	253,000	269,000	285,000	300,000	314,000
San Diego County	863,000	913,000	965,000	1,016,000	1,062,000	1,116,000	1,168,000	1,220,000	1,271,000	1,312,000
Ventura County	143,000	151,000	170,000	184,000	197,000	208,000	215,000	221,000	227,000	232,000
Metropolitan's Service Area	**5,121,000**	**5,332,000**	**5,544,000**	**5,785,000**	**6,080,000**	**6,386,000**	**6,644,000**	**6,867,000**	**7,076,000**	**7,254,000**

Source: US Census, CA Department of Finance, SCAG RTP-07, SANDAG Series 12 2050 Regional Growth Forecast (Feb 2010)

* Interpolated

Table A.1-5 Total Retail Demand in Metropolitan's Service Area with Conservation and SBx7-7
(Acre-Feet)

	Actual							Projected				
County	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**	**2010***	**2015**	**2020**	**2025**	**2030**	**2035**
Los Angeles County	1,528,000	1,703,000	1,734,000	1,558,000	1,739,000	1,643,000	1,762,000	1,704,000	1,664,000	1,676,000	1,694,000	1,705,000
Orange County	521,000	596,000	673,000	577,000	660,000	629,000	624,000	651,000	634,000	635,000	637,000	637,000
Riverside County	348,000	376,000	480,000	404,000	492,000	495,000	544,000	603,000	626,000	664,000	701,000	736,000
San Bernardino County	166,000	188,000	210,000	184,000	251,000	264,000	268,000	259,000	252,000	263,000	275,000	286,000
San Diego County	481,000	487,000	686,000	502,000	661,000	614,000	668,000	687,000	682,000	691,000	709,000	728,000
Ventura County	96,000	113,000	145,000	108,000	132,000	158,000	166,000	170,000	170,000	174,000	178,000	181,000
Metropolitan's Service Area	**3,140,000**	**3,463,000**	**3,928,000**	**3,333,000**	**3,935,000**	**3,803,000**	**4,032,000**	**4,074,000**	**4,028,000**	**4,103,000**	**4,194,000**	**4,273,000**

Table A.1-6 Total Retail M&I Demand in Metropolitan's Service Area with Conservation and SBx7-7
(Acre-Feet)

	Actual							Projected				
County	1980	1985	1990	1995	2000	2005	2010*	2015	2020	2025	2030	2035
Los Angeles County	1,522,000	1,698,000	1,732,000	1,550,000	1,738,000	1,643,000	1,761,000	1,703,000	1,664,000	1,676,000	1,693,000	1,704,000
Orange County	481,000	547,000	646,000	559,000	643,000	619,000	613,000	644,000	630,000	633,000	634,000	634,000
Riverside County	141,000	174,000	279,000	245,000	357,000	413,000	454,000	508,000	532,000	570,000	606,000	641,000
San Bernardino County	120,000	150,000	172,000	152,000	221,000	236,000	242,000	243,000	245,000	256,000	268,000	279,000
San Diego County	365,000	370,000	548,000	438,000	556,000	523,000	596,000	603,000	604,000	631,000	657,000	675,000
Ventura County	77,000	91,000	118,000	94,000	125,000	145,000	151,000	149,000	149,000	152,000	156,000	158,000
Metropolitan's Service Area	**2,706,000**	**3,030,000**	**3,495,000**	**3,038,000**	**3,640,000**	**3,579,000**	**3,817,000**	**3,850,000**	**3,824,000**	**3,918,000**	**4,014,000**	**4,091,000**

Table A.1-7 Total Retail Agricultural Demand in Metropolitan' s Service Area
(Acre-Feet)

	Actual							Projected				
County	1980	1985	1990	1995	2000	2005	2010*	2015	2020	2025	2030	2035
Los Angeles County	6,300	5,300	2,800	7,500	500	400	500	400	400	400	400	400
Orange County	40,300	48,400	26,900	17,700	17,300	9,800	10,900	6,800	3,800	2,900	2,900	2,900
Riverside County	207,000	202,000	200,800	158,700	134,100	81,700	89,600	94,200	94,200	94,200	94,200	94,200
San Bernardino County	46,100	37,700	37,200	32,200	29,800	27,500	26,500	15,200	7,100	7,100	7,100	7,100
San Diego County	116,200	117,400	138,600	64,400	105,600	91,300	72,000	84,300	78,300	59,800	52,300	52,300
Ventura County	19,400	22,000	27,400	14,300	7,500	12,600	14,700	20,900	21,300	21,700	22,300	22,900
Metropolitan's Service Area	**435,300**	**432,800**	**433,700**	**294,800**	**294,800**	**223,300**	**214,200**	**221,800**	**205,100**	**186,100**	**179,200**	**179,800**

* Data not available - estimated based on prior years.

Table A.1-8 Single Family Retail Demand in Metropolitan' s Service Area*

(Acre-Feet)

County	Projected 2010	2015	2020	2025	2030	2035
Los Angeles County	778,000	831,000	857,000	866,000	878,000	885,000
Orange County	300,000	325,000	334,000	337,000	339,000	341,000
Riverside County	329,000	376,000	411,000	439,000	465,000	490,000
San Bernardino County	138,000	148,000	154,000	159,000	165,000	168,000
San Diego County	265,000	282,000	295,000	303,000	311,000	315,000
Ventura County	91,000	99,000	103,000	105,000	107,000	108,000
Metropolitan's Service Area	**1,901,000**	**2,061,000**	**2,154,000**	**2,209,000**	**2,265,000**	**2,307,000**

* Projections do not include savings estimates to meet SBx7-7.

Table A. 1-9 Multifamily Retail Demand in Metropolitan's Service Area*

Average Year (Acre-Feet)

County	Projected 2010	2015	2020	2025	2030	2035
Los Angeles County	318,000	349,000	364,000	373,000	384,000	393,000
Orange County	111,000	125,000	129,000	131,000	133,000	135,000
Riverside County	54,000	62,000	68,000	74,000	79,000	86,000
San Bernardino County	31,000	35,000	38,000	42,000	46,000	50,000
San Diego County	125,000	140,000	154,000	170,000	186,000	201,000
Ventura County	12,000	13,000	14,000	15,000	16,000	16,000
Metropolitan's Service Area	**651,000**	**724,000**	**767,000**	**805,000**	**844,000**	**881,000**

* Projections do not include savings estimates to meet SBx7-7.

Table A. 1-10 Commercial, Industrial and Institutional Retail Demand in Metropolitan's Service Area*

Average Year (Acre-Feet)

County	Projected 2010	2015	2020	2025	2030	2035
Los Angeles County	456,000	470,000	467,000	457,000	449,000	441,000
Orange County	169,000	182,000	185,000	182,000	178,000	173,000
Riverside County	47,000	52,000	58,000	62,000	66,000	69,000
San Bernardino County	37,000	44,000	46,000	47,000	49,000	52,000
San Diego County	148,000	164,000	166,000	169,000	169,000	168,000
Ventura County	33,000	33,000	34,000	35,000	35,000	35,000
Metropolitan's Service Area	**890,000**	**945,000**	**956,000**	**952,000**	**946,000**	**938,000**

* Projections do not include savings estimates to meet SBx7-7.

Table A. 1-11 Unmetered Use in Metropolitan's Service Area*

Average Year (Acre-Feet)

	Projected					
County	2010	2015	2020	2025	2030	2035
Los Angeles County	135,000	143,000	146,000	147,000	148,000	149,000
Orange County	41,000	45,000	46,000	46,000	46,000	46,000
Riverside County	42,000	47,000	52,000	55,000	59,000	62,000
San Bernardino County	28,000	31,000	33,000	34,000	35,000	37,000
Table 2-7	45,000	50,000	52,000	54,000	56,000	58,000
Ventura County	12,000	12,000	13,000	13,000	13,000	14,000
Metropolitan's Service Area	**303,000**	**328,000**	**342,000**	**349,000**	**357,000**	**366,000**

* Projections do not include savings estimates to meet SBx7-7.

Table A.1-12 Conservation Savings in Metropolitan's Service Area - 1980 Base Year

(Acre-Feet)

	Estimated				Projected					
County	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035
Los Angeles County	0	98,000	194,000	279,000	328,000	347,000	358,000	388,000	416,000	441,000
Orange County	0	29,000	64,000	95,000	116,000	120,000	120,000	128,000	135,000	142,000
Riverside County	0	11,000	23,000	38,000	56,000	65,000	71,000	82,000	92,000	102,000
San Bernardino County	0	4,000	8,000	13,000	21,000	25,000	28,000	32,000	36,000	40,000
San Diego County	0	25,000	56,000	77,000	98,000	109,000	118,000	130,000	142,000	153,000
Ventura County	0	4,000	9,000	13,000	17,000	19,000	21,000	23,000	25,000	27,000
Active, Code and Price	**0**	**171,000**	**355,000**	**515,000**	**636,000**	**686,000**	**717,000**	**783,000**	**846,000**	**906,000**
Pre-1990 Conservation	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000
Total Conservation	**250,000**	**421,000**	**605,000**	**765,000**	**886,000**	**936,000**	**967,000**	**1,033,000**	**1,096,000**	**1,156,000**

Note:

* Estimated conservation savings with active savings installed as of calendar year 2009.
Savings projections do not include savings derived from SB7x7.

Table A.1-13 Projected Municipal and Industrial Demands by Sector

(Acre-Feet)

	Historical[1]				Projection[2]					
Sector	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035
Single-Family	1,754,000	1,529,000	1,837,000	1,812,000	1,901,000	2,061,000	2,154,000	2,209,000	2,264,000	2,307,000
Multifamily	545,000	487,000	600,000	606,000	650,000	724,000	769,000	805,000	844,000	880,000
Non-Residential	915,000	777,000	910,000	874,000	890,000	945,000	956,000	952,000	946,000	938,000
System Losses/Unmetered	282,000	245,000	294,000	289,000	303,000	328,000	342,000	350,000	358,000	365,000
Metropolitan Total	**3,495,000**	**3,038,000**	**3,640,000**	**3,580,000**	**3,744,000**	**4,058,000**	**4,221,000**	**4,315,000**	**4,413,000**	**4,490,000**
Single-Family	50.2%	50.3%	50.5%	50.6%	50.8%	50.8%	51.0%	51.2%	51.3%	51.4%
Multifamily	15.6%	16.0%	16.5%	16.9%	17.4%	17.8%	18.2%	18.7%	19.1%	19.6%
Non-Residential	26.2%	25.6%	25.0%	24.4%	23.8%	23.3%	22.7%	22.1%	21.4%	20.9%
System Losses/Unmetered	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%
Metropolitan Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

[1] Estimates of historical water use by sector are prorated using percentages from projected demands and actual water use.

[2] Projected demand are weather normalized and do not include savings estimates to meet SBx7-7.

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 45 percent of the water needs in Metropolitan's service area, while imported sources supply the remaining 55 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 7 percent of the region's water needs based on a five-year average from 2005-2009, 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 47 percent of the region's water needs based on the same five-year period. 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 ten years. Metropolitan's largest water customers are the San Diego County Water Authority (28 percent of Metropolitan's supplies based on 2005-2009 average), city of Los Angeles (15 percent) and Municipal Water District of Orange County (13 percent).[1] The reliance on Metropolitan's water supplies varies by agency. For example, in recent years, Upper San Gabriel received as little as 5 percent (in fiscal year 2008/09) of its total water supply from Metropolitan, while Beverly Hills received over 93 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

[1] Metropolitan Fiscal Annual Report 2008-09.

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 to the Metropolitan Service Area
(Acre-Feet)[1]

Calendar Year	Local Supplies	L.A. Aqueduct	Colorado River Aqueduct[2]	State Water Project[3]	Total
1976	1,363,000	430,000	778,000	638,000	3,209,000
1977	1,370,000	275,000	1,277,000	209,000	3,131,000
1978	1,253,000	472,000	705,000	576,000	3,005,000
1979	1,419,000	493,000	784,000	532,000	3,227,000
1980	1,452,000	515,000	791,000	560,000	3,317,000
1981	1,500,000	465,000	791,000	827,000	3,583,000
1982	1,392,000	483,000	686,000	737,000	3,298,000
1983	1,385,000	519,000	850,000	410,000	3,163,000
1984	1,621,000	516,000	1,150,000	498,000	3,785,000
1985	1,535,000	496,000	1,018,000	728,000	3,776,000
1986	1,510,000	521,000	1,011,000	756,000	3,799,000
1987	1,465,000	428,000	1,175,000	763,000	3,831,000
1988	1,521,000	369,000	1,199,000	957,000	4,047,000
1989	1,542,000	288,000	1,189,000	1,215,000	4,234,000
1990	1,470,000	106,000	1,183,000	1,458,000	4,217,000
1991	1,426,000	186,000	1,252,000	625,000	3,490,000
1992	1,512,000	177,000	1,153,000	744,000	3,586,000
1993	1,408,000	289,000	1,142,000	663,000	3,502,000
1994	1,527,000	133,000	1,263,000	845,000	3,768,000
1995	1,590,000	464,000	933,000	451,000	3,438,000
1996	1,715,000	425,000	1,089,000	663,000	3,892,000
1997	1,759,000	436,000	1,125,000	724,000	4,044,000
1998	1,726,000	467,000	941,000	521,000	3,655,000
1999	1,887,000	309,000	1,072,000	792,000	4,060,000
2000	1,768,000	255,000	1,217,000	1,473,000	4,714,000
2001	1,708,000	267,000	1,245,000	1,119,000	4,340,000
2002	1,706,000	179,000	1,198,000	1,415,000	4,498,000
2003	1,659,000	252,000	676,000	1,561,000	4,148,000
2004	1,627,000	203,000	741,000	1,802,000	4,373,000
2005	1,590,000	369,000	685,000	1,525,000	4,168,000
2006	1,710,000	379,000	535,000	1,695,000	4,319,000
2007	1,852,000	129,000	696,000	1,648,000	4,326,000
2008	1,842,000	147,000	896,000	1,037,000	3,922,000
*2009	1,801,000	137,000	1,043,000	908,000	3,890,000
**2010	1,832,000	243,000	1,150,000	1,500,000	4,725,000

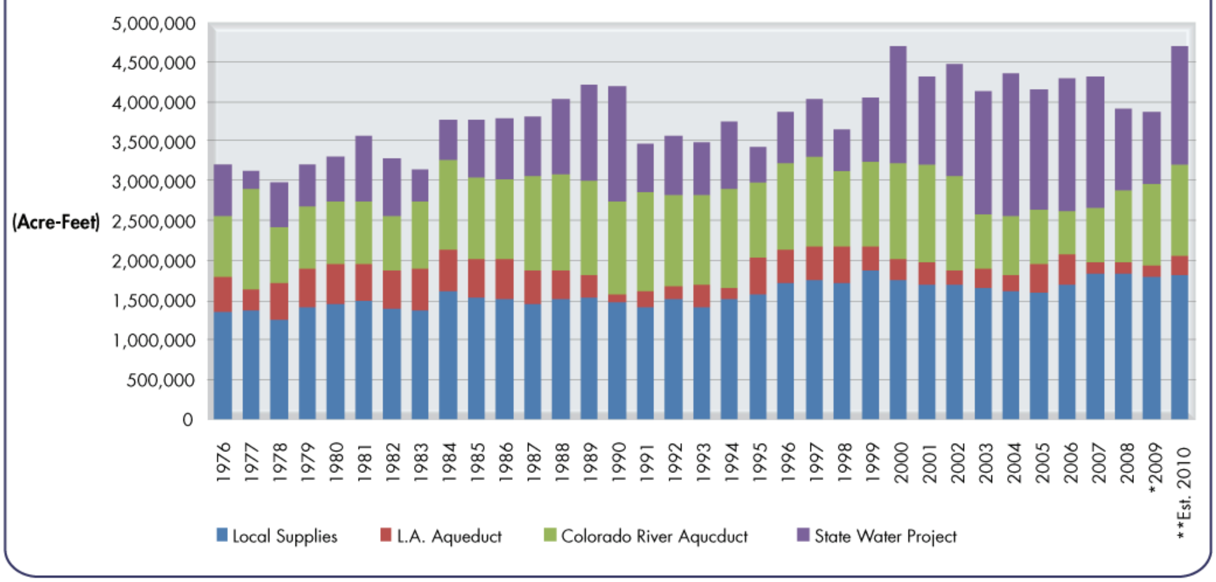
1. Not including system losses.
2 Colorado River Aqueduct deliveries to service area: gross Havasu diversions less return flows, deliveries to USBR, Mexico, and storage.
3 State Water Project deliveries to service area: includes Table A, Art. 21, Art. 14(b), Art. 12(d), Art. 55, draws from storage & carryover, DWCV & other exchanges, transfers, Drought Water Bank and Dry Year Pool Purchases, Pools A&B, Flood Water, wheeling, Port Hueneme lease, SBVMWD Purchases.
* 2009 local supplies are based 2006-08 averages.
** 2010 CRA and SWP are best estimates as of May 2010; LAA is based on actuals from January thru April plus projections for May thru December; Local Supplies are averages of prior years.

Table A. 2-2
Historic Metropolitan Water Deliveries to Member Agencies
(Acre-Feet)

Agency	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010*
City of Anaheim	25,000	16,000	23,000	21,000	26,000	33,000	25,000	21,000	16,000	21,000	21,000
City of Beverly Hills	14,000	13,000	14,000	12,000	12,000	12,000	12,000	12,000	12,000	11,000	11,000
City of Burbank	12,000	12,000	12,000	14,000	13,000	15,000	16,000	13,000	15,000	12,000	12,000
Calleguas Municipal Water District	120,000	110,000	127,000	118,000	128,000	120,000	126,000	131,000	121,000	101,000	101,000
Central Basin Municipal Water District	128,000	109,000	97,000	62,000	117,000	67,000	114,000	85,000	55,000	53,000	53,000
City of Compton	4,000	4,000	3,000	3,000	3,000	4,000	4,000	3,000	2,000	2,000	2,000
Eastern Municipal Water District	86,000	80,000	101,000	90,000	115,000	113,000	126,000	127,000	109,000	97,000	97,000
Foothill Municipal Water District	12,000	11,000	13,000	13,000	14,000	12,000	12,000	12,000	10,000	10,000	10,000
City of Fullerton	7,000	8,000	13,000	10,000	17,000	18,000	20,000	11,000	8,000	11,000	11,000
City of Glendale	29,000	28,000	23,000	23,000	24,000	22,000	22,000	23,000	21,000	19,000	19,000
Inland Empire Utilities Agency	70,000	67,000	76,000	81,000	84,000	93,000	112,000	75,000	58,000	36,000	36,000
Las Virgenes Municipal Water District	23,000	21,000	23,000	22,000	26,000	21,000	23,000	26,000	27,000	21,000	21,000
City of Long Beach	44,000	44,000	43,000	49,000	48,000	51,000	43,000	36,000	35,000	33,000	33,000
City of Los Angeles	330,000	304,000	403,000	318,000	392,000	184,000	185,000	441,000	430,000	352,000	352,000
Municipal Water District of Orange County	321,000	264,000	340,000	277,000	297,000	303,000	319,000	270,000	234,000	211,000	211,000
City of Pasadena	24,000	19,000	29,000	23,000	24,000	21,000	24,000	25,000	24,000	20,000	20,000
San Diego County Water Authority	593,000	589,000	663,000	652,000	679,000	547,000	598,000	698,000	566,000	540,000	540,000
City of San Fernando	0	0	0	1,000	1,000	1,000	0	1,000	0	0	0
City of San Marino	1,000	0	1,000	1,000	2,000	1,000	2,000	1,000	1,000	1,000	1,000
City of Santa Ana	11,000	13,000	19,000	13,000	20,000	22,000	22,000	12,000	8,000	7,000	7,000
City of Santa Monica	12,000	12,000	13,000	14,000	14,000	13,000	13,000	13,000	12,000	12,000	12,000
Three Valleys Municipal Water District	82,000	71,000	93,000	82,000	86,000	69,000	68,000	74,000	68,000	58,000	58,000
City of Torrance	21,000	22,000	21,000	21,000	21,000	21,000	21,000	20,000	19,000	18,000	18,000
Upper San Gabriel Valley Municipal Water District	60,000	31,000	54,000	72,000	45,000	45,000	48,000	23,000	13,000	6,000	6,000
West Basin Municipal Water District	151,000	141,000	147,000	145,000	147,000	145,000	144,000	142,000	130,000	120,000	120,000
Western Municipal Water District of Riverside County	85,000	82,000	99,000	97,000	106,000	91,000	103,000	120,000	99,000	88,000	88,000
Metropolitan Total	**2,265,000**	**2,071,000**	**2,450,000**	**2,234,000**	**2,461,000**	**2,044,000**	**2,202,000**	**2,415,000**	**2,093,000**	**1,860,000**	**1,860,000**

* Data not available. Assumed 2010 delivery is similar to 2009.

Figure A. 2-1 Sources of Water 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 of about 1.5 MAF 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 providing recharge to San Fernando, Raymond, Main San Gabriel, Central, and West Coast groundwater basins. In addition, the Orange County Water District operates a system of diversion structures and recharge basins along the Santa Ana River that captures much of the storm runoff, as well as water from reclamation facilities in Riverside and San Bernardino counties. Storm runoff is also diverted to recharge basins in the Chino Basin. 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. Over 90 percent of the groundwater used in Metropolitan's service area is produced from adjudicated or managed groundwater basins. Adjudicated basins in the region include: Raymond Basin, San Fernando Basins, Main San Gabriel Basin, Central Basin, West Coast Basin, Six Basins, Chino Basin, and Cucamonga 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 34 reservoirs. These reservoirs provide a storage capacity of 737 TAF. The historic average yield of these local surface supplies, which come from reservoir releases and stream diversions, is about 90 TAF per year (based on 2005-09 average). 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 80 percent 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 DVL, Lake Skinner and Lake Mathews. DVL stores water imported during years of ample supply. Of DVL's 810 TAF capacity up to half is dedicated to emergency storage; the remainder is available to augment supplies during dry years and for seasonal storage. In contrast, Lake Skinner and Lake Mathews are largely used for system operations rather than dry year storage. Table A.2-4 lists Metropolitan-owned reservoirs.

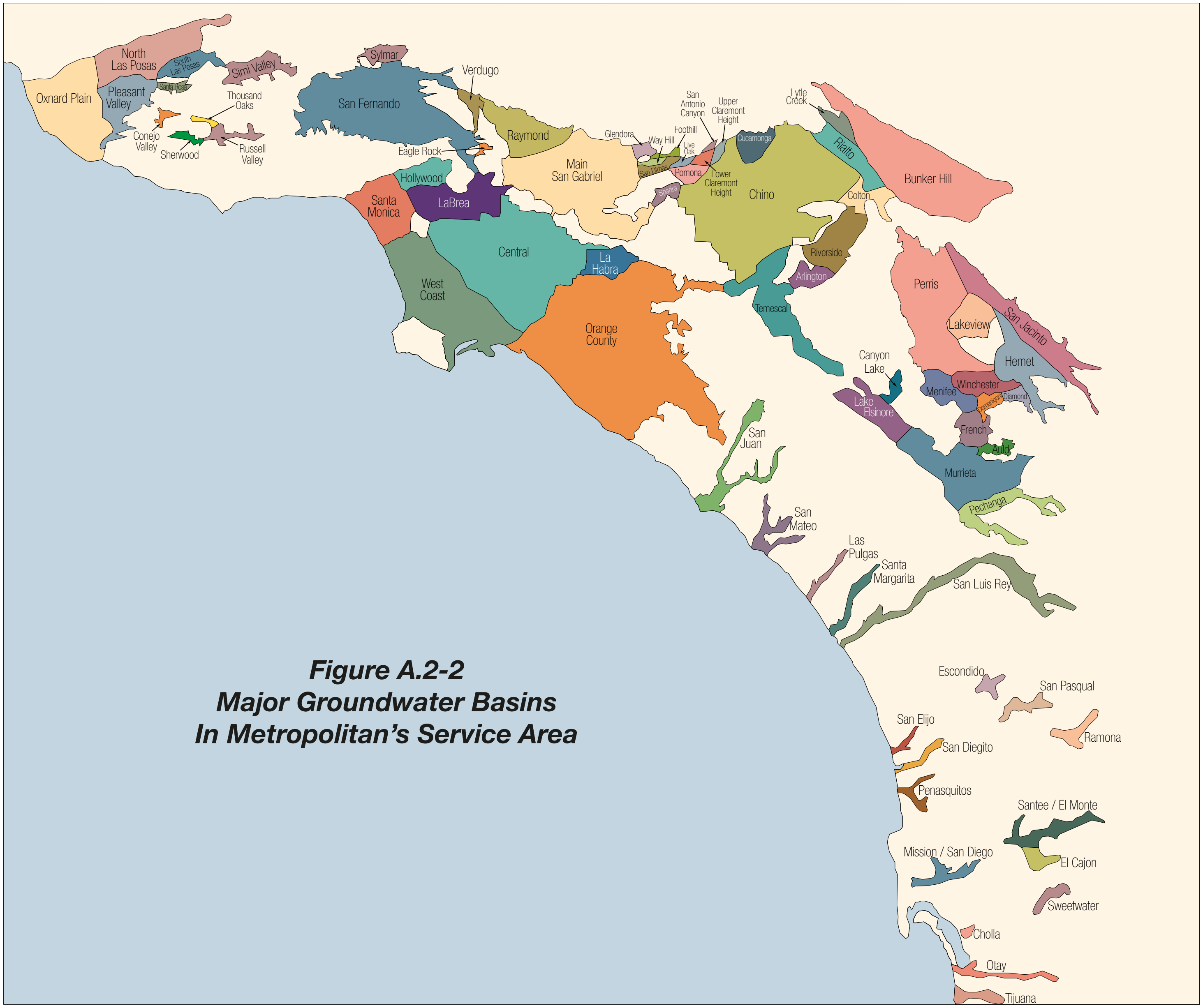


Figure A.2-2
Major Groundwater Basins
In Metropolitan's Service Area

Table A.2-3
Local Storage Reservoirs In Metropolitan's Service Area
(Thousand Acre-Feet

Member Agency/Subagency	Reservoir	Storage Capacity
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 County Water Authority		
Carlsbad MWD	Maerkle	0.6
Escondido, City of	Dixon	2.6
	Wohlford	6.5
Fallbrook PUD	Red Mountain	1.3
Helix WD	Cuyamaca	8.2
	Jennings	9.8
Poway, City of	Poway	3.3
Rainbow MWD	Beck	0.6
	Morro Hill	0.5
Ramona MWD	Ramona	12.0
San Diego County Water Authority	Olivenhain - CWA	24.8
San Diego, City of	Barrett	37.9
	El Capitan	112.8
	Hodges	30.3
	Lower Otay	49.5
	Miramar	7.2
	Morena	50.2
	Murray	4.8
	San Vicente	89.3
	Sutherland	29.7
San Dieguito WD	San Dieguito	0.9
Sweetwater Authority	Loveland	25.4
	Sweetwater	28.1
Valley Center M.WD	Turner	1.6
Vista Irrigation District	Henshaw	51.8
Western MWD of Riverside		
Temescal Water Company	Railroad Canyon	12.0
Total		**736.7**

Table A.2-4
Regional Reservoirs in Metropolitan's Service Area

Reservoir	Capacity (TAF)
Diamond Valley	810
Lake Skinner[1]	44
Lake Mathews[1]	182

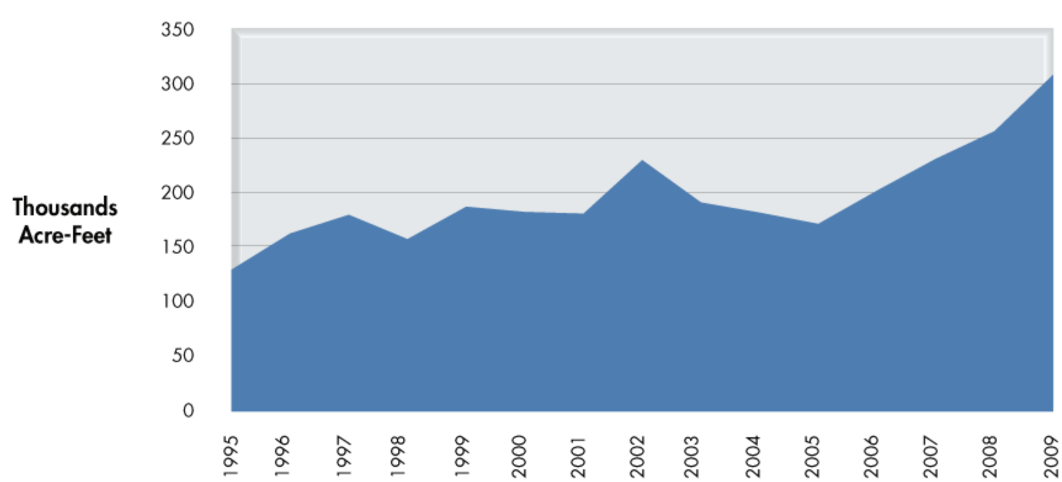
[1] These are used for operations and not primarily for dry year storage.

Lastly, Castaic Reservoir and Perris Reservoir are the terminal reservoirs to the West Branch and East Branch of the California Aqueduct operated by DWR. Through the Monterey Amendment to its SWP water service contract Metropolitan has access to 218.94 TAF of flexible storage capacity in these SWP terminal reservoirs.

Water Recycling and Groundwater Recovery

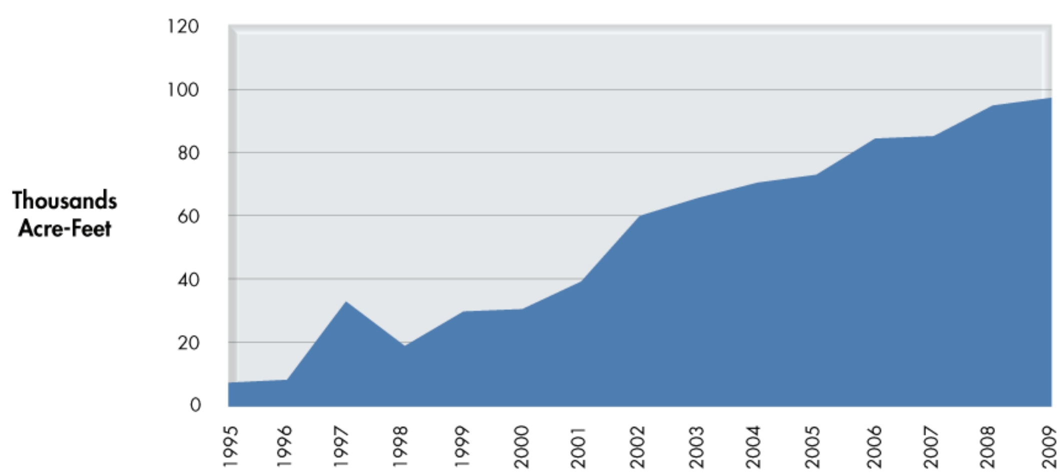
Water recycling projects involve treating wastewater to a level that is acceptable and safe for many nonpotable applications. This resource is providing an increasing level of local water. From 1995 to 2009, Metropolitan invested approximately $244 million in water recycling projects. In 2009, water recycling projects in which Metropolitan has invested produced 161 TAF. In addition, local agency projects that did not receive financial assistance from Metropolitan produced an additional 147 TAF, for a regional total of 308 TAF. Figure A.2-3 demonstrates the increase in this regional supply for direct use.

Figure A.2-3 Recycled Water



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 $102 million. In 2009, these groundwater recovery projects produced 62 TAF. Other member agency projects that did not receive funding from Metropolitan produced another 35 TAF, for a regional total of 97 TAF. Figure A.2-4 shows this increase in supply.

Figure A.2-4 Groundwater Recovery



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	3,850
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 Valleys1 to be served by All American Canal	
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 the coastal plain of Southern California	550
Subtotal		4,400
5(a)	Metropolitan Water District of Southern California for use on the coastal plain of Southern California	550
5(b)	Metropolitan Water District of Southern California for use on the coastal plain of Southern California2	112
6(a)	Imperial Irrigation District and land in Imperial and Coachella Valleys1 to be served by the All American Canal	300
6(b)	Palo Verde Irrigation District—16,000 acres of land on the Lower Palo Verde Mesa	
7	Agricultural Use in the Colorado River Basin in California	
	Total Prioritized Apportionment	**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 IN CALIFORNIA

The water is delivered to Metropolitan's service area by way of the Colorado River Aqueduct (CRA), which has a capacity of nearly 1,800 cubic feet per second or 1.3 MAF 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 85 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 has helped California reduce its reliance on Colorado River water above its normal apportionment.

The quantification of the agricultural priorities under the QSA provided for the water saved under the Palo Verde Land Management and Crop Rotation Program to be made available to Metropolitan. This program provides up to 133 TAF of water to be available to Metropolitan in certain years and will supply a minimum of 33 TAF per year.

In October 2004, SNWA and Metropolitan entered into a storage and interstate release agreement. Under this program, Nevada can request that Metropolitan store unused Nevada apportionment in Metropolitan's service area. The amount of water stored through 2009 under this agreement was approximately 70 TAF. In subsequent years, Nevada may request recovery of this stored water. As part of a recently executed amendment, it is expected that Nevada will not request return of this water until 2019. The stored water provides flexibility to Metropolitan for blending Colorado River water with State Water Project water and improves near-term water supply reliability.

In December 2007, the Secretary of the Interior approved the adoption of specific interim guidelines for reductions in Colorado River water deliveries during declared shortages and coordinated operations of Lake Powell and Lake Mead. These new guidelines provide water release criteria from Lake Powell and water storage and water release criteria from Lake Mead during shortage, normal, and surplus conditions in the Lower Basin, provide a mechanism for the storage and delivery of conserved system and non-system water in Lake Mead, and modify and extend interim surplus guidelines through 2026. The Record of Decision and accompanying agreement among the Colorado River Basin States protect reservoir levels by reducing deliveries during drought periods, encourage agencies to develop conservation programs and allow the states to develop and store new water supplies. The Colorado River Basin Project Act of 1968 insulates California from shortages in all but the most extreme hydrologic conditions.

In May 2006, Metropolitan and the USBR executed an agreement for a demonstration program that allowed Metropolitan to leave conserved water in Lake Mead that Metropolitan would otherwise have used in 2006 and 2007. The water left in Lake Mead must have been made available through extraordinary conservation measures, which was accomplished in 2006 and 2007 through savings realized under the Palo Verde Land Management, Crop Rotation, and Water Supply Program. This Demonstration program was an activity eligible for creation of Extraordinary Conservation Intentionally Created Surplus (ICS) under the provisions of the December 2007 federal guidelines for the operation of Lake Powell and Lake Mead. As of January 1, 2010, Metropolitan had nearly 80 TAF of extraordinary conservation ICS water in Lake Mead.

The December 2007 federal guidelines provided Colorado River contractors the ability to create System Efficiency ICS through development and funding of system efficiency projects. To that end, in 2008 the Central Arizona Conservation District, SNWA, and Metropolitan contributed funds for the construction of the Drop 2 Reservoir by the Bureau of Reclamation. The purpose of the Drop 2 reservoir is to increase the capacity to regulate deliveries of Colorado River water at Imperial Dam reducing the amount of released downstream by approximately 70 TAF annually. In return for funding one-sixth of the project cost, 100 TAF of water stored in Lake Mead was assigned to Metropolitan as System Efficiency ICS. As of January 1, 2010, Metropolitan had nearly 66 TAF of System Efficiency ICS water in Lake Mead.

Metropolitan is undertaking ongoing efforts to maintain and improve the flexibility and quality of its water supply from the Colorado. Section 3.7 of this report describes current programs and plans related to flexibility, and Chapter 4 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 the north and south of the San Francisco Bay Area and 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 4,172 TAF per year. Currently, DWR is delivering water to 29 of these SWP contractors. Metropolitan is the largest, with a contracted entitlement of 1,911 TAF per year, or approximately 46 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.2 Metropolitan has developed groundwater storage programs with Semitropic Water Storage District, Arvin-Edison Water Storage District, and Kern Delta Water 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 years of 1977, 1990-92, 1994, 2001-02, 2004, and 2007-09. In many years, surplus water has been delivered to contractors. Deliveries to Metropolitan reached a high of 1,802 TAF 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.[3] More recently, SWP deliveries in 2008 and 2009 were limited to

[2] The dependable yield of the existing SWP facilities is considered to be the delivery capability during a critically dry seven-year period.

[3] These numbers are Metropolitan's allocated entitlement. Total water deliveries to Metropolitan's service area are shown in Table A.2-1.

35 percent and 40 percent of entitlements, respectively, resulting in drafts from storage of approximately 820 AF over this period to meet service area demands. Continued investments in conservation and recycling have allowed Metropolitan to reduce its requirements for SWP water.

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. In January 2010, DWR released a draft of the biannual update of its Reliability Report. The report shows that future SWP deliveries will be impacted by two significant factors. The first is significant restrictions on SWP and Central Valley Project (CVP) Delta pumping required by the biological opinions issued by the U.S. Fish and Wildlife Service (December 2008) and National Marine Fisheries Service (June 2009). The second is climate change, which is altering the hydrologic conditions in the State. The 2009 draft report shows greater reductions in water deliveries on average when compared to the 2007 report. Over multiple-year dry periods, average annual Table A deliveries vary from 32 percent to 38 percent of the maximum Table A amount, while average annual deliveries over multiple-year wet periods range from 72 to 93 percent of the maximum Table A amount. Under future conditions, annual SWP Article 21 deliveries average 60 TAF, ranging from 1 TAF to 540 TAF over the 82-year simulation period.

Metropolitan is undertaking ongoing efforts to maintain and improve the reliability and quality of its water supply from the State Water Project. Sections 3.5 and 3-6 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 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 1976 through 2008 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 1976-2008 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.

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APPENDIX A.3
JUSTIFICATIONS FOR SUPPLY PROJECTIONS

A.3 JUSTIFICATIONS FOR SUPPLY PROJECTIONS

Legislation authored by Senator Sheila Kuehl (Senate Bill 221 – now Water Code §10613 *et seq.*) and Senator Jim Costa (Senate Bill 610 – 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 2009-10) was adopted at the April 14, 2009 Board Meeting. A copy of the budget summary and the Capital Investment Plan for FY 2009-10 can be found at http://www.mwdh2o.com/mwdh2o/pages/finance/budget/AB09_10web.pdf.

Another document of interest related to Metropolitan's water supply planning is its annual report to the state Legislature in compliance with Senate Bill 60 of 1999 (Hayden).[1] This requires that Metropolitan report on its 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 a number of categories specified in its supplemental water storage and delivery contract with the Secretary of the Interior: its basic apportionment that is classified as Priority 4 water, unused and surplus water that is classified as Priority 5 and Priority 6(a) water, and water resulting from a number of conservation programs that is classified as Priority 3(a) water. Pursuant to a U.S. Supreme Court decree, and regulations and operating guidelines of the U.S. Bureau of Reclamation, Metropolitan may receive as unused apportionment, water supplies unused by agricultural districts, supplies unused by the states of Arizona and Nevada, and as Intentionally Created Surplus, supplies stored from previous years' extraordinary conservation and efficiency improvements to the operations of the Colorado River system. Subject to the terms of agreements, this stored water may be withdrawn as needed during years in which insufficient supplies are available. Appendix A.2 describes the history

[1] Metropolitan Water District of Southern California, *Annual Progress Report to the California State Legislature: Achievements in Conservation, Recycling and Groundwater Recharge* (February 2010), which can be found at http://www.mwdh2o.com/mwdh2o/pages/yourwater/SB60/SB60_2010.pdf. The legislation requiring this information can be found at http://www.leginfo.ca.gov/pub/99-00/bill/sen/sb_0051-0100/sb_60_bill_19990916_chaptered.pdf. Similar reports have been filed with the Legislature since 2000.

of water supplies and the expected availability from this source, and Section 3.1 describes the agreements for water supplies.

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 is expected 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 interstate compacts, federal laws, agreements, court decrees, and guidelines 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 MAF. 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 holds Priority 4 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 and 38 TAF per year, respectively – through its Priority 5, and Priority 6(a) 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 MAF 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.
- Consolidated Court Decree.[5] The 1964 U.S. Supreme Court Decree confirmed the Arizona, California, and Nevada basic apportionments of 2.8 MAF per year, 4.4 MAF per year and 300 TAF per year, respectively. The 1964 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 of the Interior to make surplus water available. Several decrees were subsequently entered by the U.S. Supreme Court in the case *Arizona v. California et al* culminating in the Consolidated Decree entered on March 27, 2006.
- 2003 Quantification Settlement Agreement (QSA) and several other related agreements were executed in

[2] A description of many of these documents can be found at http://www.usbr.gov/lc/region/pao/lawofrvr.html.

[3] This agreement among the seven California agencies 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 Ilr-645 dated 04-09-1930, supplemented 09-28-1931.

[5] The Consolidated decree entered by the U.S. Supreme Court on March 27, 2006, in *Arizona v. California et al,* can be found at http://www.usbr.gov/lc/region/pao/pdfiles/scconsolidateddecree2006.pdf

October 2003.[6] The QSA quantifies the use of water under the third priority of the Seven Party Agreement, and further allocates 38 TAF of the sixth priority to Metropolitan. The QSA provides the numeric baseline needed to measure conservation and transfer programs, and it allows for implementation of agricultural conservation, land fallowing, and other programs identified in the 1996 IRP. Although this agreement does not directly impact Metropolitan's entitlements, Metropolitan agreed to forbear consumptive use when necessary so that the Secretary of the Interior can satisfy the uses of holders of miscellaneous and Indian present perfected rights in excess of 14.5 TAF.

- 2005 Settlement Agreement with Quechan Indian Tribe. In 2005, Metropolitan entered into a settlement agreement with the Quechan Indian Tribe (Tribe) and other parties. The Tribe uses Colorado River water on the Fort Yuma Indian Reservation. Under the settlement agreement, the Tribe, in addition to the amounts of water decreed for the benefit of the Reservation in 1964, is entitled to (a) an additional 20 TAF of diversions from the Colorado River or (b) the amount necessary to supply the consumptive use required for irrigation of a specified number of acres, and for the satisfaction of related uses, whichever is less. Of the additional water, 13 TAF became available to the Tribe in 2006. An additional 7 TAF becomes available to the Tribe in 2035. Metropolitan and the Tribe agreed that if the Tribe chooses to limit proposed development and utilization of their irrigable lands, which would require the diversion of any of the additional water in a year, and instead allows the water which would otherwise be used to be diverted by Metropolitan, Metropolitan provides an incentive payment to the Tribe to avoid or reduce a loss of supply.
- Colorado River Interim Guidelines for Lower Basin Shortage and the Coordinated Operations for Lake Powell and Lake Mead. In December 2007, the Secretary of the Interior approved a Record of Decision establishing specific interim guidelines for reductions in Colorado River water deliveries in the Lower Basin during declared shortages and coordinated operations of Lake Powell and Lake Mead. These new guidelines provide water release criteria from Lake Powell and water storage and water release criteria from Lake Mead during shortage, normal, and surplus conditions in the Lower Basin, and provide a mechanism for Metropolitan to store and take delivery of conserved system and non-system water in Lake Mead.

Financing

Metropolitan's operating budget (referenced at the beginning of this appendix) includes the cost of delivering Colorado River water and the payment to the Quechan Indian Tribe, 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 Colorado River Aqueduct (CRA). In 1988, Metropolitan executed a Conservation Agreement to fund water efficiency improvements within IID's 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

[6] These agreements can be found at http://www.iid.com/Water/QSAAgreementsRelatedDocuments2003.

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 and drip irrigation systems.

Expected Supply Capability

The IID-Metropolitan Conservation Program activity began in 1990, has been fully operational since 1998, and makes available 105 TAF of conserved water annually. The initial program agreement provided CVWD the option to call up to about 45 TAF per year if needed to meet its demands. Execution of the QSA has reduced CVWD's option to a maximum of 20 TAF. This water is available to Metropolitan if not required by CVWD, but the minimum supply to MWD has been increased to 85 TAF with continued operation of 24 tailwater pumpback systems through a second amendment to the agreement.

Rationale for Expected Supply

Historical Record

The IID-Metropolitan Conservation Program has been fully operational since 1998. 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 85 TAF per year.

With operations beginning in 1990, the program has conserved as much as 109.46 TAF per year to date. By an amendment to the program agreement beginning in 2007 the annual conserved water yield has and will be 105 TAF. The historical record indicates that Metropolitan's expected minimum supply of 85 TAF per year would be available over the next 31 years at least.

Written Contracts or Other Proof

Metropolitan's annual supply from the IID-Metropolitan Conservation Program is based on three agreements and amendments to the agreements.

- 1988 IID-Metropolitan Conservation and Use of Conserved Water Agreement. This Agreement was executed in December 1988 by IID and Metropolitan for a 35-year term following completion of program implementation (1998–2033).
- 1989 Approval Agreement. This Agreement secured the approval of the PVID and CVWD 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 CVWD 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 revise Metropolitan's potential obligation to reduce its use of the conserved water yield in favor of its use by CVWD down to 20 TAF annually. Any of this water not used by CVWD would be available to Metropolitan.
- 2007 Amendments to 1988 Agreement and 1989 Approval Agreement. These amendments specify that beginning in 2007 the annual conserved water yield has and will be 105 TAF, of which up to 20 TAF would be made available to CVWD upon its request.

Financing

The water efficiency improvements under this Program have already been funded, constructed, and put into operation. Metropolitan's five-year financial forecast in the budget includes 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 IID Board certified the final Environmental Impact Report for the Program in December 1986.[7]
- EIR for Supplemental Program. The IID Board certified the final Environmental Impact Report for the Completion Program in June 1994.[8]
- Program EIR for Quantification Settlement Agreement. Metropolitan's Board certified the final Program Environmental Impact Report for the QSA in June 2002.[9]
- Addendums to the QSA Final Program EIR. Metropolitan's Board adopted the Addendum to the QSA Final Program Environmental Impact Report in December 2002 and a second addendum in September 2003. 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 per year 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 400 TAF of additional CRA water. At buildout, 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. Over 70 TAF of water have been stored in the Hayfield aquifer since that time from historical CRA releases. A prototype extraction well was constructed in 2009.

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

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[7] Imperial Irrigation District, *Final EIR, Proposed Water Conservation Program and Initial Water Transfer, Imperial Irrigaton District,* October, 1986. SCH Number: 1986012903.

[8] Imperial Irrigation District, *Final EIR for Modified East Lowline and Trifolium Interceptors, and Completion Projects*, May 1994. SCH Number: 1992071061.

[9] Coachella Valley Water District, Imperial Irrigation District, Metropolitan, San Diego County Water Authority, *Final Program EIR, Implementation of the Colorado River Quantification Settlement Agreement*, June 2002, SCH Number 2000061034.

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 storage portion of the Hayfield Program is currently on hold indefinitely.
- October 2008 Board of Directors Authorize Agreements for Final Design. Metropolitan authorized $3 million for the final design of the facilities to extract the previously stored water in three to four years. Facilities included 4 wells, 2.5 miles of pipeline and power lines. Total estimated cost to complete the project is $21 million.
- February 2009 Board of Directors Authorize Installation of Prototype Well for Hydrogeologic Investigations. Metropolitan authorized $1.9 million for the installation of a prototype well to evaluate the hydrogeologic constraints with the extraction of the stored water from Hayfield. This action was taken to address concerns with respect to water quality and well yield.
- March 2010 Authorize Final Design of Hayfield Groundwater Extraction Project. Metropolitan authorized final design for the equipping of the Prototype Well. The prototype well would have the ability to extract the stored water in 15 years. Estimated design and construction cost is $4 million.

Financing

The capital cost of the full-scale Hayfield Project is estimated to be approximately $75 million. A four-well configuration project for extraction only is estimated to cost approximately $21 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. Metropolitan anticipates the operating permit for the Hayfield groundwater recovery project to be issued by California Department of Public Health during the later potion of 2010. 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 PVID. 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 are 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. Implementation of the program began in January 2005. The program is estimated to provide up to 133 TAF per year. The agreement also specifies that the program will provide a minimum of 33 TAF per year.

Expected Supply Capability

It is estimated that the PVID/Metropolitan Program would provide up to 133 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

<u>Historical Record</u>

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]

Implementation of the program began in January 2005. In 2005, 2006, 2007, 2008, and 2009, approximately 108.7, 105.0, 72.3, 94.3, and 120.2 TAF of water, respectively, were saved and made available to Metropolitan. In March 2009, Metropolitan and PVID entered into a one-year supplemental fallowing program within PVID that provides for the fallowing of additional acreage, with savings projected to be as much as 62 TAF. Of that total, 24.1 TAF of water was saved in 2009, with the balance to be made available in 2010.

<u>Written Contracts or Other Proof</u>

- <u>August 2004 Forbearance and Fallowing Program Agreement.</u> 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.
- <u>Landowner Agreements for Fallowing in the PVID.</u> 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 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.

[10] Presented to Metropolitan's Board at its regular meeting January 14, 1992.

[11] SCH Number 2001101149.

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. All-American and Coachella Canal Lining Projects

Source of Supply

Water is being conserved by the replacement of earthen portions of the Coachella Canal and the All-American Canal with concrete-lined canals. The concrete lining reduces the amount of water lost to seepage from the canals.

Expected Supply Capability

Pursuant to the October 10, 2003 Allocation Agreement, Metropolitan is entitled to delivery of 16 TAF annually until the San Luis Rey Settlement Parties[12] satisfy the conditions described in Section 104 of the San Luis Rey Indian Water Rights Settlement Act (Public Law 100-675 as amended). Once the statutory conditions have been met, Metropolitan will provide by exchange water to the United States for use by the Settlement Parties and San Diego County Water Authority will convey the water for use by the Settlement Parties'.

Rationale for Expected Supply

The All-American and Coachella canal lining projects were implemented pursuant to the authorization contained in Title II of Public Law 100-675. The allocation of the water resulting from these projects is provided under the Allocation Agreement. The Allocation Agreement is a QSA-related agreement. The USBR, on behalf of the Secretary of the Interior, has issued interim determinations for the Coachella Canal Lining Project (January 31, 2008) and the All-American Canal Lining Project (December 4, 2009) that results in the annual delivery to Metropolitan of 4.5 TAF and 11.5 TAF, respectively. Delivery of this water for Metropolitan's use continues until conditions described in Section 104 of Public Law 100-675 and the Allocation Agreement are satisfied.

Program Facilities

The Coachella Canal is owned by the United States and is operated by CVWD. The All-American Canal is owned by the United States and is operated by IID. The water is conveyed through existing CRA facilities from Lake Havasu to Metropolitan.

Historical Record

The Coachella Canal Lining Project began conserving water in 2006 and reached its full conservation yield in calendar year 2009. The All-American Canal Lining Project began conserving water in 2008 and will reach its full conservation yield in calendar year 2010. Actual annual deliveries to Metropolitan are as follows:

Calendar Year	Volume Delivered to Metropolitan (AF)
2006	172
2007	4,500
2008	6,013
2009	15,648
2010	16,000 (projected)

Written Contracts or Other Proof

- 2003 Allocation Agreement. This agreement among the United States, Metropolitan, CVWD, IID, San Diego County Water Authority, and the San Luis Rey Settlement Parties, provides for the determination by the Secretary of the

[12] The San Luis Rey Settlement Parties are the La Jolla, Pala, Pauma, Rincon and San Pasqual Bands of Mission Indians, the San Luis Rey River Indian Water Authority, and the City of Escondido and Vista Irrigation District.

Interior of the conserved water yield from the All-American Canal Lining Project and the Coachella Canal Lining Project, the allocation of that yield among IID, SDCWA, Metropolitan, and the Settlement Parties, and the delivery of the allocated amounts to the respective users by the Secretary of the Interior.

Financing

Under the Allocation Agreement, water resulting from the All-American and Coachella Canal lining projects is made available to Metropolitan until the conditions specified in Sections 7.2.1, 7.2.2, and 7.2.4 of the Allocation Agreement have been satisfied. Metropolitan and the San Luis Rey River Indian Water Authority have a dispute over the validity of Section 7[13] of the October 10, 2003 Agreement Relating to Supplemental Water among The Metropolitan Water District of Southern California, the San Luis Rey Settlement Parties, and the United States. Pending resolution of the dispute, Metropolitan sets aside funding for the portion of the conserved water it receives as part of its annual O&M budget.

Federal, State, and Local Permits/Approvals

A comprehensive environmental review process supported implementation.

- Program EIR for Quantification Settlement Agreement. Metropolitan's Board certified the final Program Environmental Impact Report for the QSA in June 2002.[14]
- Addendums to the QSA Final Program EIR. Metropolitan's Board adopted the Addendum to the QSA Final Program Environmental Impact Report in December 2002 and a second addendum in September 2003. Metropolitan's Board also adopted the Findings of Fact and Statement of Overriding Considerations, and Mitigation and Monitoring and Reporting Program at that time.
- EIR/EIS for the All-American Canal Lining Project. Reclamation approved the Record of Decision for the All American Canal Lining Project on July 29, 1994. IID certified the All American Canal Lining Project Final EIS/EIR and approved the project on August 16, 1994. Reclamation released a Supplemental Information Report on the All American Canal Lining Project, dated January 12, 2006.
- EIR/EIS for the Coachella Canal Lining Project. Reclamation approved the Record of Decision for the Coachella Canal Lining Project on March 27, 2002. CVWD certified the Coachella Canal Lining Project Final EIS/EIR and approved the project on May 15, 2001. Metropolitan certified that it had reviewed and considered the information contained in those two documents and adopted the Lead Agencies' findings on December 13, 1994, for the All American Canal Lining Project and on September 11, 2001, for the Coachella Canal Lining Project.
- Addendum to EIS/EIR for the Coachella Canal Lining Project. Addendum to the Coachella Canal Lining Project Final EIS/EIR was published on February 27, 2004. CVWD certified the Addendum and approved the project on March 2, 2004.

F. *Metropolitan-CVWD Delivery and Exchange Agreement for 35,000 Acre-Feet*

Source of Supply

Metropolitan delivers to CVWD up to 35 TAF from Metropolitan's available State Water Project (SWP) Table A supply without condition on the actual Department of Water Resources (DWR) allocation for that year. As CVWD does not have a connection to the SWP, the water is delivered to CVWD by an

[13] Payments from Metropolitan for Supplemental Water and Related Power Delivered Prior to Satisfaction of Section 104

[14] Coachella Valley Water District, Imperial Irrigation District, Metropolitan, San Diego County Water Authority, Final Program EIR, Implementation of the Colorado River Quantification Settlement Agreement, June 2002, SCH Number 2000061034.

exchange with Colorado River water. Metropolitan takes delivery of the Table A supply in conjunction with forgoing diversion of an equal volume of its Colorado River supply effectively leaving this water in the River for diversion by CVWD at Imperial Dam. Exchange deliveries may also be made at the CRA Whitewater service connection or through the Metropolitan-CVWD-Desert Water Agency Advance Delivery Agreement. This program represents a net debit to Metropolitan's supplies.

Expected Capability

Up to 35 TAF of Metropolitan's SWP Table A supply will be delivered annually to CVWD by exchange.

Rationale for the Expected Supply

This program is undertaken pursuant to the Delivery and Exchange Agreement between Metropolitan and Coachella for 35,000 AF dated October 10, 2003 and is a QSA-related agreement.

Program Facilities

Metropolitan takes delivery of the Table A supply from the East Branch of the California Aqueduct at Devil Canyon Afterbay. At Metropolitan's request the USBR releases a portion of Metropolitan's available Colorado River supply from Lake Mead for diversion by CVWD at Imperial Dam and conveyance through the All-American Canal System.

Historical Record

Since the 2003 execution of the QSA and the Delivery and Exchange Agreement, the following volumes of exchange water were delivered to CVWD at Imperial Dam:

Calendar Year	**Volume of Exchange Water** (AF)
2003	0
2004	0
2005	0
2006	34,958
2007	0
2008	0
2009	0
2010	10,000 (projected)

Written Contracts or Other Proof

- 2003 Delivery and Exchange Agreement. This agreement between Metropolitan and CVWD provides for the delivery of up to 35,000 AF of Metropolitan SWP Table A supply by exchange with Colorado River water.

Federal, State, and Local Permits/Approvals

- Program EIR for Quantification Settlement Agreement. Metropolitan's Board certified the final Program Environmental Impact Report for the QSA in June 2002.[15]
- Addendums to the QSA Final Program EIR. Metropolitan's Board adopted the Addendum to the QSA Final Program Environmental Impact Report in December 2002 and a second addendum in September 2003. Metropolitan's Board also adopted the Findings of Fact and Statement of Overriding Considerations, and Mitigation and Monitoring and Reporting Program at that time.
- September 2002 Final Program EIR for Coachella Valley Water Management Plan and State Water Project Entitlement Transfer as certified by the CVWD on October 8, 2002

[15] Coachella Valley Water District, Imperial Irrigation District, Metropolitan, San Diego County Water Authority, Final Program EIR, Implementation of the Colorado River Quantification Settlement Agreement, June 2002, SCH Number 2000061034.

G. SNWA and Metropolitan Storage and Interstate Release Agreement

Source of Supply

The source of supply is SNWA's intentionally created unused Nevada apportionment of Colorado River water made available to Metropolitan for diversion and storage. In later years Metropolitan would return this water through reduced diversions of Colorado River water made at the request of SNWA.

Expected Capability

Based on recent use patterns in Nevada as much as 60 TAF could be made available in a single year to Metropolitan from SNWA. As of January 1, 2010, 70 TAF has been diverted by Metropolitan.

Returns to SNWA are limited to no more than 30 TAF annually and SNWA has agreed to forgo requesting return of stored water through 2019. If the Secretary of the Interior apportions less than 280 TAF of basic apportionment for use in Nevada, SNWA may request the return of up to 50 TAF, 1 acre-foot for each acre-foot less than 280 TAF of basic apportionment apportioned for use in Nevada.

Rationale for the Expected Supply

Program Facilities

Water is diverted through the CRA by Metropolitan. To return the water to SNWA, Metropolitan would reduce its CRA diversions and the Secretary of the Interior would make water available to SNWA at Lake Mead.

Historical Record

The annual volumes of water diverted into the CRA by Metropolitan ares as follows:

Calendar Year	Volume of Exchange Water (AF)
2004	10,000
2005	10,000
2006	5,000
2007	0
2008	45,000
2009	0
2010	0 (estimated)

No water has been returned to SNWA.

Written Contracts or Other Proof

- 2004 Storage and Interstate Release Agreement. This agreement among Metropolitan, Colorado River Commission of Nevada, SNWA, and the United States provides for the Secretary of the Interior to make available to Metropolitan for diversion and storage unused Nevada apportionment. In subsequent years, the agreement provides for Metropolitan to make this water available to SNWA by forgoing diversion of a portion of its available Colorado River supply.
- Operational Agreement. As amended on August 11, 2009, the Operational Agreement specifies the conditions under which Metropolitan would divert and store unused Nevada apportionment through 2026 and the return of this water to SNWA to begin no earlier than 2019.

H. Lower Colorado Water Supply Project

Source of Supply

Groundwater is pumped by the Lower Colorado Water Supply Project near the All-American Canal and is discharged to the Canal. IID reduces its net diversions of Colorado River water by an amount equal to the amount of Project water discharged into the Canal, permitting entities along the Colorado River that do not have rights or have insufficient rights to divert Colorado River water to obtain a supply of water. In 2007, Metropolitan entered into a contract with the USBR and the City of Needles to utilize the unused Project capacity.

Expected Capability

The City of Needles projects that Metropolitan will receive 2.8 TAF of Lower Colorado Water Supply Project water in 2010. This is projected to increase to 5 TAF in future years should a new Project well be drilled.

Rationale for the Expected Supply

Program Facilities

Two Lower Colorado Water Supply Project wells pump water into the All-American Canal. The groundwater level in one of the wells has declined to the point that it cannot operate at capacity with existing equipment. Replacement equipment to restore pumping capacity is expected to be installed. A new Project well may be drilled to augment pumping capacity.

Historical Record

Metropolitan has received the following amounts of Lower Colorado Water Supply Project water:

Calendar Year	**Volume of Water** (AF)
2007	5,011
2008	6,300
2009	2,349
2010	3.000 (projected)

Written Contracts or Other Proof

- 2007 Lower Colorado Water Supply Project Contract among the United States, the City of Needles, and Metropolitan. This contract provides for the United States to deliver Colorado River water to Metropolitan, the availability of which results from the pumping of Lower Colorado Water Supply Project groundwater and the exchange of such water.

Financing

Metropolitan's budget includes the cost associated with receipt of Lower Colorado Water Supply Project water.

I. Lake Mead Storage Program, Drop 2 Reservoir Funding, and Yuma Desalting Plant Pilot Project

Source of Supply

Water has been and will be stored in Lake Mead as Intentionally Created Surplus (ICS) through extraordinary conservation measures, such as water saved through the Palo Verde Irrigation District Land Management, Crop Rotation, and Water Supply Program.

Water has been and will be stored in Lake Mead as ICS through system efficiency measures, such as Metropolitan's funding contributions toward construction of the Drop 2 Reservoir near the All-American Canal and pilot operation of the Yuma Desalting Plant.

Expected Capability

Metropolitan may create as much as 400 TAF of extraordinary conservation ICS water in a single year less the amount that may be created by IID, which could be as much as 25 TAF.

Upon creation, 5 percent of the extraordinary conservation ICS is deducted resulting in additional system water in storage in Lake Mead leaving 95 percent of the water available for release to Metropolitan. Each year thereafter, the remaining balance at the end of the year is reduced by three percent to account for evaporation losses.

The amount of extraordinary conservation ICS accumulated in Lake Mead for Metropolitan is limited to 1.5 MAF less the amount accumulated by IID which could be as much as 50 TAF.

Metropolitan may take delivery of as much as 400 TAF of extraordinary conservation ICS from Lake Mead in a year less the amount delivered to IID, which could be as much as 50 TAF.

Rather than storing extraordinary conservation ICS water in Lake Mead, IID may, with the written consent of Metropolitan, have up to 25 TAF of this water delivered to Metropolitan for storage in any one calendar year. Upon request by IID, Metropolitan would return 90 percent of the stored water to IID with the remaining 10 percent left for Metropolitan's use. Also, Metropolitan may make temporary use of IID's extraordinary conservation ICS accumulated in Lake Mead.

As of January 1, 2010, Metropolitan has 66 TAF of system efficiency ICS stored in Lake Mead. There are no evaporation losses charged to stored system efficiency ICS. Metropolitan may take delivery of as much as 34 TAF of this system efficiency ICS through 2010, down to 25 TAF annually from 2011 through 2015. The Bureau of Reclamation may reduce this delivery if it determines a reduction is necessary to avoid a shortage. If a shortage is declared in 2011 or 2012, then Metropolitan must payback any system efficiency ICS used from 2008 through 2010 in the shortage year, restoring that water to Metropolitan's system efficiency ICS account.

Pilot operation of the Yuma Desalting Plant is projected to result in the storage of 23.2 TAF of system efficiency ICS for Metropolitan over the course of its 365 days of operation.

Rationale for the Expected Supply

<u>Program Facilities</u>

This program makes use of Lake Mead and the CRA.

<u>Historical Record</u>

Since 2006 Metropolitan has created 100.6 TAF of extraordinary conservation ICS.

In 2008, the USBR assigned to Metropolitan 100 TAF of water stored in Lake Mead as system efficiency ICS.

As of January 1, 2010 Metropolitan's extraordinary conservation and system efficiency ICS volumes in Lake Mead were approximately 79.8 TAF and 66 TAF, respectively.

<u>Written Contracts or Other Proof</u>

- 2007 Lower Colorado River Basin Intentionally Created Surplus Forbearance Agreement among the Arizona Department of Water Resources, PVID, IID, the City of Needles, CVWD, Metropolitan, SNWA, and the Colorado River Commission of Nevada. This agreement sets forth the rules under which ICS water is developed, and stored in and delivered from Lake Mead.
- 2007 California Agreement for the Creation and Delivery of Extraordinary Conservation Intentionally Created Surplus among Metropolitan, PVID, IID, CVWD, and the City of Needles. This agreement determines the conditions under which California contractors receiving Colorado River water may store and deliver water from Lake Mead.
- 2007 Agreement among the United States, the Colorado River Commission of Nevada, and the SNWA for the Funding and Construction of the Lower Colorado River Drop 2 Storage Reservoir Project. This agreement provides for: the United States to design and construct the Drop 2 Storage Reservoir Project, SNWA to fund the capital cost of the Project, the United States to credit SNWA's ICS account with

600 TAF of System Efficiency ICS; and allows Metropolitan to become a party to the agreement requiring that Metropolitan provide funding for a portion of the capital cost.

- 2007 Delivery Agreement between the United States and Metropolitan. This agreement provides the procedures for creating the ICS water and guarantees delivery of the water to Metropolitan.
- 2008 Metropolitan Notice of Election to Participate as a Party to the Drop 2 Funding Agreement. This notice requires Metropolitan to provide funding for a portion of the capital cost of the Drop 2 Storage Reservoir Project, and the United States to credit Metropolitan's ICS account with 100 TAF of System Efficiency ICS, reducing the amount of System Efficiency ICS in SNWA's account by an equal amount.
- 2009 Agreement among the United States, Metropolitan, the Colorado River Commission of Nevada, SNWA, and the Central Arizona Water Conservation District for a Pilot Project for Operation of the Yuma Desalting Plant. This agreement provides for the allocation of the costs for the preparation and pilot operation of the Yuma Desalting Plant.
- 2010 Yuma Desalting Plant Pilot Project Delivery Agreement between the United States and Metropolitan. This agreement secures delivery of the ICS water created and specifies the manner in which this water will be accounted.

J. Programs Under Development as Part of the Five-Year Supply Plan

- *Expansion of the Palo Verde Irrigation District (PVID) Land Management Program:* In March 2009, the Board approved the emergency one year land fallowing expansion of the existing PVID program. An agreement with PVID was signed in April 2009 and farmers began fallowing later that month. The yield of the program is 62 TAF, with 24 TAF saved in 2009 and the balance to be made available in 2010. Additional fallowing agreements may be developed in subsequent years as needed.
- *Arizona Exchange:* An exchange program with Central Arizona Project is still in negotiations. In lieu of Arizona storing Colorado River water in the ground, water would be exchanged with Metropolitan for later return. Arizona does not expect to have water to provide to Metropolitan in 2010, but discussions continue for 2011 and beyond. At this time the potential yield is expected to be up to 150 TAF per year.
- *California Indians:* Discussions continue on developing a fallowing program. There is potential to receive from 10 to 20 TAF beginning in 2011.

A.3.2 California Aqueduct Deliveries

A. State Water Project Deliveries

Source of Supply

The State Water Project (SWP) provides imported water to the Metropolitan service area and has provided from 25 to 50 percent of Metropolitan's supplies through 2001. Since 2002, SWP deliveries accounted for an even greater share—as much as 70 percent. In accordance with its contract with the Department of Water Resources (DWR), Metropolitan has a Table A allocation of 1,911,500 AF 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 18 years is estimated according to the historical record of hydrologic conditions, existing system capabilities as may be influenced by environmental permits, requests of the state water contractors and SWP contract provisions for allocating Table A, Article 21 and other SWP deliveries including San Luis carryover 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 State Water Project Delivery Reliability Report 2007[16] and the December 2009 draft of the biannual update.

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 Devil 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 1,911,500 AF 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.

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 25 million California residents benefit from water from the SWP. DWR estimates that with current facilities and regulatory requirements, the project will deliver approximately 2.3 MAF under average hydrology considering impacts attributable to the combined Delta smelt and salmonid species biological opinions.

On a yearly basis, DWR estimates the amount of supplies that are available for that year. Metropolitan uses a forecasting method for SWP deliveries based on historical patterns of precipitation, runoff, and actual deliveries of water.

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 Bay-Delta process to achieve these requirements.

<u>Historical Record</u>

The historical record shows significant accomplishments by DWR in providing its contractors with SWP water supplies. Through 2008, the SWP has delivered nearly 80 MAF to its contractors. The maximum annual water supply was delivered in 2005, and totaled 3.75 MAF. In 2006 the project delivered 3.7 MAF. DWR has continued to invest in SWP facilities to deliver water to its contractors.

<u>Written Contracts or Other Proof</u>

- <u>1960 Contract between the State of California and The Metropolitan Water District of Southern California for a Water Supply.</u> This Contract, initially executed in 1960 and amended numerous times since, is the basis for SWP deliveries to Metropolitan. It requires 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

[16] The State Water Project Delivery Reliability Report 2007 can be accessed at http://baydeltaoffice.water.ca.gov/swpreliability/.

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.
- U.S. Fish and Wildlife Service Biological Opinion. In December 2008, U.S. Fish and Wildlife issued a Biological Opinion for Delta smelt.
- National Marine Fisheries Service Biological Opinion. In June 2009, the National Marine Fisheries Service issued a Biological Opinion for salmon.

B. *Desert Water Agency/Coachella Valley Water District/Metropolitan Water Exchange and Advance Delivery Programs*

Source of Supply

The Desert Water Agency (DWA) and CVWD, both in Riverside County, have rights to SWP deliveries but do not have any physical connections to the SWP facilities. Both agencies are adjacent to the CRA. 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 55.75 TAF per year and CVWD has a SWP Table A contract right of 138.35 TAF per year, for a total of 194.1 TAF per year.

Expected Supply Capability

Under the existing agreements, Metropolitan provides water from its CRA 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 SWP allocation from the two agencies, while the two agencies can rely on the stored water for meeting their water supply needs. The amount of DWA and CVWD SWP Table A water available to Metropolitan depends on total SWP deliveries and varies from year to year.

In addition to their Table A supplies DWA and CVWD, subject to Metropolitan's written consent, may take delivery of SWP supplies available under Article 21, the Turn-back Pool Program, and non-SWP water supplies they may acquire and convey through the SWP facilities. These non-SWP deliveries are delivered to DWA and CVWD by exchange with Metropolitan in the same manner as Table A deliveries. DWA and CVWD are participants in the Yuba Dry Year Water Purchase Program and DWA participated in the 2009 Drought Water Bank. Metropolitan has also consented to:

- 10 TAF of exchange deliveries to CVWD for non-SWP water acquired from the San Joaquin Valley from 2008 through 2010, and
- 36 TAF of exchange deliveries to DWA for non-SWP water acquired from the San Joaquin Valley from 2008 through 2015.

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 1984. Since 1973, Metropolitan has been taking delivery of these agencies' SWP Table A water and has provided equivalent water to those agencies from Metropolitan's CRA supplies. Metropolitan has also been delivering water in advance of the amount needed under the exchange agreements. With water having been delivered in advance, Metropolitan can reduce deliveries to DWA and CVWD as needed. Indeed, from the end of December 2005 through December 2009, Metropolitan drafted approximately 231 TAF leaving 45 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 contract has been in place since 1967, was amended in 1972 and was modified with execution of additional agreements in 1983.
- 1984 Advance Delivery Agreement. The 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 agreements. In future years, Metropolitan can recover this water by reducing its deliveries under the exchange agreements.
- The 2003 Exchange Agreement. DWA, CVWD and Metropolitan executed The 2003 Exchange Agreement under which Metropolitan transferred 88,100 AF and 11,900 AF of its SWP Table A to DWA and CVWD, respectively, reducing Metropolitan's Table A volume from 2,011,500 AF to 1,911,500 AF. The 2003 Exchange Agreement became operational in calendar year 2005 with the execution of letter agreements among DWA, CVWD, and Metropolitan governing its implementation. The exhibits to the November 9, 2004, and November 19, 2007, letter agreements also modify certain provisions of the Water Exchange Contract and Agreements and the Advance Delivery Agreement.

Financing

The funds for deliveries under this Program are included in Metropolitan's O&M budget and Long-Range Finance Plan (referenced above).

Federal, State, and Local Permits/Approvals

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
- September 2002, Final Program EIR for Coachella Valley Water Management Plan and State Water Project Entitlement Transfer as certified by CVWD on October 8, 2002

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 350 TAF of 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. Five other banking partners participate in this Program and use 650 TAF of 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 31.5 TAF per year (assuming the lowest groundwater return capacity available) up to 223 TAF (assuming the maximum capacity from the groundwater return and highest State Water Project Allocation). The average annual supply capability for a single dry year similar to 1977 is 125 TAF or multiple dry years similar to the period 1990-1992 is 107 TAF.

Rationale for Expected Supply

<u>Historical Record</u>

The Semitropic-Metropolitan Water Banking and 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 2009, Metropolitan had 45 TAF in its storage account. The program expects to have 45 TAF in its storage account by the end of 2010.

<u>Written Contracts or Other Proof</u>

- <u>1992 Turn-in/out Construction, Operation and Maintenance Agreement.</u> 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.
- <u>1993 Temporary Semitropic-Metropolitan Water Banking Agreement.</u> 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.
- <u>1994 Semitropic/Metropolitan Water Banking and Exchange Agreement</u>. This Agreement was executed in December 1994 by Semitropic and Metropolitan to implement the program for a 41-year term (1994-2035).
- <u>1995 Point of Delivery Agreement.</u> 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.
- <u>1995 Introduction of Local Water into the California Aqueduct.</u> 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 350 TAF of water under the current agreement. 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 75 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 38 years (1997-2035). At the end of 2009, Metropolitan had 95 TAF in its storage account. The program expects to have 95 TAF in its storage account by the end of 2010.

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.
- 2007 First Amended and Restated Agreement Between Arvin-Edison Water Storage District and The Metropolitan Water District of Southern California for a Water Management Program. This amendment increased the maximum storage level to 350 TAF, extended the agreement term to 2035, and provided for the construction of the South Canal Improvement Project. The project increases the reliability of Arvin-Edison returning higher water quality to 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.
- A Negative Declaration for the Arvin-Edison South Canal Improvement Project was completed in 2007.
- 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 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, Metropolitan has an alternative conveyance capacity of 260 cfs into Metropolitan's system should an outage occur on the upper section of the Inland Feeder.

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, the 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. There was no water remaining in the carryover account in 2009. Deliveries in 2010 have been suspended by mutual agreement.

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 Coordinated 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 MAF per year in dry years. In addition, Metropolitan policy objectives for Bay-Delta improvements include an average of 1.5 MAF 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 MAF. Municipal uses account for about 60 percent of annual deliveries, with the remaining 40 percent going to agriculture.

In January 2010, DWR released a draft of the biannual update of its Reliability Report. The report shows that future SWP deliveries will be impacted by two significant factors. The first is significant restrictions on SWP and Central Valley Project (CVP) Delta pumping required by the biological opinions issued by the U.S. Fish and Wildlife Service (December 2008) and National Marine Fisheries Service (June 2009). The second is climate change, which is altering the hydrologic conditions in the State. The 2009 draft report shows greater reductions in water deliveries on average when compared to the 2007 report. Over multiple-year dry periods, average annual Table A deliveries vary from 32% to 38% of the maximum Table A amount, while average annual deliveries over multiple-year wet periods range from 72 to 93% of the maximum Table A amount. Under future conditions, annual SWP Article 21 deliveries average 60 TAF, ranging from 1 TAF to 540 TAF over the 82-year simulation period.

The Bay Delta Conservation Plan

The Bay Delta Conservation Plan (BDCP) is being prepared through a collaboration of state, federal, and local water agencies, state and federal fish agencies, environmental organizations, and other interested parties. These organizations have formed the BDCP Steering Committee. The plan will identify a set of water flow and habitat restoration actions to contribute to the recovery of endangered and sensitive species and their habitats in California's Sacramento-San Joaquin Delta. The goal of the BDCP is to provide for both species/habitat protection and improved reliability of water supplies.

In order to select the most appropriate elements of the final conservation plan, the

BDCP will consider a range of options for accomplishing these goals using information developed as part of an environmental review process. Potential habitat restoration and water supply conveyance options included in the BDCP will be assessed through an Environmental Impact Report (EIR)/Environmental Impact Statement (EIS). The BDCP planning process and the supporting EIR/EIS process is being funded by state and federal water contractors.

Lead agencies for the EIR/EIS are the California Department of Water Resources, the Bureau of Reclamation, the U.S. Fish and Wildlife Service, and NOAA's National Marine Fisheries Service, in cooperation with the California Department of Fish and Game, the U.S. Environmental Protection Agency and the U.S. Army Corps of Engineers. MWD is on the steering committee.

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.[17]
  - 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[18].
  - 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.

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[17] A copy of this agreement can be found at http://calwater.ca.gov/Archives/GeneralArchive/SanFranciscoBayDeltaAgreement.shtml.

[18] California's Water Future: A Framework for Action can be found at http://calwater.ca.gov/Archives/GeneralArchive/adobe_pdf/new_final_framework.pdf.

- Proposition 50 funds approved by voters in November 2002.
  - Annual Federal appropriations.
- Sacramento Valley Water Management Agreement[19]
  - 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 BDCP will come from federal, state, and local water supplier sources.

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 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.

[19] A copy of this agreement can be found at http://www.norcalwater.org/pdf/agreementfinal.pdf

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 10 TAF in storage as of the end of 2009 and expects to recover all stored water by the end of 2010.

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 Water Transfers

Source of Supply

Up to 27 MAF 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.

In recent years, a portion of this agricultural water supply has been secured by Metropolitan through mutually beneficial transfer agreements:

- The Governor's Water Bank (Bank) in 1991, 1992, 1994, and 2009 secured 75 to 820 TAF per year of water supply. Further, the 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 MAF 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.
- In December 2007, Metropolitan entered into a long-term agreement with DWR providing for Metropolitan's participation in the Yuba Dry Year Water Purchase Program between Yuba County Water Agency and DWR that was approved by the SWRCB as part of the Yuba River Accord. This program provides for transfers of water from the Yuba County Water Agency during dry years through the year 2025 and Metropolitan has purchased 26.4 TAF and 42.9 TAF of Yuba transfer supplies in 2008 and 2009, respectively.
- In 2008, Metropolitan, in partnership with eight other State Water Contractors, purchased approximately 40 TAF of water from willing sellers in the Sacramento Valley during the irrigation season, of which Metropolitan's share was approximately 27 TAF.
- In 2009, Metropolitan participated in the Governor's Water Bank, which purchased approximately 47.5 TAF, of which Metropolitan's share was approximately 36.9 TAF.

Expected Supply Capability

Metropolitan's recent water transfer activities demonstrate Metropolitan's ability to develop and negotiate water transfer agreements working either directly with the agricultural districts that are selling the water or with DWR acting as an intermediary via a Drought Water Bank. As discussed in the State Water Project section of this document, significant restrictions on SWP and Central Valley Project (CVP) Delta pumping required by the biological opinions issued by the U.S. Fish and Wildlife Service (December 2008) and National Marine Fisheries Service (June 2009) will reduce anticipated SWP deliveries and therefore increase Metropolitan's need for Central Valley water transfer supplies. Unfortunately, these biological opinions result in SWP deliveries being shifted to the summer months thereby restricting the ability to pump water transfer supplies through the Delta pumping plants. On average, in dry years when Delta pumping capacity is available, Metropolitan expects to be able to purchase 125 TAF for delivery via the California Aqueduct.

Rationale for Expected Supply

<u>Historical Record</u>

Metropolitan has made rapid progress in 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 transfer programs; increased willingness of Central Valley agricultural interests to enter into transfer programs with Metropolitan; and Metropolitan staff's ability to work with California Department of Water Resources and USBR staff to facilitate Central Valley storage and transfer programs. The availability of dry year supplies has been demonstrated in 1991, 1992, 1994, 2001, 2002, 2003, 2005, 2008, and 2009.

The historical record for purchases from the Bank, Purchase Program, and Metropolitan-initiated Central Valley programs, 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 Table A.3-1 below.

A portion of these transfers from north of the Delta were lost in its conveyance across the Delta to the Banks Pumping Plant (20 percent) and in its conveyance through the California Aqueduct System to Metropolitan's service area (3 percent).

<u>Written Contracts or Other Proof</u>

- <u>Executive Orders.</u> 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. In June 2008, Governor Schwarzenegger issued an executive order establishing a 2009 Drought Water Bank.

Table A.3-1
Historical Record of MWD Central Valley Water Transfers

Program	Purchases (AF 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	138,806	80,000	9	8
2003 MWD Water Transfer Program	146,230[1]	126,230	11	1
2005 SWC Water Transfer Program	127,275[2]	0	3	4
2008 SWC Water Transfer Program	39,152	26,621	4	8
2009 Governor's Water Bank	47,505	36,900	10	9

[1] Quantities denote options Metropolitan secured, of which 20,000 AF were not exercised due to improved hydrologic conditions.
[2] Quantities denote options Metropolitan secured, but not exercised due to improved hydrologic conditions.

- Agreements Between Sellers and Buyers. Since 1991, Metropolitan has entered into Central Valley water transfer agreements in eight years with sellers, or DWR acting in an intermediary capacity for the Drought Water Banks. 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 agreements.
- 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 documentation for the Drought Water Banks. In November 1993, DWR prepared and finalized a programmatic Environmental Impact Report for the operation of the drought water banks during future drought events. In 2009, an emergency CEQA exemption was issued to support the Drought Water Bank.
- Individual CEQA and NEPA documents for Metropolitan's 2003, 2005, and 2008 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.

I. Yuba Accord Dry Year Purchase Program

Source of Supply

As part of a comprehensive settlement of a State Water Resources Control Board (SWRCB) proceeding in which the Yuba County Water Agency (YCWA) is required to increase Yuba River fishery flows, referred to as the "Yuba River Accord" (Accord), YCWA reached agreement with DWR and the United States Bureau of Reclamation to sell a portion of the water it would be required to release, plus additional water made available by reoperation of YCWA's storage reservoirs and groundwater substitution. DWR entered into a purchase agreement with YCWA under which one-half of the water available for purchase would be available to SWP contractors that elected to participate in the purchase program.

Under this 25-year program Metropolitan is obligated to purchase transfer water when the Table A allocation is 40 percent or less and has the option to purchase transfer water when the Table A allocation is greater than 40 percent but less than or equal to 60 percent. The price for water is set by the agreement between DWR and the Yuba County Water Agency. There are four categories of water the price for which varies depending on hydrology.

Expected Supply Capability

Metropolitan's share of the water made available under the Yuba Accord Dry Year Purchase Program is approximately 25 percent. Should other participating contractors decline to purchase their respective shares, that water is allocated to the remaining interested participating contractors. Metropolitan's likely share of assured YCWA transfer water would be at least 13,750 AF in dry years and up to 35,000 AF or more in other years. These volumes are as provided by YCWA north-of-the-Delta. Conveyance losses through the Delta to the Banks Pumping Plant

(20 percent) and down the California Aqueduct (3 percent) results in net delivery to Metropolitan ranging from approximately 11,000 AF in dry years to 27,000 AF or more in other years.

Rationale for Expected Supply

Historical Record

Actual volumes purchased and net deliveries to Metropolitan during the first two years of this program were as follows:

Year	Purchased Volume (AF)	Net Delivery (AF)
2008	26,430	20,510
2009	42,915	33,302

Written Contracts or Other Proof

- DWR-YCWA Purchase Agreement. This December 4, 2007, agreement provides the annual determination of the amount of water to be made available by YUBA and purchased by DWR. The agreement also specifies the costs of various categories of water to be made available under a variety of hydrologic conditions.
- DWR-Metropolitan Participation Agreement. This December 21, 2007, agreement provides Metropolitan's election to purchase water made available by YCWA to DWR and the scheduling delivery of the purchased water. The agreement provides for mechanisms for Metropolitan payments to DWR that are due to YCWA under the DWR-YCWA Purchase Agreement.

Financing

Funds for purchases of water from the Yuba Accord Dry Year Purchase Program are included in the O&M budget.

Federal, State, and Local Permits/Approvals

- SWRCB Order WR 2008-0014. Approval of YCWA's petition to modify revised Water Right Decision 1644 related to Water Right Permits 15026, 15027, and 15030 (Applications 5632, 15204, and 15574), and petition for long-term transfer of up to 200,000 AF of water per year from YCWA to the Department of Water Resources and the United States Bureau of Reclamation under Permit 15026 (Application 5632) - Lower Yuba River in Yuba County.

J. Programs Under Development as Part of the Five Year Supply Plan

- *Two-Gate System:* This project is in addition to the Bay-Delta improvements described under section F above. The proposed system includes the installation of new temporary gates in central Delta channels that would be operated in real time to reduce fish take, minimize water supply restrictions at the State and Federal export facilities, and improve Delta water quality. A review by the State Water Contractors (SWC) and Central Valley Project contractors suggests that the Two-Gate System can operate within the discretionary provisions of the Biological Opinion (BiOp) to reduce water supply restrictions. This would beneficially affect Delta smelt salvage, help maintain Delta smelt and their preferred habitats further downstream from the export pumps, and provide improved water supply benefits. The installation of the Two-Gate System is estimated to be completed by Fall 2012 and is anticipated to be fully operational in 2013.
- *North of Delta Transfers:* (covered under section H above)
- *In-Delta Transfers*: In January 2009, the Board authorized staff to enter into a water transfer agreement with Delta Wetlands Properties. Metropolitan entered into the water transfer agreement in late January to secure up to 18 TAF of new supply prior to any losses. The program is estimated to provide 8 TAF in 2009, depending on the amount of land fallowed and the conveyance losses. Metropolitan only pays for water that is made available for transfer. For 2010 and beyond, additional transfer agreements

like this one could yield up to 20 TAF per year.

- *North Kern / DWA Exchange*: In this agreement, Desert Water Agency (DWA) will purchase water from North Kern and deliver it to Metropolitan in exchange for Colorado River water delivered to DWA. In 2008, DWA purchased over 8 TAF from North Kern and delivered it to Metropolitan. In future years, DWA will buy additional water for delivery to Metropolitan. Metropolitan is scheduled to return all water received from DWA uniformly over the next 30 years, but may return it sooner if desired.
- *Semitropic Agricultural Water Reuse Demonstration Project*: This project provides a new water supply through the recovery of agricultural water in the San Joaquin Valley with an expected yield of about 11 TAF per year. In November 2009, Metropolitan and Semitropic Water District finalized an agreement to complete environmental review and technical studies for this project. Currently work is underway to complete the characterization of the groundwater, develop documents for environmental permits, and define facility design. Assuming this project moves forward as planned, it could begin operation in late 2011.

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, DWR 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 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 AF, 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 AF. 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 AF.

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 1991and Metropolitan's IRP, 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.

<u>Updated Emergency Storage Requirements:</u> 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 Aqueduct that could force the aqueducts out of service for six 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 in Table A.3-2. The residual storage available to meet other needs, dry-year/seasonal, is also shown and discussed in greater detail in this appendix.

<u>Updated Storage Requirements for Dry-Year Supply and Seasonal Needs:</u> 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

Table A.3-2
Surface Storage Utilization
(acre-feet per year)

Forecast Year	2015	2020	2025	2030	2035
MWD Dry-Year/Seasonal Surface Storage					
DVL, Mathews, Skinner	794,203	765,773	773,380	756,073	734,180
Flexible Storage in Castaic & Perris	219,000	219,000	219,000	219,000	219,000
Subtotal of Dry-Year/Seasonal Storage	***1,013,203***	***984,773***	***992,380***	***975,073***	***953,180***
MWD Emergency Storage					
DVL, Mathews, Skinner	238,097	266,527	258,920	276,227	298,120
Emergency Storage in DWR Reservoirs	334,000	334,000	334,000	334,000	334,000
Subtotal of Emergency Storage	***572,097***	***600,527***	***592,920***	***610,227***	***632,120***
Total MWD Surface Storage	**1,585,300**	**1,585,300**	**1,585,300**	**1,585,300**	**1,585,300**

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 five 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 (see Section A.3.3.B for a discussion of Metropolitan's contractual rights to storage in these DWR reservoirs). 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 1,911,500 AF 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

Metropolitan's flexible storage accounts in Castaic Lake and Lake Perris, SWP reservoirs, is 153,940 AF and 65,000 AF, respectively. These accounts provide Metropolitan with dry-year supply that is independent of the Table A allocation. Metropolitan can withdraw water from these reservoirs in addition to their allocated supply in any year on an as-needed basis. Withdrawn water must be replaced from supplies available to Metropolitan within five years of each withdrawal. This "flexible storage" 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.

In 2005, Seismic concerns arose regarding 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. However, since 2005 Metropolitan has continued to withdraw and replace water from the reservoir, which is operating at a lower level. In January 2010, DWR issued a Draft EIR for the repair of the Dam. Discussions are ongoing regarding the ultimate disposition of the reservoir as it related to costs allocated to the SWP contractors.

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 on numerous occasions through and including calendar year 2010. Its use is based on existing contract provisions.

Table A.3-3
Estimated Water Supplies Available for Metropolitan's Use Under the Flexible Storage Use of Castaic Lake and Lake Perris *
(TAF per year)

Year	Multiple Dry-Years (1990-1992)	Single Dry Year (1997)
2015	73	219
2020	73	219
2025	73	219
2030	73	219
2035	73	219

* Source: Metropolitan's operating criteria.

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 shown in Table A.3-4 below.

Table A.3-4
Flexible Storage Allocations

Participating Contractor	Proportionate Use Factor	Maximum Flexible Storage Allocation (AF)
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[1]	1.00000000	65,000
Metropolitan		

[1] The 2003 Exchange Agreement among Metropolitan, CVWD, and DWA, among other things, transferred to CVWD and DWA a portion of Metropolitan's capacity in the California Aqueduct and the East Branch including Lake Perris. However, Metropolitan's rights to the full 65,000 AF of Lake Perris flexible storage account was retained by Metropolitan.

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 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 1,585,300 AF. As discussed earlier, approximately 570 TAF in 2015 rising to 630 TAF in 2035 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 in Table A.3-5.

Rationale for Expected Supply

<u>Program Facilities</u>

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.

<u>Historical Record</u>

The Diamond Valley Lake has been operational for 10 years and is currently half full. Lake Mathews and Lake Skinner have been in service for over 30 years and are currently available for full operations.

- <u>November 1974 Memorandum of Understanding and Agreement on Operation of Lake Skinner.</u> 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.
- <u>October 1991 Final Environmental Impact Report for the Eastside Reservoir Project (DVL).</u> 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.
- <u>November 1999 Memorandum of Understanding on Operation of Diamond Valley Lake.</u> 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.

Table A.3-5
Estimated Supplies Available from Metropolitan Surface Storage
Program Capabilities
(acre-feet per year)

Forecast Year	Multiple Dry Years (1990-92)	Single Dry Year (1977)
2015	171,000	514,000
2020	239,000	716,000
2025	277,000	832,000
2030	237,000	712,000
2035	192,000	576,000

Source: Metropolitan analysis

- 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

Metropolitan's IRP established the 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 SWP and the Colorado River during dry years when competing demands by other users and risks to the watershed ecosystems are greatest.

Groundwater basins in Metropolitan's service area have potential to store more than 3.0 MAF of additional water supplies. In 2000, the Association of Ground Water Agencies (AGWA) published Groundwater and Surface Water in Southern California: A Guide to Conjunctive Use which estimated a substantial potential for developing dry-year or long term conjunctive use within Metropolitan's service area. In 2007, Metropolitan published the Groundwater Assessment Study which estimated 3.2 MAF of space in groundwater basins available for storage. Based on these studies, Metropolitan continues to pursue a resource objective to develop dry-year supply from in-basin groundwater storage of 300 TAF per year by 2020.

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. In years of surplus imported supply, Metropolitan has delivered discounted water for groundwater storage under the Long-Term Replenishment Program in order to maintain groundwater production during the summer season and dry years. In recent years, Metropolitan has sold an average of 200 to 225 TAF per year of water under this program. The Replenishment Program was interrupted in 2007 due to imported water shortages.
- The Main San Gabriel Cyclic Storage Agreement. The Cyclic Storage Agreement with Upper San Gabriel Valley MWD was originally signed in 1975 for a term of five years and has been extended in five year increments. In 2009, the agreement was extended for two years. Currently expires in 2009, but is expected to be renewed repeatedly in future. The Cyclic Storage Agreement with Three Valleys MWD was originally signed in 1991 for a term of five years and has been extended in five year increments. This agreement was also extended for two years in 2009.
- Chino Basin Cyclic Storage Agreement. The Cyclic Storage Agreement with Inland Empire Utilities Agency was first signed in 1979 and extended in five year increments through 2012.
- North Las Posas Groundwater Storage Program. Two phases of the program's ASR wells (18 wells) have been constructed, providing approximately 8 TAF per year of replenishment capacity and 12 TAF per year of withdrawal capacity until fully integrated into Calleguas MWD's distribution system. At such time, the wellfields 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 July 1, 2007, approximately 230 TAF of water had been stored in contractual dry-year storage programs in the North Las Posas, Chino, Orange County, Live Oak, Central, and Raymond groundwater basins. As of January 1, 2010, 117 TAF had been produced to offset imported water shortages leaving a balance of about 113 TAF in these storage accounts.

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 April 2009.
- 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 and in March 2008. The term of the Agreement extends to 2035.
- Proposition 13 Groundwater Conjunctive Use Programs Operational by 2010.
  - Association of Ground Water Agencies (AGWA) published Groundwater and Surface Water in Southern California: A Guide to Conjunctive Use in 2000 identifying the potential storage capacity for groundwater basins.

- Metropolitan Water District published the Groundwater Assessment Study Report in 2007 in collaboration with its member agencies and groundwater basin managers documenting existing use and development of groundwater resources in Metropolitan's service area and estimating additional groundwater basin storage potential.
- 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
- Agreement executed for Upper Claremont Basin Groundwater Storage Program, September 2005
- Agreement executed for Elsinore Basin Conjunctive Use Program, May 2008

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:

- <u>Financing for Long-Term Replenishment Program.</u> 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. In May 2006, Metropolitan's Board appropriated $480,000 to conduct preliminary engineering and complete CEQA environmental

documentation for the proposed storage program.

– 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 for nine storage programs, expended $45 million of the Proposition 13 funds, and appropriated over $35 million of Metropolitan capital funds for the storage programs in the Orange County and Chino groundwater basins. All nine storage programs have completed facilities and are on-line. Metropolitan has called for production of stored water beginning in 2007.

Table A.3-6 provides details of funding for specific groundwater storage programs.

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.
- Upper Claremont Basin Groundwater Storage Program. Environmental documentation for the project was certified by Three Valleys MWD in July 2005.
- Elsinore Basin Conjunctive Use Program. Environmental documentation for the project was certified by Elsinore Valley MWD in February 2004

E. Programs under Development as Part of the Five Year Supply Plan

LADWP Groundwater Demonstration Project: Treatment facilities were installed at the Tujunga Well Field to produce about 12 TAF per year. In December 2008, Metropolitan entered into an agreement with LADWP and in April 2009, a contract was awarded to Siemens Water Technologies Corporation. The facilities were on line and production began in May 2010. Metropolitan's partnership with LADWP brought the treatment facilities on-line nearly two years ahead of the original schedule.

F. IRP Development Targets

20% x 2020 Regional Consistency: Achieving regional consistency on water use efficiency with the legislative goal of 20 percent reduction for the region as a whole would result in a total reduction of potable demand by 580 TAF by 2020. This estimate for regional compliance requires a 200 TAF of additional savings over the 380 TAF estimated retail level reduction already included in the demand projections for the 2010 RUWMP. The additional 200 TAF savings target by 2020 would be an important part of the region's future supply and is included in the water supply forecast tables as part of IRP Development Targets presented in Appendix A.3-7. Achieving an annual demand reduction of 580 TAF by 2020 will require additional local and regional investments in both conservation and recycled water.

Local Supply Augmentation: Included as part of the IRP Development Target are additional supplies obtained through Local Supply Augmentation. Appendix A.5 presents a list of recycling, groundwater recovery, and seawater desalination projects within Metropolitan's service area that could be developed to achieve this future supply goal. Metropolitan collected information on the ultimate yields of each project and potential project on-line dates through various technical workgroups and collaborative efforts with the member agencies. These local projects are in various stages of development and Metropolitan anticipates continued partnership with its member agencies in augmenting local water supplies.

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.

In developing the supply capabilities for the 2010 RUWMP, Metropolitan assumed a simulated median storage level going into each of the five-year increments based on the balances of supplies and demands. Under the median storage condition, there is an estimated 50 percent probability that storage levels would be higher than the assumption used, and a 50 percent probability that storage levels would be lower than the assumption used. All storage capability figures shown in the 2010 RUWMP reflect actual storage program conveyance constraints. In addition, SWP supplies are estimated using the draft 2009 SWP Delivery Reliability Report distributed by DWR in December 2009. The draft 2009 reliability report presents the current DWR estimate of the amount of water deliveries for current (2009) conditions and conditions 20 years in the future. DWR estimates are based on current facilities and incorporate restrictions on SWP and CVP operations in accordance with the biological opinions of the U.S. Fish and Wildlife Service and National Marine Fishery Service issued on December 15, 2008, and June 4, 2009, respectively.

Table A.3-6
Metropolitan's In-Region Groundwater Storage Programs

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 (Monkhill/ 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	66,000+	22,000	$31.7million: $15.0 million – Prop 13 $16.7million – 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 La Verne	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	$31 million – Met CIP* $28.2 million expended.
Long Beach Conjunctive Use Program Expansion in Lakewood (Central Basin)	Long Beach	July 2005	3,600	1,200	$3.1 million – Prop 13

Table A.3-6 (Contd)
Metropolitan's In-Region Groundwater Storage Programs

Program	Metropolitan Agreement Partners	Agreement Execution Date	Max Storage AF	Dry-Year Yield AF/Yr	Capital Funding
Upper Claremont Basin Groundwater Storage Program (Six Basins)	TVMWD	Sept. 2005	3,000	1,000	$1.23 million – Prop 13
Elsinore Basin Conjunctive Use Storage Program (Elsinore Basin)	Western MWD Elsinore Valley MWD	May 2008	12,000	4,000	$4.74 million - Prop 13
Total			**421,889**	**117,263**	**$45 million – Prop 13** **$63.4 million – Met CIP***

* Metropolitan's Capital Investment Plan

Table A.3-7
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			
Basic Apportionment – Priority 4	550,000	550,000	550,000
IID/MWD Conservation Program	85,000	85,000	85,000
Priority 5 Apportionment (Surplus)	0	0	91,000
PVID Land Management, Crop Rotation, and Water Supply Program	133,000	133,000	133,000
Lower Colorado Water Supply Project	6,000	6,000	6,000
Lake Mead Storage Program	341,000	400,000	400,000
Quechan Settlement Agreement Supply	7,000	7,000	7,000
Forbearance for Present Perfected Rights	(42,000)	(47,000)	(47,000)
CVWD SWP/QSA Transfer Obligation	(35,000)	(35,000)	(35,000)
DWCV SWP Table A Obligation	(60,000)	(54,000)	(127,000)
DWCV SWP Table A Transfer Callback	32,000	29,000	67,000
DWCV Advance Delivery Account	28,000	25,000	60,000
Drop 2 Reservoir Funding	22,000	66,000	66,000
SNWA Agreement	40,000	40,000	40,000
Expand SNWA Agreement	15,000	15,000	15,000
Subtotal of Current Programs	***1,122,000***	***1,220,000***	***1,311,000***
Programs Under Development			
Additional PVID Transfers (Crop Stressing/Fallowing)	62,000	62,000	62,000
Arizona Programs - CAP	50,000	50,000	50,000
California Indians / Other Ag	10,000	10,000	10,000
ICS Exchange	25,000	25,000	25,000
Agreements with CVWD	35,000	35,000	35,000
Hayfield Groundwater Extraction Project	5,000	5,000	5,000
Subtotal of Proposed Programs	***187,000***	***187,000***	***187,000***
Additional Non-Metropolitan CRA Supplies			
SDCWA/IID Transfer	100,000	100,000	100,000
Coachella & All-American Canal Lining			
To SDCWA	80,000	80,000	80,000
To San Luis Rey Settlement Parties1	16,000	16,000	16,000
Subtotal of Non-Metropolitan Supplies	***196,000***	***196,000***	***196,000***
Maximum CRA Supply Capability[2]	**1,505,000**	**1,603,000**	**1,694,000**
Less CRA Capacity Constraint (amount above 1.25 MAF)	*(255,000)*	*(353,000)*	*(444,000)*
Maximum Expected CRA Deliveries[3]	**1,250,000**	**1,250,000**	**1,250,000**
Less Non-Metropolitan Supplies[4]	*(196,000)*	*(196,000)*	*(196,000)*
Maximum Metropolitan Supply Capability[5]	**1,054,000**	**1,054,000**	**1,054,000**

[1] Subject to satisfaction of conditions specified in agreement among Metropolitan, the United States, and the San Luis Rey Settlement Parties
[2] Total amount of supplies available without taking into consideration CRA capacity constraint.
[3] The Colorado River Aqueduct delivery capacity is 1.250 MAF annually.
[4] Exchange obligation for the SDCWA-IID transfer and the Coachella and All American Canal Lining projects.
[5] The amount of CRA water available to Metropolitan after meeting its exchange obligations.

Table A.3-7
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			
Basic Apportionment – Priority 4	550,000	550,000	550,000
IID/MWD Conservation Program	85,000	85,000	85,000
Priority 5 Apportionment (Surplus)	167,000	356,000	61,000
PVID Land Management, Crop Rotation, and Water Supply Program	133,000	133,000	133,000
Lower Colorado Water Supply Project	6,000	6,000	6,000
Lake Mead Storage Program	400,000	400,000	400,000
Quechan Settlement Agreement Supply	7,000	7,000	7,000
Forbearance for Present Perfected Rights	(47,000)	(47,000)	(47,000)
CVWD SWP/QSA Transfer Obligation	(35,000)	(35,000)	(35,000)
DWCV SWP Table A Obligation	(60,000)	(54,000)	(127,000)
DWCV SWP Table A Transfer Callback	32,000	29,000	67,000
DWCV Advance Delivery Account	28,000	25,000	60,000
Drop 2 Reservoir Funding	22,000	25,000	25,000
SNWA Agreement	40,000	40,000	40,000
Expand SNWA Agreement	15,000	15,000	15,000
Subtotal of Current Programs	***1,343,000***	***1,535,000***	***1,240,000***
Programs Under Development			
Additional PVID Transfers (Crop Stressing/Fallowing)	62,000	62,000	62,000
Arizona Programs - CAP	50,000	50,000	50,000
California Indians / Other Ag	10,000	10,000	10,000
ICS Exchange	25,000	25,000	25,000
Agreements with CVWD	35,000	35,000	35,000
Hayfield Groundwater Extraction Project	5,000	5,000	5,000
Subtotal of Proposed Programs	***187,000***	***187,000***	***187,000***
Additional Non-Metropolitan CRA Supplies			
SDCWA/IID Transfer	161,000	193,000	193,000
Coachella & All-American Canal Lining			
To SDCWA	80,000	80,000	80,000
To San Luis Rey Settlement Parties1	16,000	16,000	16,000
Subtotal of Non-Metropolitan Supplies	***257,000***	***289,000***	***289,000***
Maximum CRA Supply Capability[2]	**1,787,000**	**2,011,000**	**1,716,000**
Less CRA Capacity Constraint (amount above 1.25 MAF)	*(537,000)*	*(761,000)*	*(466,000)*
Maximum Expected CRA Deliveries[3]	**1,250,000**	**1,250,000**	**1,250,000**
Less Non-Metropolitan Supplies[4]	*(257,000)*	*(289,000)*	*(289,000)*
Maximum Metropolitan Supply Capability[5]	**993,000**	**961,000**	**961,000**

[1] Subject to satisfaction of conditions specified in agreement among Metropolitan, the United States, and the San Luis Rey Settlement Parties
[2] Total amount of supplies available without taking into consideration CRA capacity constraint.
[3] The Colorado River Aqueduct delivery capacity is 1.250 MAF annually.
[4] Exchange obligation for the SDCWA-IID transfer and the Coachella and All American Canal Lining projects.
[5] The amount of CRA water available to Metropolitan after meeting its exchange obligations.

Table A.3-7
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			
Basic Apportionment – Priority 4	550,000	550,000	550,000
IID/MWD Conservation Program	85,000	85,000	85,000
Priority 5 Apportionment (Surplus)	0	250,000	53,000
PVID Land Management, Crop Rotation, and Water Supply Program	133,000	133,000	133,000
Lower Colorado Water Supply Project	6,000	5,000	5,000
Lake Mead Storage Program	400,000	400,000	400,000
Quechan Settlement Agreement Supply	7,000	7,000	7,000
Forbearance for Present Perfected Rights	(47,000)	(47,000)	(47,000)
CVWD SWP/QSA Transfer Obligation	(35,000)	(35,000)	(35,000)
DWCV SWP Table A Obligation	(77,000)	(60,000)	(155,000)
DWCV SWP Table A Transfer Callback	41,000	32,000	82,000
DWCV Advance Delivery Account	36,000	28,000	73,000
Drop 2 Reservoir Funding	22,000	25,000	25,000
SNWA Agreement	0	0	0
Expand SNWA Agreement	0	0	0
Subtotal of Current Programs	***1,121,000***	***1,373,000***	***1,176,000***
Programs Under Development			
Additional PVID Transfers (Crop Stressing/Fallowing)	62,000	62,000	62,000
Arizona Programs - CAP	50,000	50,000	50,000
California Indians / Other Ag	10,000	10,000	10,000
ICS Exchange	25,000	25,000	25,000
Agreements with CVWD	35,000	35,000	35,000
Hayfield Groundwater Extraction Project	5,000	5,000	5,000
Subtotal of Proposed Programs	***187,000***	***187,000***	***187,000***
Additional Non-Metropolitan CRA Supplies			
SDCWA/IID Transfer	200,000	200,000	200,000
Coachella & All-American Canal Lining			
To SDCWA	80,000	80,000	80,000
To San Luis Rey Settlement Parties1	16,000	16,000	16,000
Subtotal of Non-Metropolitan Supplies	***296,000***	***296,000***	***296,000***
Maximum CRA Supply Capability[2]	**1,604,000**	**1,856,000**	**1,659,000**
Less CRA Capacity Constraint (amount above 1.25 MAF)	*(354,000)*	*(606,000)*	*(409,000)*
Maximum Expected CRA Deliveries[3]	**1,250,000**	**1,250,000**	**1,250,000**
Less Non-Metropolitan Supplies[4]	*(296,000)*	*(296,000)*	*(296,000)*
Maximum Metropolitan Supply Capability[5]	**954,000**	**954,000**	**954,000**

[1] Subject to satisfaction of conditions specified in agreement among Metropolitan, the United States, and the San Luis Rey Settlement Parties
[2] Total amount of supplies available without taking into consideration CRA capacity constraint.
[3] The Colorado River Aqueduct delivery capacity is 1.250 MAF annually.
[4] Exchange obligation for the SDCWA-IID transfer and the Coachella and All American Canal Lining projects.
[5] The amount of CRA water available to Metropolitan after meeting its exchange obligations.

Table A.3-7
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			
Basic Apportionment – Priority 4	550,000	550,000	550,000
IID/MWD Conservation Program	85,000	85,000	85,000
Priority 5 Apportionment (Surplus)	0	0	13,000
PVID Land Management, Crop Rotation, and Water Supply Program	133,000	133,000	133,000
Lower Colorado Water Supply Project	5,000	5,000	5,000
Lake Mead Storage Program	400,000	400,000	400,000
Quechan Settlement Agreement Supply	7,000	7,000	7,000
Forbearance for Present Perfected Rights	(47,000)	(47,000)	(47,000)
CVWD SWP/QSA Transfer Obligation	(35,000)	(35,000)	(35,000)
DWCV SWP Table A Obligation	(77,000)	(60,000)	(155,000)
DWCV SWP Table A Transfer Callback	41,000	32,000	82,000
DWCV Advance Delivery Account	36,000	28,000	73,000
Drop 2 Reservoir Funding	22,000	25,000	25,000
SNWA Agreement	0	0	0
Expand SNWA Agreement	0	0	0
Subtotal of Current Programs	***1,120,000***	***1,123,000***	***1,136,000***
Programs Under Development			
Additional PVID Transfers (Crop Stressing/Fallowing)	62,000	62,000	62,000
Arizona Programs - CAP	50,000	50,000	50,000
California Indians / Other Ag	10,000	10,000	10,000
ICS Exchange	25,000	25,000	25,000
Agreements with CVWD	35,000	35,000	35,000
Hayfield Groundwater Extraction Project	0	0	0
Subtotal of Proposed Programs	***182,000***	***182,000***	***182,000***
Additional Non-Metropolitan CRA Supplies			
SDCWA/IID Transfer	200,000	200,000	200,000
Coachella & All-American Canal Lining			
To SDCWA	80,000	80,000	80,000
To San Luis Rey Settlement Parties1	16,000	16,000	16,000
Subtotal of Non-Metropolitan Supplies	***296,000***	***296,000***	***296,000***
Maximum CRA Supply Capability[2]	**1,598,000**	**1,601,000**	**1,614,000**
Less CRA Capacity Constraint (amount above 1.25 MAF)	*(348,000)*	*(351,000)*	*(364,000)*
Maximum Expected CRA Deliveries[3]	**1,250,000**	**1,250,000**	**1,250,000**
Less Non-Metropolitan Supplies[4]	*(296,000)*	*(296,000)*	*(296,000)*
Maximum Metropolitan Supply Capability[5]	**954,000**	**954,000**	**954,000**

[1] Subject to satisfaction of conditions specified in agreement among Metropolitan, the United States, and the San Luis Rey Settlement Parties
[2] Total amount of supplies available without taking into consideration CRA capacity constraint.
[3] The Colorado River Aqueduct delivery capacity is 1.250 MAF annually.
[4] Exchange obligation for the SDCWA-IID transfer and the Coachella and All American Canal Lining projects.
[5] The amount of CRA water available to Metropolitan after meeting its exchange obligations.

Table A.3-7
Colorado River Aqueduct
Program Capabilities
Year 2035
(acre-feet per year)

Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
Basic Apportionment – Priority 4	550,000	550,000	550,000
IID/MWD Conservation Program	85,000	85,000	85,000
Priority 5 Apportionment (Surplus)	0	0	10,000
PVID Land Management, Crop Rotation, and Water Supply Program	133,000	133,000	133,000
Lower Colorado Water Supply Project	5,000	5,000	5,000
Lake Mead Storage Program	400,000	400,000	400,000
Quechan Settlement Agreement Supply	7,000	7,000	7,000
Forbearance for Present Perfected Rights	(47,000)	(47,000)	(47,000)
CVWD SWP/QSA Transfer Obligation	(35,000)	(35,000)	(35,000)
DWCV SWP Table A Obligation	(77,000)	(60,000)	(155,000)
DWCV SWP Table A Transfer Callback	41,000	32,000	82,000
DWCV Advance Delivery Account	36,000	28,000	73,000
Drop 2 Reservoir Funding	22,000	25,000	25,000
SNWA Agreement	0	0	0
Expand SNWA Agreement	0	0	0
Subtotal of Current Programs	***1,120,000***	***1,123,000***	***1,133,000***
Programs Under Development			
Additional PVID Transfers (Crop Stressing/Fallowing)	62,000	62,000	62,000
Arizona Programs - CAP	50,000	50,000	50,000
California Indians / Other Ag	10,000	10,000	10,000
ICS Exchange	25,000	25,000	25,000
Agreements with CVWD	35,000	35,000	35,000
Hayfield Groundwater Extraction Project	0	0	0
Subtotal of Proposed Programs	***182,000***	***182,000***	***182,000***
Additional Non-Metropolitan CRA Supplies			
SDCWA/IID Transfer	200,000	200,000	200,000
Coachella & All-American Canal Lining			
To SDCWA	80,000	80,000	80,000
To San Luis Rey Settlement Parties1	16,000	16,000	16,000
Subtotal of Non-Metropolitan Supplies	***296,000***	***296,000***	***296,000***
Maximum CRA Supply Capability[2]	**1,598,000**	**1,601,000**	**1,611,000**
Less CRA Capacity Constraint (amount above 1.25 MAF)	*(348,000)*	*(351,000)*	*(361,000)*
Maximum Expected CRA Deliveries[3]	**1,250,000**	**1,250,000**	**1,250,000**
Less Non-Metropolitan Supplies[4]	*(296,000)*	*(296,000)*	*(296,000)*
Maximum Metropolitan Supply Capability[5]	**954,000**	**954,000**	**954,000**

[1] Subject to satisfaction of conditions specified in agreement among Metropolitan, the United States, and the San Luis Rey Settlement Parties
[2] Total amount of supplies available without taking into consideration CRA capacity constraint.
[3] The Colorado River Aqueduct delivery capacity is 1.250 MAF annually.
[4] Exchange obligation for the SDCWA-IID transfer and the Coachella and All American Canal Lining projects.
[5] The amount of CRA water available to Metropolitan after meeting its exchange obligations.

Table A.3-7
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			
MWD Table A	469,000	107,000	1,026,000
DWCV Table A	60,000	54,000	127,000
San Luis Carryover [1]	48,000	145,000	145,000
Article 21 Supplies	0	0	3,000
San Bernardino Valley MWD Minimum Purchase	8,000	5,000	20,000
San Bernardino Valley MWD Option Purchase	11,000	13,000	20,000
Yuba River Accord Purchase	14,000	14,000	4,000
Central Valley Storage and Transfers			
Semitropic Program	41,000	39,000	60,000
Arvin Edison Program	47,000	75,000	75,000
San Bernardino Valley MWD Program	7,000	20,000	20,000
Kern Delta Program	47,000	50,000	50,000
Subtotal of Current Programs	***752,000***	***522,000***	***1,550,000***
Programs Under Development			
Delta Improvements	154,000	487,000	285,000
Mojave Groundwater Storage Program	5,000	2,000	30,000
North of Delta/In-Delta Transfers	33,000	33,000	33,000
SBVMWD Central Feeder	5,000	5,000	5,000
Shasta Return	18,000	18,000	18,000
Semitropic Agricultural Water Reuse	11,000	11,000	11,000
IRP SWP Target [2]	16,000	0	0
Subtotal of Proposed Programs	***242,000***	***556,000***	***382,000***
Maximum Supply Capability	**994,000**	**1,078,000**	**1,932,000**

[1] Includes DWCV carryover.

[2] Remaining supply needed to meet IRP target.

Table A.3-7
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			
MWD Table A	469,000	107,000	1,026,000
DWCV Table A	60,000	54,000	127,000
San Luis Carryover [1]	69,000	208,000	208,000
Article 21 Supplies	0	0	3,000
San Bernardino Valley MWD Minimum Purchase	8,000	5,000	20,000
San Bernardino Valley MWD Option Purchase	11,000	13,000	20,000
Yuba River Accord Purchase	14,000	14,000	4,000
Central Valley Storage and Transfers			
Semitropic Program	41,000	39,000	60,000
Arvin Edison Program	63,000	75,000	75,000
San Bernardino Valley MWD Program	12,000	36,000	36,000
Kern Delta Program	47,000	50,000	50,000
Subtotal of Current Programs	***794,000***	***601,000***	***1,629,000***
Programs Under Development			
Delta Improvements	154,000	487,000	285,000
Mojave Groundwater Storage Program	5,000	2,000	31,000
North of Delta/In-Delta Transfers	33,000	33,000	33,000
SBVMWD Central Feeder	5,000	5,000	5,000
Shasta Return	18,000	18,000	18,000
Semitropic Agricultural Water Reuse	11,000	11,000	11,000
IRP SWP Target [2]	47,000	0	0
Subtotal of Proposed Programs	***273,000***	***556,000***	***383,000***
Maximum Supply Capability	**1,067,000**	**1,157,000**	**2,012,000**

[1] Includes DWCV carryover.

[2] Remaining supply needed to meet IRP target.

Table A.3-7
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			
MWD Table A	469,000	107,000	1,026,000
DWCV Table A	77,000	60,000	155,000
San Luis Carryover [1]	80,000	239,000	239,000
Article 21 Supplies	0	0	52,000
San Bernardino Valley MWD Minimum Purchase	12,000	8,000	20,000
San Bernardino Valley MWD Option Purchase	12,000	11,000	29,000
Yuba River Accord Purchase	14,000	14,000	2,000
Central Valley Storage and Transfers			
Semitropic Program	46,000	41,000	69,000
Arvin Edison Program	63,000	75,000	75,000
San Bernardino Valley MWD Program	15,000	46,000	46,000
Kern Delta Program	47,000	50,000	50,000
Subtotal of Current Programs	***835,000***	***651,000***	***1,763,000***
Programs Under Development			
Delta Improvements	341,000	628,000	605,000
Mojave Groundwater Storage Program	11,000	5,000	43,000
North of Delta/In-Delta Transfers	33,000	33,000	33,000
SBVMWD Central Feeder	5,000	5,000	5,000
Shasta Return	18,000	18,000	18,000
Semitropic Agricultural Water Reuse	11,000	11,000	11,000
IRP SWP Target [2]	0	0	0
Subtotal of Proposed Programs	***419,000***	***700,000***	***715,000***
Maximum Supply Capability	**1,254,000**	**1,351,000**	**2,478,000**

[1] Includes DWCV carryover.

[2] Remaining supply needed to meet IRP target.

Table A.3-7
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			
MWD Table A	469,000	107,000	1,026,000
DWCV Table A	77,000	60,000	155,000
San Luis Carryover [1]	69,000	208,000	208,000
Article 21 Supplies	0	0	52,000
San Bernardino Valley MWD Minimum Purchase	12,000	8,000	20,000
San Bernardino Valley MWD Option Purchase	12,000	11,000	29,000
Yuba River Accord Purchase	0	0	0
Central Valley Storage and Transfers			
Semitropic Program	46,000	41,000	69,000
Arvin Edison Program	63,000	75,000	75,000
San Bernardino Valley MWD Program	16,000	49,000	49,000
Kern Delta Program	47,000	50,000	50,000
Subtotal of Current Programs	***811,000***	***609,000***	***1,733,000***
Programs Under Development			
Delta Improvements	341,000	628,000	605,000
Mojave Groundwater Storage Program	11,000	5,000	43,000
North of Delta/In-Delta Transfers	33,000	33,000	33,000
SBVMWD Central Feeder	5,000	5,000	5,000
Shasta Return	18,000	18,000	18,000
Semitropic Agricultural Water Reuse	11,000	11,000	11,000
IRP SWP Target [2]	0	0	0
Subtotal of Proposed Programs	***419,000***	***700,000***	***715,000***
Maximum Supply Capability	**1,230,000**	**1,309,000**	**2,448,000**

[1] Includes DWCV carryover.

[2] Remaining supply needed to meet IRP target.

Table A.3-7
California Aqueduct
Program Capabilities
Year 2035
(acre-feet per year)

Hydrology	Multiple Dry Years (1990-92)	Single Dry Year (1977)	Average Year (1922-2004)
Current Programs			
MWD Table A	469,000	107,000	1,026,000
DWCV Table A	77,000	60,000	155,000
San Luis Carryover [1]	69,000	208,000	208,000
Article 21 Supplies	0	0	52,000
San Bernardino Valley MWD Minimum Purchase	12,000	8,000	20,000
San Bernardino Valley MWD Option Purchase	12,000	11,000	29,000
Yuba River Accord Purchase	0	0	0
Central Valley Storage and Transfers			
Semitropic Program	46,000	41,000	69,000
Arvin Edison Program	63,000	75,000	75,000
San Bernardino Valley MWD Program	17,000	50,000	50,000
Kern Delta Program	47,000	50,000	50,000
Subtotal of Current Programs	***812,000***	***610,000***	***1,734,000***
Programs Under Development			
Delta Improvements	341,000	628,000	605,000
Mojave Groundwater Storage Program	11,000	5,000	43,000
North of Delta/In-Delta Transfers	33,000	33,000	33,000
SBVMWD Central Feeder	5,000	5,000	5,000
Shasta Return	18,000	18,000	18,000
Semitropic Agricultural Water Reuse	11,000	11,000	11,000
IRP SWP Target [2]	0	0	0
Subtotal of Proposed Programs	***419,000***	***700,000***	***715,000***
Maximum Supply Capability	**1,231,000**	**1,310,000**	**2,449,000**

[1] Includes DWCV carryover.

[2] Remaining supply needed to meet IRP target.

Table A.3-7
In-Region Storage and Programs
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)	134,000	403,000	403,000
Flexible Storage in Castaic & Perris	37,000	111,000	111,000
Groundwater Storage			
Conjunctive Use	56,000	115,000	115,000
Cyclic Storage	19,000	56,000	56,000
Subtotal of Current Programs	***246,000***	***685,000***	***685,000***
Programs Under Development			
Raymond Basin Groundwater Conjunctive Use	9,000	22,000	22,000
LADWP Groundwater Recovery Project	12,000	12,000	12,000
IRP Development Targets			
20% by 2020 Regional Consistency	80,000	100,000	100,000
Local Supply Augmentation	61,000	72,000	72,000
Subtotal of Proposed Programs	***162,000***	***206,000***	***206,000***
Maximum Supply Capability	**408,000**	**891,000**	**891,000**

Table A.3-7
In-Region Storage and Programs
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)	186,000	557,000	557,000
Flexible Storage in Castaic & Perris	53,000	159,000	159,000
Groundwater Storage			
Conjunctive Use	101,000	115,000	115,000
Cyclic Storage	33,000	100,000	100,000
Subtotal of Current Programs	***373,000***	***931,000***	***931,000***
Programs Under Development			
Raymond Basin Groundwater Conjunctive Use	16,000	22,000	22,000
LADWP Groundwater Recovery Project	12,000	12,000	12,000
IRP Development Targets			
20% by 2020 Regional Consistency	180,000	200,000	200,000
Local Supply Augmentation	72,000	72,000	72,000
Subtotal of Proposed Programs	***280,000***	***306,000***	***306,000***
Maximum Supply Capability	**653,000**	**1,237,000**	**1,237,000**

Table A.3-7
In-Region Storage and Programs
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)	216,000	648,000	648,000
Flexible Storage in Castaic & Perris	61,000	184,000	184,000
Groundwater Storage			
Conjunctive Use	115,000	115,000	115,000
Cyclic Storage	43,000	129,000	129,000
Subtotal of Current Programs	***435,000***	***1,076,000***	***1,076,000***
Programs Under Development			
Raymond Basin Groundwater Conjunctive Use	20,000	22,000	22,000
LADWP Groundwater Recovery Project	12,000	12,000	12,000
IRP Development Targets			
20% by 2020 Regional Consistency	200,000	200,000	200,000
Local Supply Augmentation	82,000	102,000	102,000
Subtotal of Proposed Programs	***314,000***	***336,000***	***336,000***
Maximum Supply Capability	**749,000**	**1,412,000**	**1,412,000**

Table A.3-7
In-Region Storage and Programs
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)	184,000	552,000	552,000
Flexible Storage in Castaic & Perris	53,000	160,000	160,000
Groundwater Storage			
Conjunctive Use	115,000	115,000	115,000
Cyclic Storage	46,000	137,000	137,000
Subtotal of Current Programs	***398,000***	***964,000***	***964,000***
Programs Under Development			
Raymond Basin Groundwater Conjunctive Use	22,000	22,000	22,000
LADWP Groundwater Recovery Project	12,000	12,000	12,000
IRP Development Targets			
20% by 2020 Regional Consistency	200,000	200,000	200,000
Local Supply Augmentation	102,000	102,000	102,000
Subtotal of Proposed Programs	***336,000***	***336,000***	***336,000***
Maximum Supply Capability	**734,000**	**1,300,000**	**1,300,000**

Table A.3-7
In-Region Storage and Programs
Program Capabilities
Year 2035
(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)	148,000	444,000	444,000
Flexible Storage in Castaic & Perris	44,000	132,000	132,000
Groundwater Storage			
Conjunctive Use	115,000	115,000	115,000
Cyclic Storage	46,000	139,000	139,000
Subtotal of Current Programs	***353,000***	***830,000***	***830,000***
Programs Under Development			
Raymond Basin Groundwater Conjunctive Use	22,000	22,000	22,000
LADWP Groundwater Recovery Project	12,000	12,000	12,000
IRP Development Targets			
20% by 2020 Regional Consistency	200,000	200,000	200,000
Local Supply Augmentation	102,000	102,000	102,000
Subtotal of Proposed Programs	***336,000***	***336,000***	***336,000***
Maximum Supply Capability	**689,000**	**1,166,000**	**1,166,000**

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APPENDIX A.4

WATER SUPPLY ALLOCATION PLAN

AND

WATER SURPLUS AND DROUGHT MANAGEMENT PLAN

Water Supply Allocation Plan

Revised June 2009

Southern California

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

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

Water Supply Allocation Plan

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List of Acronyms:

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

Definitions:

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

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

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

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

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

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

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

Section 1: Introduction

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

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

Section 2: Development Process

Member Agency Input

Between July 2007 and February 2008, Metropolitan staff worked cooperatively with the member agencies through a series of member agency manager meetings and workgroups to develop a formula and implementation plan to allocate supplies in case of shortage. These workgroups provided an arena for in-depth discussion of the objectives, mechanics, and policy aspects of the different parts of the Plan. Metropolitan staff also met individually with 15 member agencies for detailed discussions of the elements of the recommended proposal. Metropolitan introduced the elements of the proposal to many nonmember retail agencies in its service area by providing presentations and feedback to a number of member agency caucuses, working groups, and governing boards. The discussions, suggestions, and comments expressed by the member agencies during this process contributed significantly to the development of this Plan.

Board of Directors Input

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

[1] Firm demands are also referred to as uninterruptable demands; likewise non-firm demands are also called interruptible demands.

[2] See Appendix A for list of member agencies.

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

Section 3: Review of Historical Shortage Plans[4]

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

Interruptible Water Service Program

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

Incremental Interruption and Conservation Plan

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

1995 Drought Management Plan

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

1999 Water Surplus and Drought Management Plan

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

[3] A complete listing of member agency meetings and Board of Directors reporting activities is contained in Appendix B of this report.

[4] A summary of the key elements in the following allocation plans is found in Appendix C.

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

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

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

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

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

Section 4: Water Supply Allocation Formula

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

Step 1: Base Period Calculations

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

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

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

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

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

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

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

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

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

Step 2: Allocation Year Calculations

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

(a) **Allocation Year Retail Demands:** Total retail M&I demands for the allocation year are calculated by adjusting the Base Period Retail Demands for growth. The growth adjustment is calculated using the estimated actual annual rate of population growth at the county level, as generated by the California Department of Finance, whenever possible. For years without complete data, the growth rate is calculated using an average of the three most recent years available. On an appeals basis, member agencies may request that their adjustment be calculated using member agency level population growth. A weighted combination of actual population and actual employment growth rates may also be requested.

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

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

Step 3: Supply Allocation Calculations

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

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

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

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

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

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

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

(e) Maximum Retail Impact Adjustment: The purpose of this adjustment is to ensure that agencies with a high level of dependence on Metropolitan do not experience disparate shortages at the retail level compared to other agencies when faced with a reduction in wholesale water supplies. The Maximum Retail Impact Percentage is calculated as the difference between the Regional Shortage Percentage and the Wholesale Minimum Percentage then prorated on a linear scale[11] based on each member agency's dependence on Metropolitan at the retail level. This percentage is then multiplied by the agency's Allocation Year Wholesale Demand to determine an additional allocation. For agencies that are 100 percent dependent on Metropolitan, this will result in a shortage equal to the Regional Shortage Percentage.

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

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

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

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

Section 5: Plan Implementation

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

[11] This pro-rated adjustment is only applied when Metropolitan Shortage Level is three or greater.
[12] See Appendix D for specific allocation formulae.

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

Allocation Period

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

Setting the Regional Shortage Level

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

Allocation Appeals Process

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

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

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

Allocation Penalty Rates

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

(1) Standard Penalty Rates: The recommended penalty rate structure is an ascending block structure that provides a lower penalty for minor overuse of allocations and a higher penalty for major overuse of allocations. The structure and applicable rates are listed in Table 2. The penalty rates shall be based on the official Metropolitan water rates in effect the last day in June of the 12-month allocation period.

Table 2: Standard Penalty Rates

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

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

[13] See Appendix E for tiered pricing rates as of January 10, 2008.

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

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

[16] For further definition of Preferential Rights, see Appendix F.

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

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

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

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

As previously stated, the penalty rates shall be based on the official Metropolitan water rates in effect the last day in June of the 12-month allocation period. Metropolitan staff will include equivalent preferential rights calculations in monthly reports of each member agency's water use compared to allocations.

(3) Qualifying Income-Based Rate Penalty Adjustment[20]: Any penalties incurred by a member agency under the Plan will be adjusted to reflect the extent to which retail customers within a member agency's service area are served under a "lifeline" or similar qualified discounted rate program based on income or ability to pay ("Income-Based Rate").

Any member agency who is assessed penalties under the Plan may submit an acre-foot equivalent of water used by retail customers served under a qualifying Income-Based Rate[21]. This amount of water use would be multiplied by the percentage of retail-level reduction in allocation year demand necessary for that member agency to avoid exceeding its allocation. The monetary penalties resulting from these acre feet are subtracted from the total monetary penalties incurred by an agency for exceeding its allocation. In the case that the monetary penalties associated with the Income-Based Rate are greater than the total penalties an agency incurs, no penalty will be incurred. The end result of this adjustment is that the member agency will not be subject to penalties for the use of water by their retail customers served under a qualifying Income-Based Rate.

Tracking and Reporting

Subsequent to a declared regional shortage by the Board of Directors, Metropolitan staff will produce monthly reports of each member agency's water use compared to its allocations based on monthly delivery patterns to be submitted by the member agency. In order to produce these reports, member agencies are requested to submit their local supply use on a monthly basis and certify end of allocation

[18] The base water rate shall be the applicable water rate for the water being purchased. In most cases, it will be the Tier 1 rate (plus Treatment Surcharge for treated water deliveries). However, it is possible that the water being purchased would be in the amount that would put an agency beyond its Tier 1 limit. In that case, the base water rate will be the Tier 2 rate (plus Treatment Surcharge for treated water deliveries).
[19] Penalty rate is the fully loaded untreated Tier 2 Rate.
[20] See Appendix E for specific penalty adjustment formulae and example.
[21] Appropriate documentation and certification will be required.

year local supply use. These reports and comparisons are to be used for the purposes of tracking and communicating potential underage/overage of an agency's annual allocations.

Key Dates for Water Supply Allocation Implementation

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

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

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

June 30: The allocation year is complete.

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

June 30: The allocation year is complete.

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

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

Table 5: Board Adopted Allocation Timeline

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

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

Revisiting the Plan

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

Appendix A: Member Agency List as of November 2007

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

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

Appendix B: Water Supply Allocation Plan Process Timeline

July 2007

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

August 2007

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

September 2007

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

- Member Agency Workgroup meeting
- MWD Board of Directors Oral Report

October 2007

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

November 2007

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

December 2007

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

January 2008

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

February 2008

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

Appendix C: Summary of Historical Shortage Plans

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

Table 7: Historical Shortage Plan Overview

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

Appendix D: Water Supply Allocation Formula Example

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

Step 1: Base Period Calculations

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

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

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

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

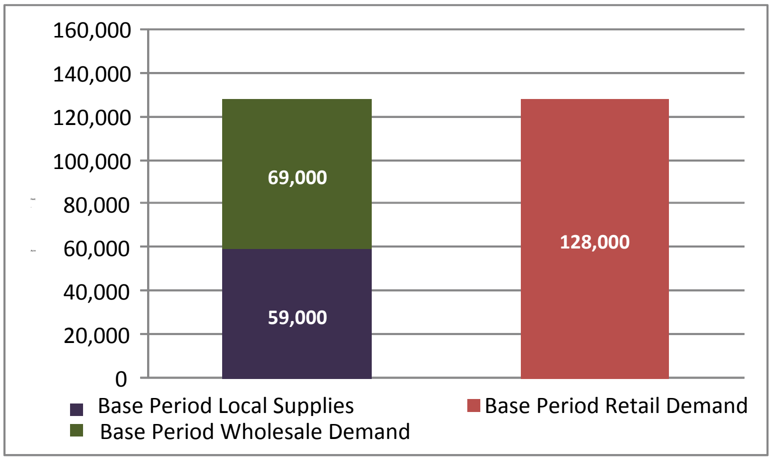
$$[(fs^1+sb^1+ss^1+ssoa^1)+(fs^2+sb^2+ss^2+ssoa^2)+(fs^3+sb^3+ss^3+ssoa^3)]\div 3=69{,}000\text{ AF}$$

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

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

59,000 + 69,000 = 128,000 AF

Figure 1: Base Period Calculations



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

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

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

Base Period IAWP Deliveries = 6,000 AF

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

Base Period Conservation=14,500 AF

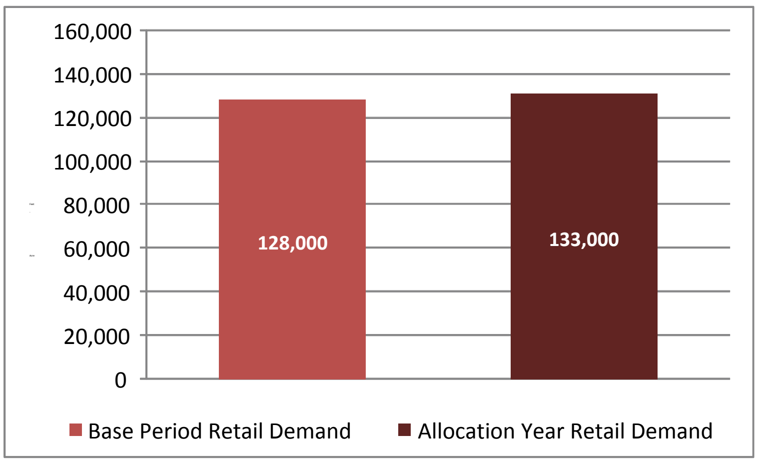
(g) Qualifying Conservation Rate Structure: Agencies that have retail use that is covered by a qualifying conserving water rates structure would be able to add .five percent of their covered Base Period Retail Demand to the Base Period Conservation.

Step 2: Allocation Year Calculations

(a) Allocation Year Retail Demand: Calculated by adjusting the Base Period Retail Demand for growth that occurred since the Base Period. Growth is estimated using the actual annual rate of county-level population growth whenever possible, or an average of the three most recent years if complete data in not available. Member agency level population or a weighted combination of population and employment growth rates may be used if an agency so requests through the appeals process.

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

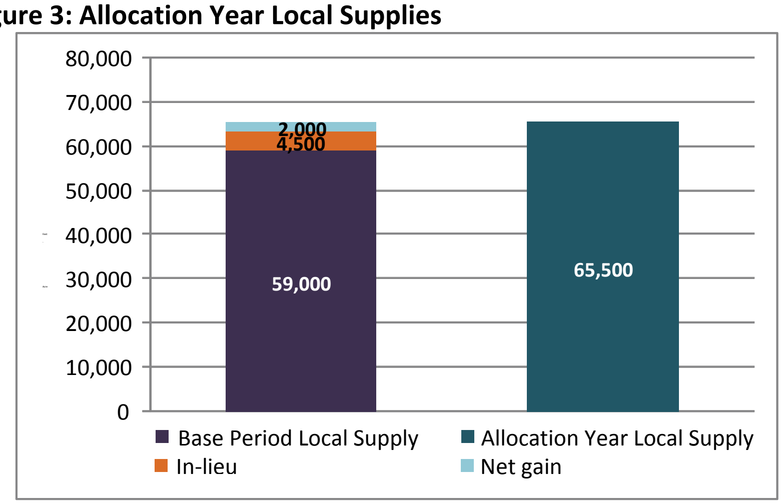
Figure 2: Allocation Year Retail Demand



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

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

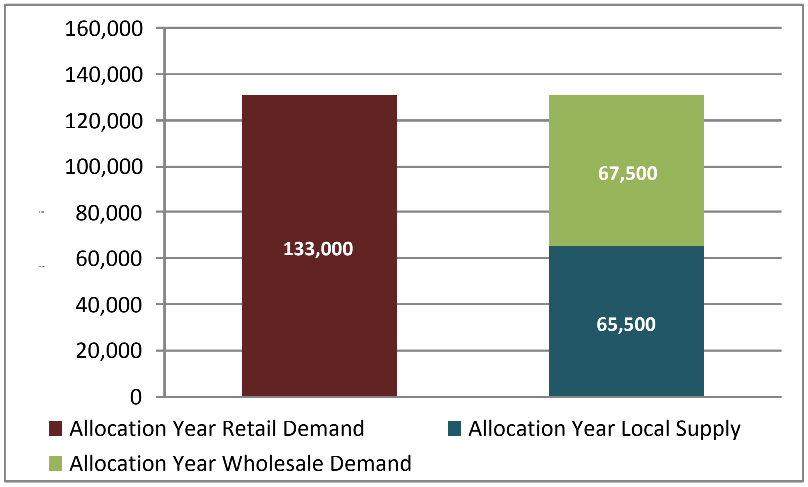
Figure 3: Allocation Year Local Supplies



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

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

Figure 4: Allocation Year Wholesale Demand



Step 3: Supply Allocation Calculations

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

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

Table 1: Shortage Allocation Index					
(a) Regional Shortage Level	(b) Regional Shortage Percentage	(c) Extraordinary Increased Production Percentage	(d) Wholesale Minimum Percentage	(e) Maximum Retail Impact Percentage	(f) IAWP Reduction
2	10%	0%	85.0%	0.0%	30%

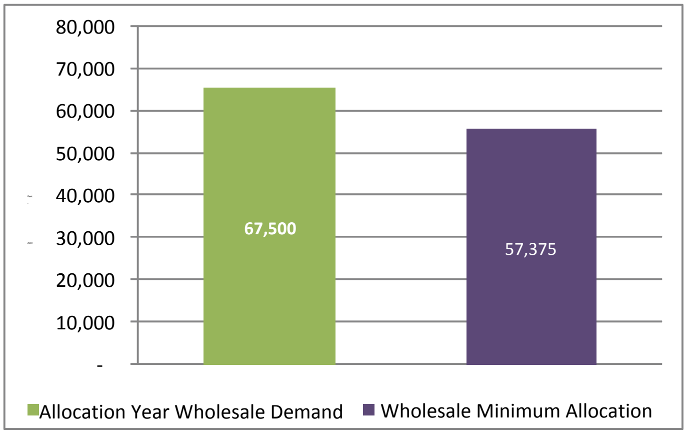
(b) Regional Shortage Percentage: The Regional Shortage Percentage at Regional Shortage Level 2 = 10%

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

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

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

Figure 5: Wholesale Minimum Allocation Shortage Level 2



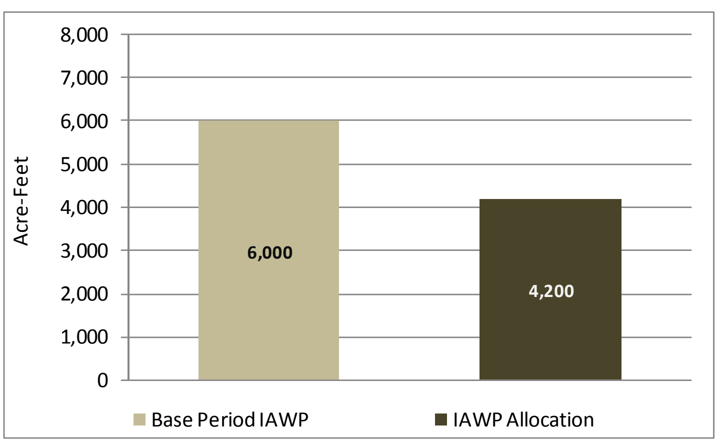
(e) Maximum Retail Impact Adjustment: There is no adjustment for Maximum Retail Impact Adjustment for Regional Shortage Levels 1 and 2.

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

6,000 AF x .30 = 1,800 AF reduction

6,000 AF- 1,800 AF= 4,200 AF IAWP Allocation

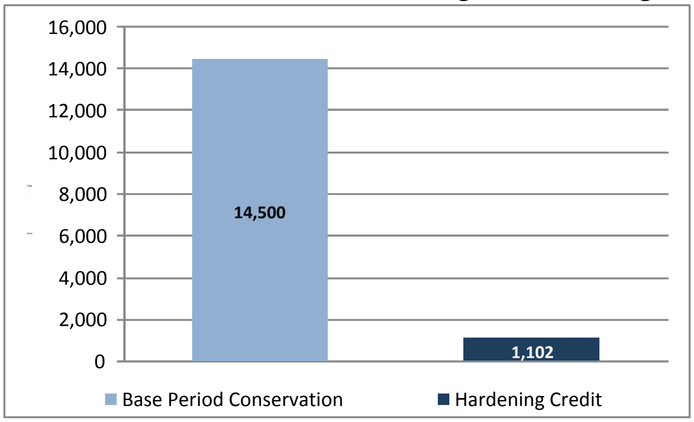
Figure 6: Interim Agricultural Water Program Reductions Shortage Level 2



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

1- ((57,375 + 65,500) ÷ 133,000) = .076 = 7.6%.
14,500 AF*.076= 1,102 AF

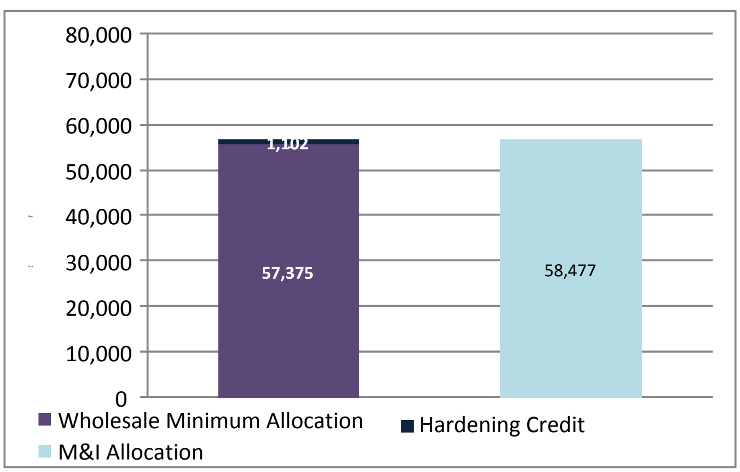
Figure 7: Conservation Demand Hardening Credit Shortage Level 2



(h) Municipal & Industrial Allocation: Calculated by adding the Wholesale Minimum Allocation (57,375 AF) and the Conservation Hardening Credit (1,102 AF).

57,375 AF + AF+1,102 AF= 58,477 acre-feet.

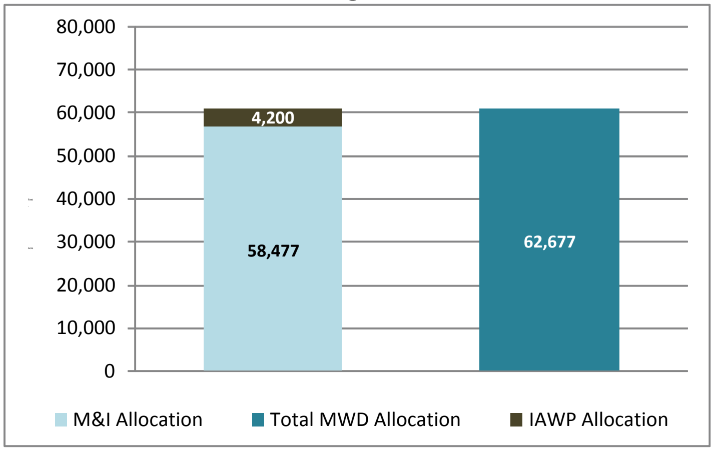
Figure 8: Municipal and Industrial Allocation Shortage Level 2



(i) Total Allocation: Add Municipal & Industrial Allocation (58,477 AF) and Interim Agricultural Water Program (4,200 AF) totals.

58,477 AF + 4,200 AF = 62,677 AF

Figure 9: Total Allocation Shortage Level 2



Regional Shortage Levels 3-10: For deeper regional shortages greater than 10 percent, the Allocation Plan formula includes a Retail Impact Adjustment Allocation to address disparate retail level shortages. This example will follow the allocation formula through a Regional Shortage Level 4.

(a) Regional Shortage Levels: Calculate from Table 1 for Regional Shortage Level 4.

Table 1: Shortage Allocation Index

(a) Regional Shortage Level	(b) Regional Shortage Percentage	(c) Extraordinary Increased Production Percentage	(d) Wholesale Minimum Percentage	(e) Maximum Retail Impact Percentage	(f) IAWP Reduction
4	20%	20%	70.0%	10.0%	50%

(b) Regional Shortage Percentage: The Regional Shortage Percentage at Regional Shortage Level 4 is 20%

(c) Extraordinary Increased Production Adjustment: Let us assume that the agency has produced 3,700 AF of extraordinary production of local supplies in a shortage year. This is calculated by multiplying the extraordinary production (3,700 AF) and the Extraordinary Increase Percentage (20%).

3,700 AF*.20=740 AF

This is then added to the Allocation Year Local Supply (65,500 AF).

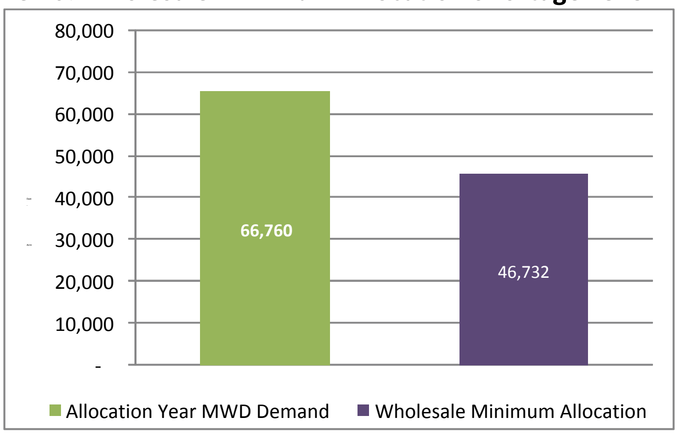
65,500 AF + 740 AF = 66,240 AF

The **Allocation Year Wholesale Demand** (67,500 AF) is then decreased by the extraordinary local supply production (740 AF) because Allocation Year Retail Demands (133,000 AF) remain unchanged.

133,000 AF- 66,240 AF = 66,760 AF or
67,500 AF-740 AF=66,760 AF

(d) Wholesale Minimum Allocation: Calculated by multiplying the agency's Allocation Year Wholesale Demand (66,760 AF) by the Wholesale Minimum Percentage (70%) from the Table 1 for Regional Shortage Level 4.
66,760 AF*.70 = 46,732 AF

Figure 10: Wholesale Minimum Allocation Shortage Level 4



(e) Maximum Retail Impact Adjustment: Calculated first by determining the agency's dependence on Metropolitan by dividing the Allocation Year Wholesale Demand (66,760 AF) by the Allocation Year Retail Demand (133,000 AF) and multiplying by 100.

(66,760 AF/ 133,000 AF)*100=50.2%

Next, this percentage dependence on Metropolitan (50.2%) is multiplied by the Maximum Retail Impact Percentage for Shortage Level 4 (10%).

.502 * .10 =.050=5%

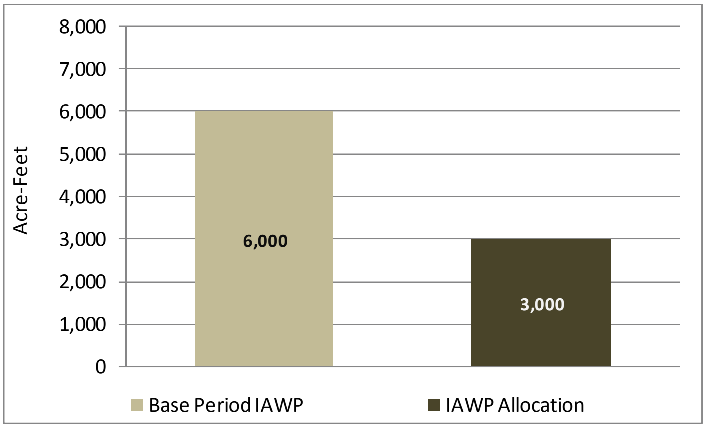
This percentage is now multiplied by the Allocation Year Wholesale Demand (66,760 AF) for the Maximum Retail Impact Adjustment.

66,760 AF*.050=3,351 AF

(f) Interim Agricultural Water Program Reductions: Calculated by reducing the Base Year IAWP deliveries by the IAWP Reduction Percentage. Under a Regional Shortage Level 4 the agency would see 50% reduction in IAWP deliveries in the allocation year. We will assume the agency has 6,000 AF IAWP water.

6,000 AF * .50 = 3,000 AF

Figure 11: Interim Agricultural Water Program Reductions Shortage Level 4



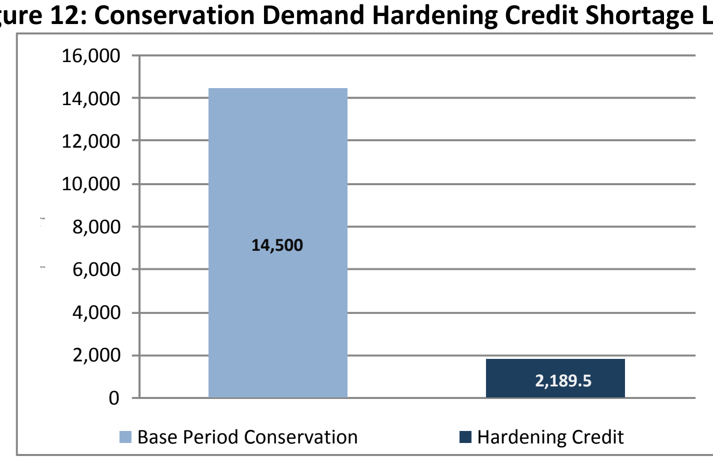
(g) Conservation Demand Hardening Credit: Calculated by adding Wholesale Minimum Allocation (46,732 AF) and Allocation Year Local Supplies (66,240 AF), dividing by Allocation Year Retail Demands (133,000 AF) and then subtracting this from 1.

1- ((46,732 + 66,240) ÷ 133,000) = .151 = 15.1%.

Next, multiply the agency's quantified conservation savings in acre-feet (14,500 AF) by its estimated retail shortage percentage calculated in the step above.

14,500 AF*.151= 2,189.5 AF

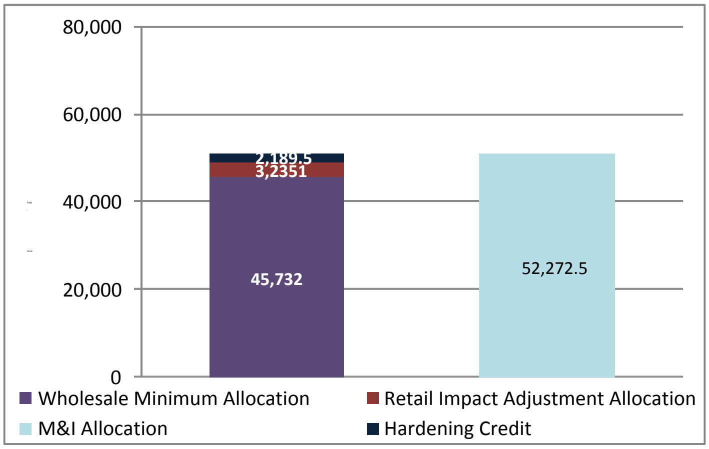
Figure 12: Conservation Demand Hardening Credit Shortage Level 4



(h) Municipal & Industrial Allocation: Calculated by adding the Wholesale Minimum Allocation (46,732 AF), the Maximum Retail Impact Adjustment (3,351 AF), and the Conservation Hardening Credit (2,189.5 AF).

46,732 AF + 3,351 AF+ 2,189.5 AF= 52,272.5 AF

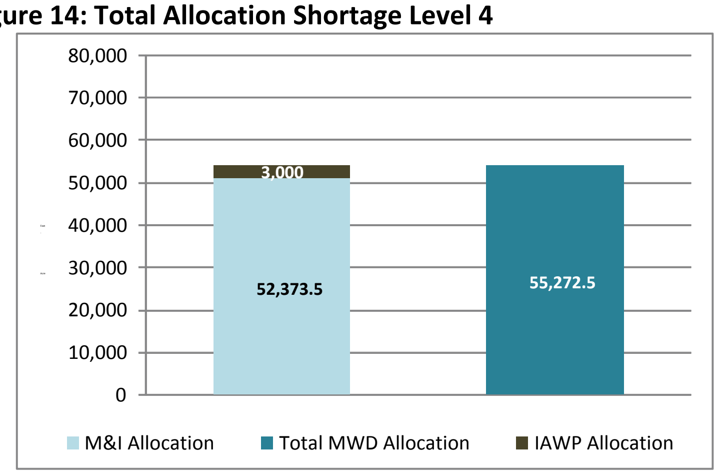
Figure 13: Municipal and Industrial Allocation Shortage Level 4



(i) Total Allocation: Calculated by adding the Municipal and Industrial Allocation (52,272.5 AF) and the Interim Agricultural Water Program Allocation (3,000 AF).

52,272.5 AF + 3,000 AF= 55,272.5 AF

Figure 14: Total Allocation Shortage Level 4



Appendix E: Qualifying Income-Based Rate Penalty Adjustment Example

The following example provides a step by step description of how the qualifying income-based rate penalty adjustment is calculated.

The following table summarizes the allocation year demands, local supplies and allocation as calculated in Appendix D for a hypothetical agency under a Level 1 or 2 Regional Shortage Level. For detailed instructions on how to calculate these figures, reference Appendix D of the Plan.

Allocation Year Retail Demand	133,000 AF
Allocation Year Local Supplies	65,500 AF
Wholesale Municipal & Industrial Allocation	58,477 AF

Step 1: Penalty Calculation

(a) **Water Use above Allocation:** The first step in calculating the income-based rate penalty adjustment is to calculate the agency's total penalty under the Plan. If the agency did not incur any penalties from the allocation year, the income-based rate penalty adjustment would not apply. For the purpose of this example, the agency used 67,600 acre-feet of MWD supplies in the allocation year. This represents 9,123 acre-feet of use above the water supply allocation.

Total MWD Water Supply Allocation	58,477 AF
Actual MWD Water Use	67,600 AF
Use Above Water Supply Allocation	**9,123 AF**

(b) **Total Penalty:** In this example the agency used 115.6% of its water supply allocation. Assuming that the preferential right penalty rate does not apply to this agency, 8,772 of the 9,123 acre-feet of use above the allocation would be penalized at a rate of two times the untreated Tier 2 rate and 351 of the 9,123 acre-feet of use above the allocation would be penalized at a rate of four times the untreated Tier 2 rate. Note that this calculation is based on the 2008 rates found in Appendix F; the actual rate will be based on the rate in effect at the end of the allocation year.

Between 100% and 115% of Allocation	8,772 AF	2 x Tier 2 = $898/AF	$7,877,256
Greater than 115% of Allocation	351 AF	4 x Tier 2 = $1796/AF	$630,396
Total	**9,123 AF**		**$8,507,652**

Step 2: Effective Income-Based Rate Cutback

(a) **Calculate Retail Cutback:** The second step in calculating the income-based rate penalty adjustment is to calculate the amount of supply cutback that would have been expected from qualifying income-based rate customers under the WSAP. Using the water supply allocation that was calculated above, the total retail level impact on the agency can be determined. In this example the agency receives a retail level cutback of 9,023 acre-feet, or 6.8% of their retail level demand.

Wholesale Municipal & Industrial Allocation + Allocation Year Local Supplies	123,977 AF
Allocation Year Retail Demand	133,000 AF
Effective Cutback	**9,023 AF (6.8%)**

(b) Income-based Rate Customer Retail Cutback: To calculate the effective income-based rate cutback, the amount of demand covered by a qualifying income-based rate is multiplied by the effective retail level cutback.

Qualifying Income-Based Rate Demand	7,690 AF
Effective Cutback Percentage	6.8%
Effective Income-Based Rate Cutback	**523 AF**

(c) Income-based Rate Cutback Penalty: Once the effective cutback has been calculated, the amount of penalty that is associated with qualifying income-based rate customers can be determined.

Between 100% and 115% of Allocation	172 AF	2 x Tier 2 = $898/AF	$154,456
Greater than 115% of Allocation	351 AF	4 x Tier 2 = $1796/AF	$630,396
Total	**523 AF**		**$784,852**

(d) Adjusted Penalty Calculation: Finally, the penalty attributable to qualifying income-based rate customers is subtracted from the total penalty that was calculated above to determine the qualifying income-based rate adjusted penalty. In the case that the monetary penalties associated with the Income-Based Rate are greater than the total penalties an agency incurs, no penalty will be incurred.

Total Penalty	$8,507,652
Qualifying Income-Based Rate Penalty	$784,852
Qualifying Income-Based Rate Adjusted Penalty	**$7,722,800**

Appendix F: Water Rates, Charges, and Definitions

Table 8: Tiered Water Pricing Rates and Charges		
Rate	**2007**	**2008**
Tier 1 Supply Rate (dollars per acre-foot)	$73	$73
Tier 2 Supply Rate (dollars per acre-foot)	$169	$171
System Access Rate (dollars per acre-foot)	$143	$143
Water Stewardship Rate (dollars per acre-foot)	$25	$25
System Power Rate (dollars per acre-foot)	$90	$110
Full Service Untreated Volumetric Cost ($/AF)		
Tier 1	$331	$351
Tier 2	$427	$449
Replenishment Water Rate: untreated (dollars per acre-foot)	$238	$258
Interim Agricultural Water Program: untreated (dollars per acre-foot)	$241	$261
Treatment Surcharge (dollars per acre-foot)	$147	$157
Full Service Treated Volumetric Cost ($/AF)		
Tier 1	$478	$508
Tier 2	$574	$606
Treated Replenishment Water Rate (treated dollars per acre-foot)	$360	$390
Treated Interim Agricultural Water Program (dollars per acre-foot)	$364	$394
Readiness-to-Serve Charge (millions of dollars)	$80	$82
Capacity Charge (dollars per cubic foot second)	$6,800	$6,800

Definitions:

(1) **Tier 1 Supply Rate -** recovers the cost of maintaining a reliable amount of supply.

(2) **Tier 2 Supply Rate** - set at Metropolitan's cost of developing additional supply to encourage efficient use of local resources.

(3) **System Access Rate** – recovers a portion of the costs associated with the delivery of supplies.

(4) **System Power Rate** – recovers Metropolitan's power costs for pumping supplies to Southern California.

(5) **Water Stewardship Rate** – recovers the cost of Metropolitan's financial commitment to conservation, water recycling, groundwater clean-up and other local resource management programs.

(6) **Replenishment Water Rate** – a discounted rate for surplus system supplies available for the purpose of replenishing local storage.

(7) **Treated Replenishment Water Rate** – a discounted rate for surplus system supplies available for the purpose of replenishing local storage.

(8) **Interim Agricultural Water Rate** – discounted rate for surplus system supplies available for the purpose of growing agricultural, horticultural, or floricultural products.

(9) **Treated Interim Agricultural Water Program Rate** – discounted rate for surplus system supplies available for the purpose of growing agricultural, horticultural, or floricultural products.

(10) **Treatment Surcharge** – recovers the costs of treating imported water.

(11) **Readiness-to-Serve Charge -** a fixed charge that recovers the cost of the portion of system capacity that is on standby to provide emergency service and operational flexibility.

(12) **Capacity Charge** – the capacity charge recovers the cost of providing peak capacity within the distribution system.

http://www.mwdh2o.com/mwdh2o/pages/finance/finance_03.html

Appendix G: Preferential Rights

Any review of Metropolitan's methods for allocating supplies during shortages must recognize Section 135 of the 1927 Metropolitan Water District Act (Act). Under Section 135, each member agency has a preferential right to a percentage of Metropolitan's available water supplies based on a legislatively established formula. That percentage is equal to the ratio of each member agency's total accumulated payments to Metropolitan's capital costs and operating expenses compared to the total of all member agencies' payments toward those costs, exempting payments for water purchases. As a result, a member agency's preferential right roughly equals it's pro rata share of all tax assessments and other payments.

In the event of a water supply shortage or drought, any Metropolitan member agency can request that its preferential right be invoked; however, Metropolitan's Board of Directors has never exercised this provision of the Act, even in response to the two statewide droughts in 1976-77 and 1987-92.

Appendix H: Allocation Appeals Process

Step 1: Appeals Submittal:

All appeals shall be submitted to the Appeals Liaison in the form of a written letter signed by the member agency General Manager. Each appeal must be submitted as a separate request, submittals with more than one appeal will not be considered. The appeal request is to include:

- A designated member agency staff person to serve as point of contact.
- The type of appeal (erroneous baseline data, loss of local supply, etc.).
- The quantity (in acre-feet) of the appeal.
- A justification for the appeal which includes supporting documentation.

A minimum of 60 days are required to coordinate the appeals process with Metropolitan's Board process.

Step 2: Notification of Response and Start of Appeals Process

The Appeals Liaison will phone the designated member agency staff contact within three business days of receiving the appeal to provide an initial receipt notification, and schedule an appeals conference. Subsequent to the phone call, the Liaison will send an e-mail to the Agency General Manager and designated staff contact documenting the conversation. An official notification letter confirming both receipt of the appeal submittal, and the date of the appeals conference, will be mailed within two business days following the phone contact

Step 3: Appeals Conference

All practical efforts will be made to hold an appeals conference between Metropolitan staff and member agency staff at Metropolitan's Union Station Headquarters within 15 business days of receiving the appeal submittal. The appeals conference will serve as a forum to review the submittal materials, and ensure that there is consensus understanding as to the spirit of the appeal. Metropolitan staff will provide an initial determination of the size of the appeal (small or large), and review the corresponding steps and timeline for completing the appeals process.

Steps 4-7 of the appeals process differ depending upon the size of the appeal

Small Appeals

Small appeals are defined as those that would change an agency's allocation by less than 10 percent, or are less than 5,000 acre-feet in quantity. Small appeals are evaluated and approved or denied by Metropolitan staff.

Step 4: Preliminary Decision

Metropolitan staff will provide a preliminary notice of decision to the member agency within ten business days of the appeals conference. The Appeals Liaison will mail a written letter to the member agency staff contact and General Manager, stating the preliminary decision and the rationale for approving or denying the appeal.

Step 5: Clarification Conference

Following the preliminary decision the Appeals Liaison will schedule a clarification conference. The member agency may choose to decline the clarification conference if they are satisfied with the preliminary decision. Declining the clarification conference serves as acceptance of the preliminary decision, and the decision becomes final.

Step 6: Final Decision

Metropolitan staff will provide a final notice of decision to the member agency within ten business days of the clarification conference. The Appeals Liaison will mail a written letter to the member agency staff contact and General Manager, stating the final decision and the rationale for the decision. A copy of the letter will also be provided to Metropolitan executive staff.

Step 6a: Board Resolution of Small Appeal Claims

> Member agencies may request to forward appeals that are denied by Metropolitan staff to the Board of Directors through the Water Planning and Stewardship Committee for final resolution. The request for Board resolution shall be submitted to the Appeals Liaison in the form of a written letter signed by the member agency General Manager, this request will be administered according to Steps 6 and 7 of the large appeals process.

Step 7: Board Notification

Metropolitan staff will provide a report to the Board of Directors, through the Water Planning and Stewardship Committee, on all submitted appeals including the basis for determination of the outcome of the appeal.

Large Appeals

Large appeals are defined as those that would change an agency's allocation by more than 10 percent, and are larger than 5,000 acre-feet. Large appeals are evaluated and approved or denied by the Board of Directors.

Step 4: Preliminary Recommendation

Metropolitan staff will provide a preliminary notice of recommendation to the member agency within 10 business days of the appeals conference. The Appeals Liaison will mail a written letter to the member agency staff contact and General Manager, stating the preliminary recommendation and the rationale for the recommendation. A copy of the draft recommendation will also be provided to Metropolitan executive staff.

Step 5: Clarification Conference

Following the preliminary recommendation the Appeals Liaison will schedule a clarification conference. The member agency may choose to decline the clarification conference if the satisfied with preliminary recommendation. Declining the clarification conference signifies acceptance of the preliminary recommendation, and the recommendation becomes final.

Step 6: Final recommendation

Metropolitan staff will provide a final notice of recommendation to the member agency within 10 business days of the clarification conference. The Appeals Liaison will mail a written letter to the member agency staff contact and General Manager, stating the final recommendation and the rationale for the recommendation. A copy of the final recommendation will also be provided for Metropolitan executive review.

Step 7: Board Action

Metropolitan staff shall refer the appeal to the Board of Directors through the Water Planning and Stewardship Committee for approval.

Appendix I: Appeals Submittal Checklist

Appeal Submittal

- ☐ Written letter (E-mail or other electronic formats will not be accepted)
- ☐ Signed by the Agency General Manager
- ☐ Mailed to the appointed Metropolitan Appeals Liaison

Contact Information

- ☐ Designated staff contact
    - o Name
    - o Address
    - o Phone Number
    - o E-mail Address
- ☐ General Manager
    - o Name
    - o Address
    - o Phone Number
    - o E-mail Address

Type of Appeal

- ☐ State the type of appeal
    - o Erroneous historical data used in base period calculations
        - Metropolitan Deliveries
        - Local Production
        - Growth adjustment
        - Conservation savings
    - o Unforeseen loss or gain in local supply
    - o Extraordinary increases in local supply

Quantity of Appeal

- ☐ State the quantity in acre-feet of the appeal

Justification and Supporting Documentation

- ☐ State the rationale for the appeal
- ☐ Provide verifiable documentation to support the stated rationale
    - o Examples of verifiable documentation Include, but are not limited to:
        - Billing Statements
        - Invoices for conservation device installations
        - Basin Groundwater/Watermaster Reports
        - CA Department of Finance economic or population data
        - Department of Public Health reports

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

WATER SURPLUS AND DROUGHT MANAGEMENT PLAN

REPORT NO. 1150

AUGUST 1999

ACKNOWLEDGMENTS

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WATER SURPLUS AND DROUGHT MANAGEMENT PLAN

METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

TABLE OF CONTENTS

EXECUTIVE SUMMARY

INTRODUCTION

The Water Surplus and Drought Management (WSDM) Plan for the Metropolitan Water District of Southern California (Metropolitan) is a ten-year plan that will be used to direct Metropolitan's resource operations to help attain the region's 100% reliability goal. The WSDM Plan recognizes the interdependence of surplus and shortage actions and is a coordinated plan that utilizes all available resources to maximize supply reliability. The overall objective of the WSDM Plan is to ensure that shortage allocation of Metropolitan's imported water supplies is not required.

The central effort in developing the WSDM Plan was a participatory process involving Metropolitan and its member agencies. Metropolitan staff and member agency representatives coordinated the Plan's development during a series of meetings of the Rate Refinement Team.

To lay a foundation for the WSDM Plan, participants in the Rate Refinement Process developed a set of proposed WSDM Principles and Implementation Goals which were subsequently adopted by the Metropolitan Board of Directors in September 1998. These Principles and Implementation Goals outline fundamental policies for guiding surplus and shortage management and establish a basis for dealing with shortages in an equitable and efficient manner.

WSDM PRINCIPLES AND IMPLEMENTATION GOALS

Guiding Principle

- Metropolitan will encourage storage of water during periods of surplus and work jointly with its Member Agencies to minimize the impacts of water shortages on the region's retail consumers and economy during periods of shortage.

Supporting Principles

- Maintain an ongoing coordinated effort among Metropolitan and its Member Agencies to encourage efficient water use, develop cost-effective local resource programs, and inform the public on water supply and reliability issues

- Encourage local and regional storage during periods of surplus and use of storage during periods of shortage

- Manage and operate Metropolitan's regional storage and delivery system in coordination with local facilities to capture and store surplus water in local groundwater and surface reservoirs

- Arrange for secure sources of additional water from outside the region for use during periods of shortage

- Call upon sources of additional water from outside the region and water stored locally to meet the needs of consumers and protect the economy during periods of shortage

WSDM Plan Implementation Goals

- Avoid mandatory import water allocations to the extent practicable

- Equitably allocate imported water on the basis of agencies' needs

  Considerations to create an equitable allocation of imported water may include:

  - Impact on retail consumers and economy
  - Reclamation/Recycling
  - Conservation
  - Population and economic growth
  - Investment in local resources
  - Change and/or loss of local supply
  - Participation in Metropolitan's Non-firm (interruptible) programs
  - Investment in Metropolitan's facilities

- Encourage storage of surplus supplies to mitigate shortages and improve water quality

SURPLUS AND SHORTAGE ACTIONS

The region's ability to implement a long-term WSDM Plan results from the significant investments Metropolitan and its member agencies have made in a variety of resources since 1991. These additional resources include increased local conservation and water recycling, improvements in the reliability of imported supplies, increased regional storage, and increased conjunctive use groundwater programs. Together these improvements allow a comprehensive approach to water management.

The growing variety of resources available to the region is transforming Metropolitan from an agency with relatively modest storage capacity to one that will have storage sufficient to manage many shortages without impacts to its member agencies or retail customers. To attain this level of reliability, all storage programs and facilities, along with conservation, recycling, and other programs, must be managed as an integrated set of regional resources. To accomplish this, the WSDM Plan establishes the linkage between surplus and shortage resource management actions.

When imported supplies exceed projected demands for imported water within Metropolitan's service area, Metropolitan can operate available storage facilities to maximize the benefits of stored water to its member agencies. A number of factors affect Metropolitan's ability to divert surplus water into storage. Some of these factors include facility outages, system capacity, water quality (including requirements for managing total dissolved solids), and varying supply and demand patterns. The WSDM Plan provides a description of storage options available to Metropolitan and a framework for storing water in these programs and facilities when surplus supplies are available.

Except in severe or extreme shortages (defined in the Introduction) or emergencies, Metropolitan's resource management will allow shortages to be mitigated without impacting retail Municipal and Industrial (M&I) customers. A list of resource management actions and their descriptions are provided below. This list emphasizes critical storage programs and facilities, and conservation programs that make up part of Metropolitan's response to shortages. The order in which these actions are presented does not imply the exact operational management of resources that would occur during a shortage, rather it represents a general framework and guide. In fact, several actions are likely to be taken concurrently. Many factors will dictate the exact order in which these actions will be taken during shortages. One action, however, will have an assigned prioritization: the curtailment of Full Service (firm) deliveries will be last. The following summarizes the drought actions:

- Draw on storage in the Eastside Reservoir Project
- Draw on out-of-region storage in Semitropic and Arvin-Edison
- Reduce/suspend long-term seasonal and groundwater replenishment deliveries
- Draw on contractual groundwater storage programs in the region
- Draw on State Water Project (SWP) terminal reservoir storage (per Monterey Agreement)
- Call for extraordinary drought conservation and public education
- Reduce Interim Agricultural Water Program (IAWP) deliveries
- Call on water transfer options contracts
- Purchase transfers on the spot market
- Implement the allocation of Metropolitan's imported supplies to its member agencies

For the ten-year period addressed by the WSDM Plan, 1999-2008, the majority of shortage contingencies will be managed by withdrawals from storage, groundwater management and options transfers. Shortages managed using these actions would not impact the quantity of water delivered to member agencies for consumptive uses. In fact, when coupled with other drought actions such as extraordinary conservation and reduction of agricultural deliveries, it is fully expected that an allocation of firm imported water supplies will not be necessary during the next ten years. Under this worse-case scenario, an approach to allocate Metropolitan's firm imported water supplies in a fair and equitable manner will be developed.

The overall policy objective of the allocation method will be to minimize the impacts to any one agency and the region as a whole. To meet that objective, the method of allocating firm imported supply will account for:

- Each agency's demands on Metropolitan,
- Each agency's local resources
- Each agency's total retail demands.

The WSDM Plan allocation method would address each of these supply and demand components and account for each agency's conservation and recycled water programs. A pricing structure will be coupled with the WSDM allocation method to accomplish two goals:

- Encourage conservation and water recycling
- Ensure that the regional impact of the shortage is as small as possible

To provide as much water as possible without changing wholesale prices, the allocation of all available supplies will be made at the prevailing rates for firm deliveries. In order to encourage conservation to the level of allocation, the rate for agency usage from 100-102% of its allocation will be the Full Service rate plus $175. Usage above 102% of allocated supply will be charged at three times the Full Service rate. Any substantial change in Metropolitan's water rate structure may require these rates to be revised.

During severe or extreme shortage conditions, public outreach will play a critical role in shaping consumer response. Public information campaigns will send clear signals if extraordinary drought conservation is required. An effective public information campaign requires a joint effort among Metropolitan and its member agencies. Under this Plan, the administration of the Public Information and Government Affairs program will be the responsibility of a Drought Program Officer (DPO). The DPO will be responsible for integrating the various activities in these areas, coordinating efforts with Metropolitan's Board of Directors and member agencies, and designing the region-wide messages for the general public and various target audiences. Important constituencies are residential users, industrial and institutional users, business interests, agricultural users, elected officials, officials of various agencies such as the Department of Water Resources, and the media.

INTEGRATED RESOURCES MANAGEMENT

Throughout the Integrated Resources Planning process and the development of the WSDM Plan, extensive analysis of resource management strategies focused on maximizing supply reliability while minimizing overall resource costs. Various management strategies were analyzed trader shortage scenarios based on historical hydrologic data. The WSDM Plan presents a resource management framework to guide Metropolitan's integrated approach to supply management.

The resource management framework does not dictate a scripted response to shortage or surplus. The framework recognizes the complexity and variety of conditions that require action. Supporting this framework are general rules that describe the actions to be taken in each stage of surplus or shortage. These rules depend on shortage stage, account for monthly delivery requirements, and depend on when various supplies would be available.

One of the fundamental trade-offs in dealing with supply shortages is the need to maintain flexibility while providing supply certainty to member agencies and consumers. A central focus of the WSDM Plan is the analysis of information about supplies and demands. When do various pieces of information about the supply/demand balance become more certain? When should this information impact policy-making and trigger various resource actions? The WSDM Plan addresses these questions and the actual implementation of the Plan during a shortage.

Appendix A of this report provides a ten-year simulation of projected demands and supplies showing an example of how the region can maintain 100% reliability.

INTRODUCTION

The Metropolitan Water District of Southern California (Metropolitan) provides water to a service area covering approximately 5,200 square miles. Over 16.5 million people live within the service area, which supports a $500 billion economy. Metropolitan provides supplemental supplies to twenty-seven member agencies, both retail and wholesale agencies, who in turn provide water to over three hundred cities and local agencies providing supplies at the retail level. In recent years Metropolitan supplemental deliveries have accounted for about one-half to two-thirds of the region's total water demands. With supplies from its Colorado River Aqueduct (CRA) and the State Water Project (SWP), Metropolitan delivers water for municipal and industrial (M&I) uses, agricultural uses, and augmentation of local storage.

As part of the implementation of the regional Integrated Resources Plan (IRP), Metropolitan and its member agencies have developed the Water Surplus and Drought Management (WSDM) Plan for Southern California. This ten-year plan will direct Metropolitan's resource operations to help attain the region's 100% reliability goal. Over this ten-year period, the WSDM Plan will be updated to account for changes impacting supplies from the Colorado River and California's Bay-Delta. In the past, Metropolitan has developed drought management plans that simply addressed shortage actions and primarily focused on issues of short-term conservation and allocation of imported water. The WSDM Plan recognizes the interdependence of surplus and shortage actions and is a coordinated plan that utilizes all available resources to maximize supply reliability. The overall goal of the WSDM Plan is to ensure that shortage allocation of Metropolitan's imported water supplies is no---At required.

Because it addresses both surplus and shortage contingencies, the WSDM Plans draws clear distinctions among the terms *surplus, shortage, severe shortage,* and *extreme shortage.*

Surplus*: Supplies are sufficient to allow Metropolitan to meet Full Service demands, make deliveries to all interruptible programs (replenishment, long-term seasonal storage, and agricultural deliveries), and deliver water to regional and local facilities for storage.*

Shortage*: Supplies are sufficient to allow Metropolitan to meet Full Service demands and make partial or full deliveries to interruptible programs, sometimes using stored water and voluntary water transfers.*

Severe Shortage*: Supplies are insufficient and Metropolitan is required to make withdrawals from storage, call on its water transfers, and possibly call for extraordinary drought conservation and reduce deliveries under the IAWP.*

Extreme Shortage*: Supplies are insufficient and Metropolitan is required to allocate available imported supplies.*

WSDM PRINCIPLES AND IMPLEMENTATION GOALS

The central effort in developing the WSDM Plan was a participatory process involving Metropolitan and its member agencies. Metropolitan staff and member agency representatives coordinated the Plan's development during a series of meetings of the Rate Refinement Team and the Integrated Resources Planning Workgroup. To lay a foundation for the WSDM Plan, participants in the Rate Refinement Process developed a set of "WSDM Principles and Implementation Goals."

Guiding Principle

- Metropolitan will encourage storage of water during periods of surplus and work jointly with its Member Agencies to minimize the impacts of water shortages on the region's retail consumers and economy during periods of shortage.

Supporting Principles

- Maintain an ongoing coordinated effort among Metropolitan and its Member Agencies to encourage efficient water use and cost-effective local resource programs and to inform the public on water supply and reliability issues

- Encourage local and regional storage during periods of surplus and use of storage during periods of shortage

- Manage and operate Metropolitan's regional storage and delivery system in coordination with local facilities to capture and store surplus water in local groundwater and surface reservoirs

- Arrange for secure sources of additional water from outside the region for use during periods of shortage

- Call upon sources of additional water from outside the region and water stored locally to meet the needs of consumers and protect the economy during periods of shortage

WSDM Plan Implementation Goals

- Avoid mandatory import water allocations to the extent practicable

- Equitably allocate imported water on the basis of agencies' needs

  Considerations to create an equitable allocation of imported water may include:
  - Impact on retail consumers and economy
  - Reclamation/Recycling
  - Conservation
  - Population and economic growth
  - Investment in local resources
  - Change and/or loss of local supply
  - Participation in Metropolitan's Non-firm (interruptible) programs
  - Investment in Metropolitan's facilities.

- Encourage storage of surplus supplies to mitigate shortages and improve water quality

REGIONAL RESOURCES AND DEMANDS

Southern California receives its water supplies from a variety of different sources, both local to the region and imported from outside the region. These sources are summarized below.

Local Supplies

Local supplies include groundwater pumping of local aquifers, surface reservoir production, recycled water, and supplies imported through wheeling arrangements or through the Los Angeles Aqueduct, which is owned and operated by the City of Los Angeles. Local supplies have, in the past, provided as much as 2.1 million acre-feet (maf) of water to meet the region's water demands. By far the largest component of local supplies is groundwater pumping, providing over 75% of historical local supplies.

Colorado River Supplies

The distribution and management of Colorado River water is governed by a complex body of laws, court decrees, compacts, agreements, regulations, and an international treaty collectively known as the "Law of the River." Metropolitan's entitlement is established by the fourth and fifth priorities of California's Seven Party Agreement, included in Metropolitan's 1931 and 1946 contracts with the Secretary of the Interior. These priorities provide 550,000 acre-feet (af) per year and 662,000 af per year, respectively. In addition, Metropolitan holds a surplus water contract for delivery of 180,000 af. The physical capacity of the CRA is slightly in excess of 1.3 maf per year, based on a pumping capacity of 1,800 cubic feet per second (cfs). Metropolitan's long-held objective is to maximize the availability of Colorado River water, up to the maximum capacity of the CRA, subject to environmental, contractual, legal, political, financial, and institutional constraints. A California 4.4 Plan is being developed among California parties that will help ensure that full CRA deliveries are maintained, while addressing the concerns of the other Colorado River basin states that rely on the river. The California 4.4 Plan includes core transfers (such as the IID/MWD conservation agreement and the proposed IID/SDCWA transfer), system conservation (such as the lining of the All American Canal), offstream storage (such as the Arizona groundwater storage program), dry year option transfers (such as PVID land fallowing), and river re-operations.

State Water Project

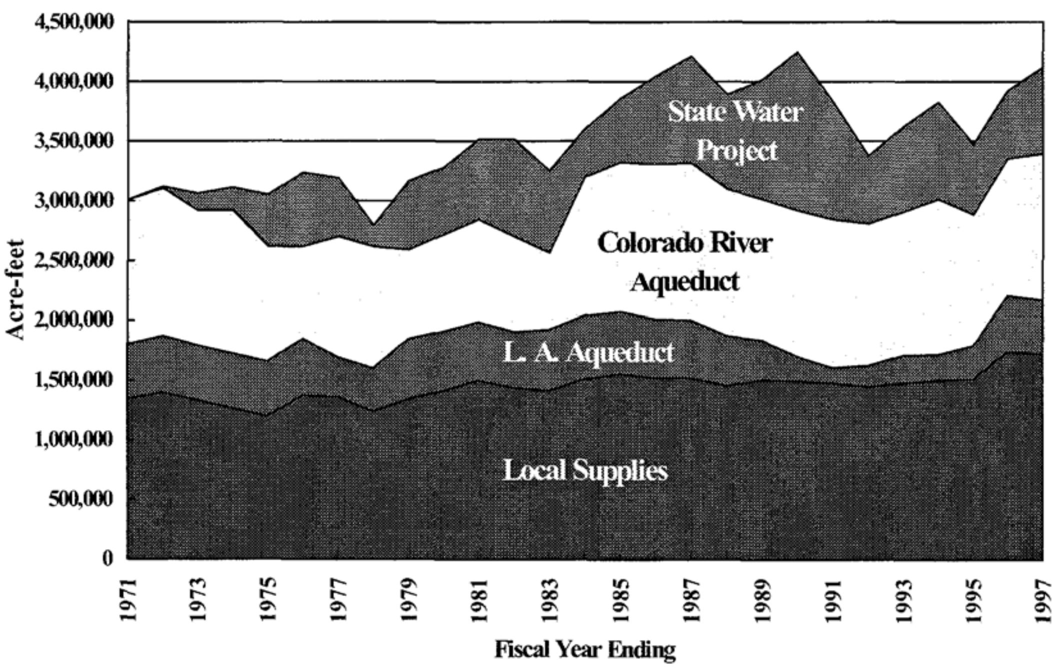
Metropolitan is one of 29 water agencies that have contracted with the State of California, through the Department of Water Resources (DWR), for water deliveries from the SWP system. Metropolitan's contracted entitlement is for 2.01 maf per year, or about 48 percent of the total contracted entitlement of 4.2 maf per year. SWP deliveries to Metropolitan are made via the SWP's California Aqueduct.

Initial SWP facilities, completed in the early 1970's, have produced average supply yields adequate to meet just over half of the total contracted entitlement. While it was intended that additional SWP facilities would be constructed as SWP contractor demands increased up to their contracted entitlements, few facilities have been constructed since that time.

The SWP obtains its supplies primarily from the Sacramento River Basin. About half of the total supply diverted from the Delta for the SWP is regulated flow from the Feather River (a tributary to the Sacramento River), while the other half is unregulated flow from runoff downstream of Sacramento River reservoirs and from other rivers that flow into the Delta. The Sacramento River watershed is subject to wide annual variations in total runoff. The Sacramento River Index (SRI), which measures runoff in the watershed, has averaged about 18 maf per year over the last 90 years. However, runoff varies widely from year to year. For example, the SRI measured 7.8 mafin 1994 and 32.5 mafin 1995.

Figure 1 shows the historical total regional supply production by type. As shown in Figure 1, water supplies were as high as 4.25 mafin 1990 and within two years dropped to 3.4 mar, a 20% decrease.

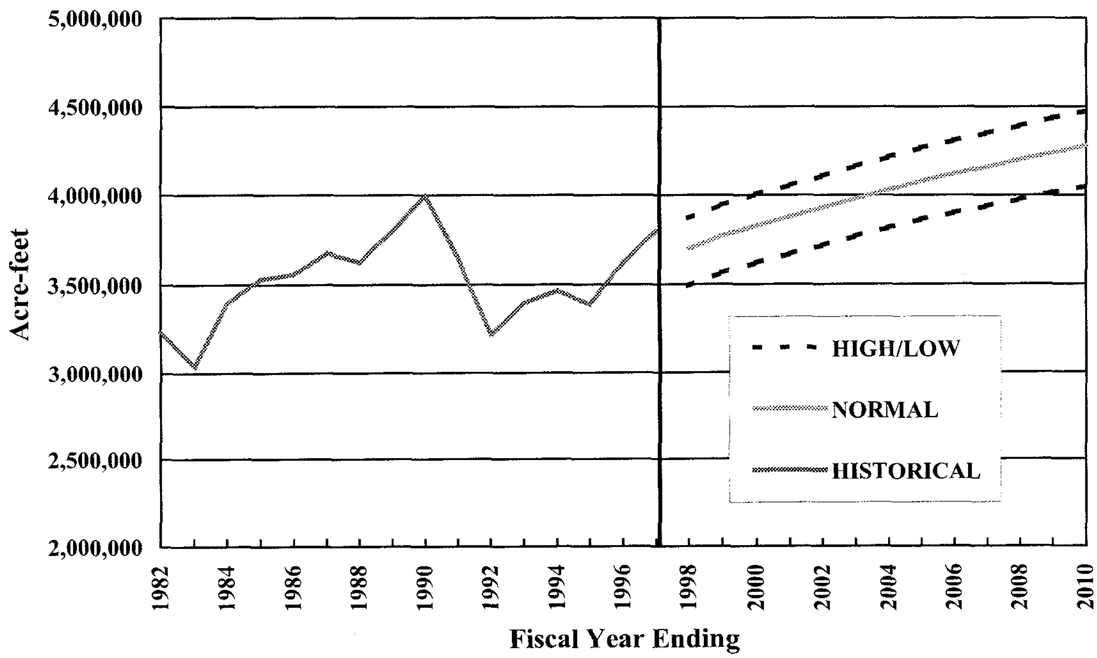
Figure 1. Historical Supply Production by Type of Supply



RETAIL DEMANDS

From 1982 through 1995, the region experienced retail water demands averaging 3.5 mar. In dry years retail demands are approximately 5 to 7% greater than normal years, while demands in wet years are about 6 to 8% below normal demands. Under normal weather conditions, assuming full implementation of conservation best management practices, total regional retail demands are projected to increase from about 3.7 mar in 1997 to almost 4.3 mar in 2010. Without conservation, demands in 2010 would be about 10 to 12% greater than projected. Increases in retail demand are driven by demographics and economics, including changes in population, housing, employment, and income. Figure 2 shows the historical and projected retail demands in Metropolitan's service area.

Figure 2. Regional Retail Water Demands



The historical variability in demands from 1982 to 1997 is mainly due to weather and the economy. In 1983, extreme wet weather caused a significant drop in retail demands. During the period from 1985 to 1990, hot and dry weather coupled with a strong economy resulted in increased demand from 3.5 maf to 4.0 maf, a 14% increase. In 1991, the 5th year of a prolonged drought, conditions forced many communities to implement mandatory supply reductions. These mandatory reductions coupled with extraordinary drought conservation caused a 10 to 15% decrease in retail demands for the region. In addition, the period between 1992 and 1995 was very wet (with the exception of 1994, which was dry), and was a period of severe economic recession. Southern California alone lost some 700,000 jobs from 1990 through 1995. The combination of wet weather, economic recession, and conservation resulted in demands decreasing by over 17%.

DEMANDS ON METROPOLITAN

For many member agencies, Metropolitan's water deliveries represent a supplemental supply. Most member agencies have local water supplies, but agencies differ in how much their supplies alone can meet their respective retail demands. Local supplies are often base-loaded (maximized subject to various constraints) and purchases from Metropolitan are used to meet remaining demands. In addition, to meeting consumptive demands, Metropolitan's deliveries are used to replenish local groundwater and surface reservoirs. To project demands on Metropolitan, projections of member agency's retail water demands and local water supplies are made. Local supplies are then subtracted from retail demands to get consumptive demands on Metropolitan. A projection of Metropolitan's long-term seasonal and replenishment deliveries are made based on safe groundwater yield and weather/hydrology.

Metropolitan forecasts its demands for three different broad categories: Full Service, Seasonal (reservoir storage and groundwater replenishment delivered for shift or long-term storage purposes and sold at a discount), and Agricultural (deliveries of water sold at a discount for agricultural use). Overall, demands on Metropolitan can vary -+ 11 to 18% from normal conditions due to weather and hydrology.

The following four figures show historical and projected demands on Metropolitan by category. Figure 3 shows Basic Water Deliveries, Figure 4 shows Seasonal Water Deliveries, Figure 5 shows Interim Agricultural Water Program (IAWP) Deliveries, and Figure 6 shows Total Water Deliveries for Metropolitan.

Figure 3. MWD Basic Water Deliveries

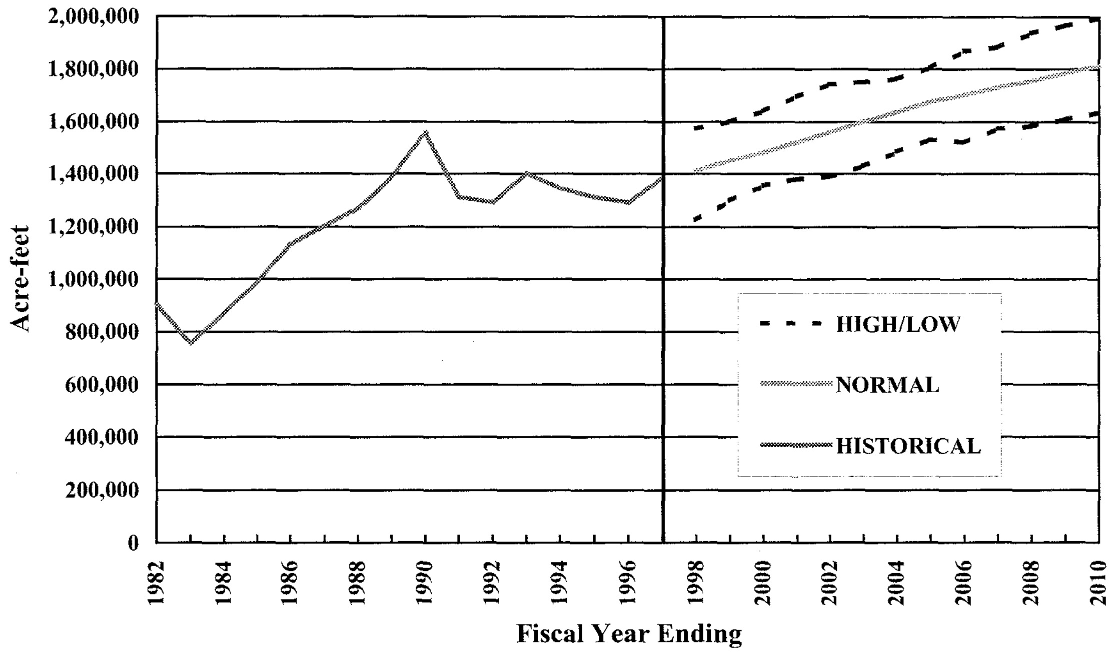


Figure 4. MWD Seasonal Water Deliveries

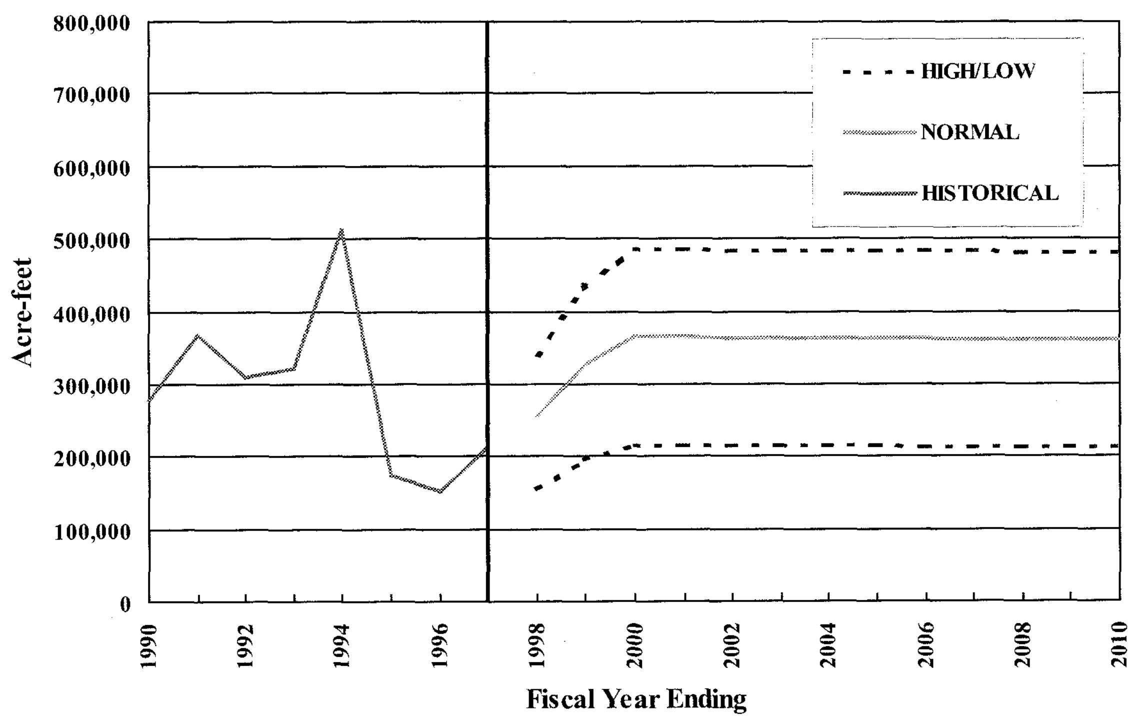


Figure 5. MWD Interim Agricultural Water Program (IAWP) Deliveries

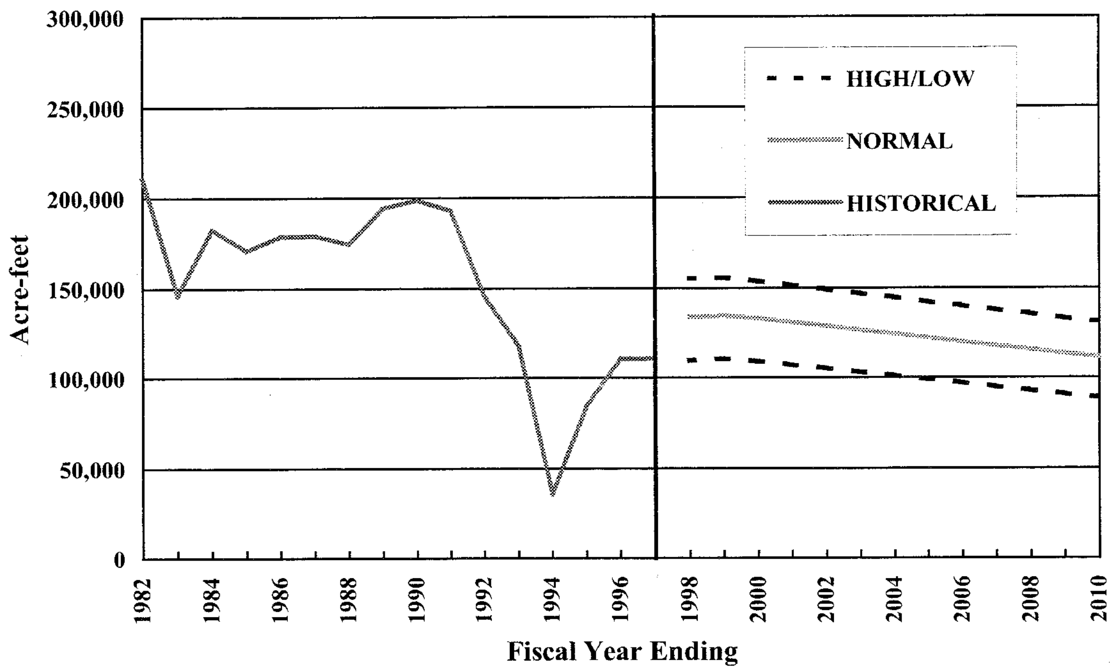
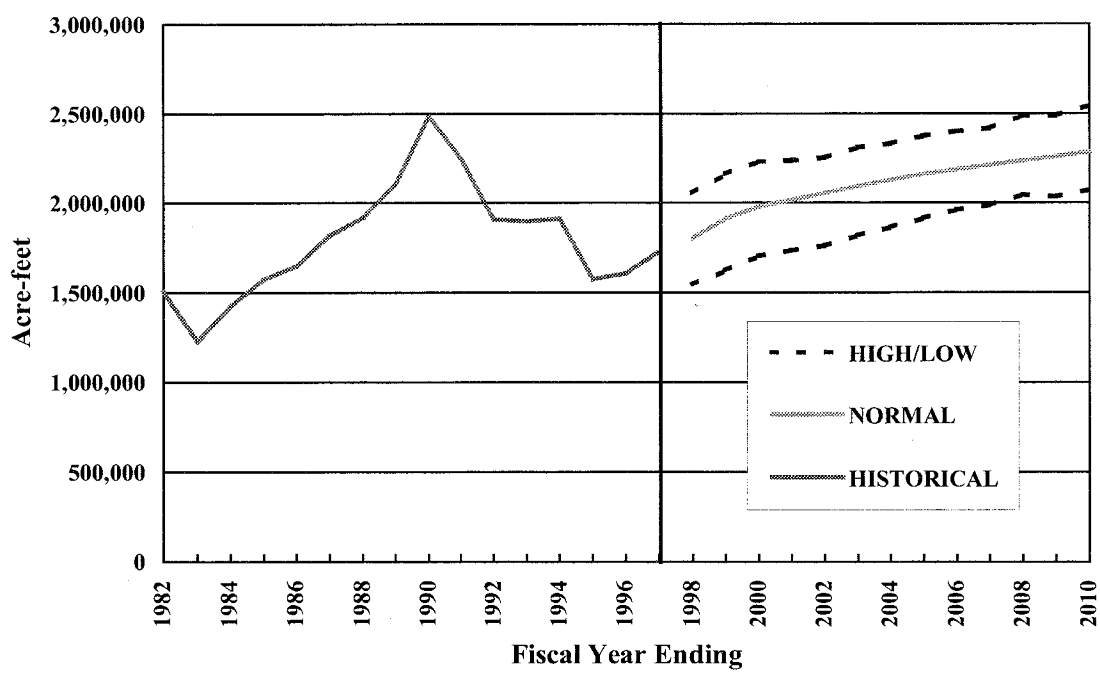


Figure 6. MWD Total Water Deliveries



INTEGRATED RESOURCES PLANNING

To ensure supply reliability under various drought conditions, Metropolitan and its member agencies developed an Integrated Resources Plan (IRP). The IRP, adopted by Metropolitan's Board of Directors in January 1996 and periodically updated, guides Metropolitan's resource and capital improvements investments. The region's ability to develop a long-term WSDM Plan results from the significant investments Metropolitan and its member agencies have made in resources since 1991. To date, these investments include:

- Local supplies: Metropolitan co-funded over 23 local projects and 200 conservation programs that will yield a total of 160,000 af per year.

- **Colorado River Aqueduct:** Metropolitan developed transfers and storage programs to help ensure a full aqueduct. The landmark Metropolitan/Imperial Irrigation District Conservation Program (IID), will result in a savings of 107,000 af per year. Storage programs in Arizona and California, combined with the IID savings, yield a total of 280,000 af of annual core, dry year options, and storage supply.

- **State Water Project:** Metropolitan and other parties negotiated the Bay-Delta Accord and the Monterey Amendment. The Bay-Delta Accord and subsequent efforts will increase the reliability of Metropolitan's entitlement deliveries. The Monterey Amendment provides access to 220,000 af of SWP storage.

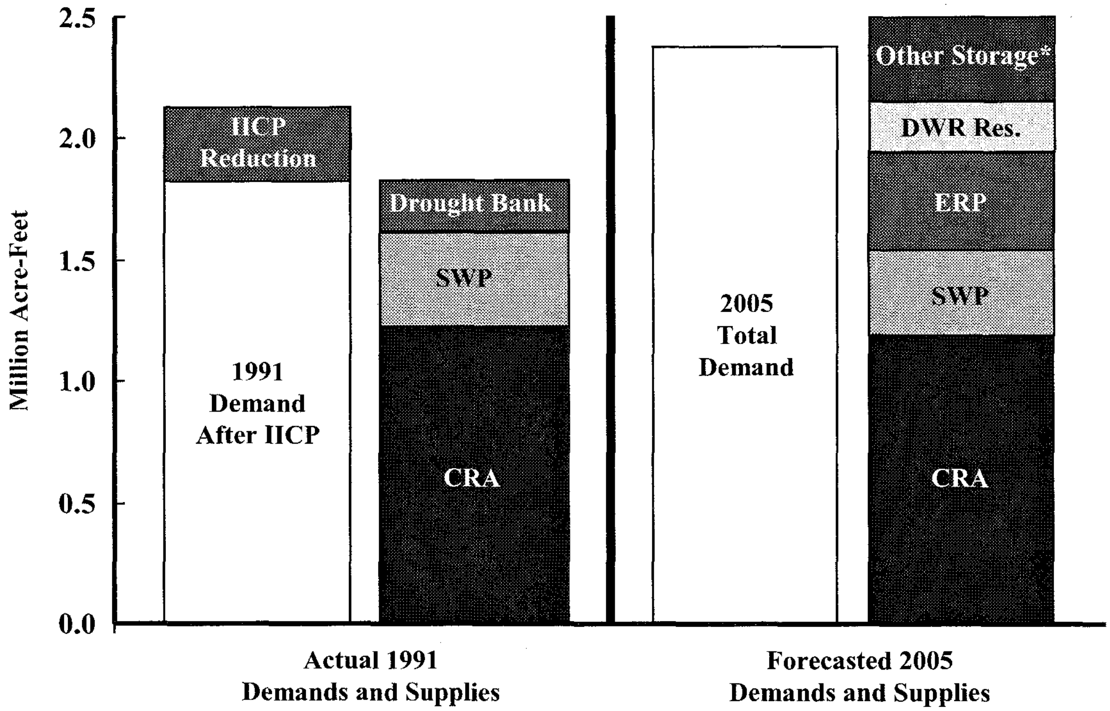
- **In-Basin Storage:** Metropolitan is constructing the Eastside Reservoir Project, with 800,000 af of storage (400,000 af of which is emergency storage for use in case of facility failure as a result of earthquake or other event).

- **Groundwater Conjunctive Use Storage:** Metropolitan developed a conjunctive use storage program in the North Las Posas Basin in Ventura County with an anticipated capacity of 210,000 af and a dry-year withdrawal rate of up to 70,000 af.

- **Transfers and Storage:** Metropolitan developed the Semitropic Storage Program, with 350,000 af of storage and dry-year withdrawals averaging about 60,000 af. Metropolitan also approved the Arvin-Edison Storage and Transfer Program, with 250,000 af of storage and dry-year withdrawals averaging about 70,000 af. Metropolitan is also exploring storage and transfer programs with the Coachella Valley Water District and the Cadiz Land Company.

As a result of these investments, it is anticipated that Metropolitan and its member agencies will be 100% reliable over the next 10 years even under a repeat of the 1991 drought condition. Figure 7 compares actual Metropolitan demands and supplies during 1991 (the last year in a multiyear severe drought) and projected demands and supplies in year 2005 (assuming a repeat of 1991 conditions). In 1991, the region faced shortages that required Metropolitan to allocate water under the Incremental Interruption and Conservation Plan (IICP). The reduction in deliveries came after demands had already been reduced as a result of local conservation. In addition, water had to be purchased from the Governor's drought emergency water bank. By the year 2005 with the investments made to date, Metropolitan's additional water supplies will be more than adequate to meet demands under a repeat of the 1991 drought event--even with increased demands due to growth.

Figure 7. Historical and Projected Metropolitan Supplies and Demands Under Drought Conditions



*** Groundwater management, Semitropic Storage Program, and Arvin-Edison Storage Program**

SURPLUS AND SHORTAGE RESOURCE ACTIONS

Metropolitan's investments in water resources, facilities, and programs has transformed it from an agency with relatively modest storage capacity to one that will have storage sufficient to manage many shortages without negative impacts to its member agencies or retail customers. To attain this level of reliability, storage programs and facilities, along with conservation, recycling, and other programs, must be managed as an integrated set of regional resources. To accomplish this, the WSDM Plan recognizes the linkage between surplus and shortage resource management actions.

SURPLUS ACTIONS

The combination of Metropolitan's regional storage facilities, such as Lake Mathews, Lake Skinner, the future Eastside Reservoir Project, and the storage capacity available to Metropolitan in Castaic Lake and Lake Perris as a result of the Monterey Amendment, allows Metropolitan great flexibility in managing its water resources. The development of storage programs both outside and within the service area provides even greater flexibility in storing surplus water. Each of the storage facilities and programs plays an important role in achieving Metropolitan's reliability goal.

When imported supplies exceed projected demands for imported water within Metropolitan's service area, Metropolitan can operate storage facilities to maximize stored water to benefit its member agencies. A number of factors affect Metropolitan's ability to divert surplus water into storage. Some of these factors include facility outages, system capacity, water quality (including requirements for managing total dissolved solids), and varying supply and demand patterns. This section provides a description of storage options available to Metropolitan and a framework for storing water in these programs and facilities when surplus supplies are available.

Storage of Colorado River Supplies

Metropolitan has participated in a number of programs to maximize the reliability of supplies from the Colorado River. The landmark Metropolitan/Imperial Irrigation District Conservation Program will result in a savings of 107,000 af per year. These supplies will increase the reliability of Metropolitan's entitlement of Colorado River water. Other programs yield shortage benefits by increasing amounts of water stored for use during shortages. Between August 1992 and July 1994, Metropolitan and the Palo Verde Irrigation District conducted a Test Land Fallowing Program. Approximately 20,000 acres of farmland in the Palo Verde Valley were not irrigated, saving 186,000 af of water which was stored in Lake Mead for later use by Metropolitan. With Arizona and Nevada water agencies, Metropolitan is participating in a Central Arizona Groundwater Storage Demonstration Program that has encouraged the storage of water. To date, 139,000 af of supplies have been stored in groundwater basins in Central Arizona. The Desert Coachella program is an exchange and storage program with agencies situated along the Colorado River Aqueduct. Metropolitan releases Colorado River water for storage in the Coachella Groundwater Basin. Metropolitan then exchanges these supplies for the participating agencies' SWP supplies. These programs serve as models for future programs that could increase the reliability of Colorado River supplies. Metropolitan continues to explore other possible options that would increase the reliability of supplies. The California 4.4 Plan is being developed among California parties to increase storage programs for Colorado River supplies. In addition to core transfers and conservation programs, the California 4.4 Plan includes offstream storage (such as the Arizona groundwater storage program), dry year option transfers (such as PVID land fallowing), and river re-operations. These programs, in conjunction with favorable supply determinations by the Secretary of Interior, will ensure the highest possible reliability of Colorado River supplies.

In addition to the programs mentioned above, the Colorado River system itself contributes to the high reliability of Metropolitan's Colorado River supplies. Currently, the average Colorado River runoff exceeds basin-wide demands by over 1.0 maf per year. The Colorado River system also contains a great deal of reservoir storage capacity. The total storage capacity in the Colorado River Basin is approximately 60 maf, almost four times the Colorado River's average annual flow. For much of 1997, system storage levels were at 80% or more of total capacity. These factors allow the Bureau of Reclamation, operators of the Colorado River system, to store significant supplies for use during shortages.

Storage of State Water Project Supplies

Total storage capacity is a critical factor in comparing the operations of the Colorado River system with the SWP. On average, both systems have similar amounts of water available on an annual basis. The SWP's watersheds in the Sacramento River Basin have produced about 18 maf per year over the long term, as represented by the Sacramento River Index (SRI.) Long-term runoff on the Colorado River has averaged more than 16 maf annually since 1906. However, the ability to carry over unused water from a wet year for use in a dry year differs substantially between the two systems. State Water Project storage facilities have storage capacity of about 4.5 maf, while system storage in the Colorado River Basin totals nearly 60 maf. This gives the operators of the Colorado River reservoirs much more flexibility in storing unused water from a wet year for use in a subsequent dry year.

When water from the SWP cannot be put to immediate use in Metropolitan's service area, the water may be stored for future use. Provided storage capacity is available, the water may remain in either Oroville Reservoir (as SWP storage for delivery to all contractors the following year) or San Luis Reservoir (as carryover storage assigned to Metropolitan). Through the carryover storage program, as amended by the Monterey Amendment, Metropolitan can place a maximum of 200,000 af per year of allocated supplies in SWP surface reservoirs. The program also allows for carryover storage in non-project facilities, including surface reservoirs and groundwater basins. In the case of carryover storage in San Luis Reservoir, SWP supplies allocated to but unused by a contractor may, under certain conditions, be assigned as carryover if storage capacity is available at the end of the calendar year. However, carryover water stored for a contractor has lower priority than storage of SWP water and consequently "spills" first as San Luis Reservoir fills.

Also, in a wet year such as 1995, low demands may allow DWR to operate San Luis Reservoir nearly full, eliminating any possibility of contractor carryover storage into the following year. As a result, carryover storage on the SWP may not be possible, and even when possible, is subject to spilling.

Due to these carryover storage limitations, Metropolitan has invested a great deal to expand its ability to store surplus SWP supplies. Metropolitan has entered into a number of water transfer and storage agreements. The Semitropic Water Banking and Exchange program allows Metropolitan to store up to 350,000 afin the groundwater basin underlying the Semitropic Water Storage District. The storage and withdrawal capacities of the program are shared with other participants in the storage program, with Metropolitan's share equaling 35%. Dry-year withdrawals will average about 60,000 af.

Metropolitan and the Arvin-Edison Water Storage District have developed a program that allows Metropolitan to store water in the groundwater basin in the Arvin-Edison service area. The program would allow the storage and withdrawal of 250,000 af of supplies over the next 25430 years. Dry-year withdrawals will average about 70,000 af.

Storage in Regional Facilities

In addition to the storage of Colorado River and SWP supplies outside the region, Metropolitan has established a number of programs for storing supplies within the region. Metropolitan owns and operates two main surface reservoirs, Lake Mathews and Lake Skinner, which have a combined storage of about 226,000 af. Only a small portion of this capacity is available for shortages, with the balance being used to regulate flows in Metr0Politan's delivery system. The Eastside Reservoir Project, currently under construction, will have a total capacity of 800,000 af, with approximately 400,000 af of operational drought and seasonal storage and 400,000 af of emergency storage. Through the Monterey Amendment, Metropolitan obtained the fight to use up to 220,000 af of water stored in the SWP terminal reservoirs. However, withdrawals from these terminal reservoirs must be replaced within five years.

Metropolitan and its member agencies have established the cyclic storage program to increase storage in groundwater basins within the service area. Regional groundwater basins offer an economical way for Metropolitan to improve supply reliability by storing water within the service area. This makes water readily accessible in times of need, either in emergency situations or during shortages. Some limitations are imposed by the fact that such water can generally only be used through pumping from the groundwater basin by an overlying member agency or local agency. Storage in groundwater basins takes place either by direct replenishment (spreading or injection), or through in-lieu means. Spreading (or injection) is desirable because direct measurement of the amount of stored water is a relatively simple, verifiable transaction. The main disadvantage to direct spreading is that spreading can occur only under certain conditions. For example, spreading cannot occur when spreading facilities are being used to capture local storm runoff for flood control purposes, or when the amount of local runoff precludes the need for imported water to replenish the basins. Also, spreading basins require frequent maintenance to assure maximum efficiency. These and other conditions can limit the ability to deliver water for spreading at a time when surplus supplies are available.

In-lieu replenishment allows most member agencies to participate in groundwater replenishment without needing direct access to replenishment facilities. Their wells, in effect, become their replenishment facilities. Both direct and in-lieu replenishment from 1986 through 1990 served the region well during the critical drought years from 1991 through 1993.

The overall objective of the various storage programs is to maximize the availability of imported water during times of need by storing surplus water in a strategic manner and utilizing the storage available within the region. Many factors affect the availability of storage capacity and Metropolitan's ability to move water to and from various facilities. After reviewing the full range of shortage actions available to Metropolitan, a framework for prioritizing the full range of surplus and shortage actions will be presented.

In addition to pricing incentives used to encourage local agencies to store water in groundwater basins, Metropolitan has developed a conjunctive use contractual storage program with the Calleguas MWD in the North Las Posas Basin. Metropolitan will fund the construction of wells which will be called upon to meet demands during dry years. This program will yield a dry year supply of about 70,000 af.

SHORTAGE ACTIONS

Except in severe or extreme shortages or emergencies, Metropolitan's management of available resources will allow shortages to be mitigated without negatively impacting retail M&I demands. Below is a list of drought actions that will be taken during periods of shortage. The goal of these actions is to avoid, to the extent practicable, the allocation of Metropolitan's firm supplies. The order in which these actions are presented does not imply the exact operational management of resources that would occur. In fact, several actions are likely to be taken concurrently. Many factors dictate the particular order in which actions will be taken during an actual shortage, although it is clear that the last action will be the curtailment of firm deliveries to the member agencies.

- Draw on storage in the Eastside Reservoir Project
- Draw on out-of-region storage in Semitropic and Arvin-Edison
- Reduce/suspend long-term seasonal and groundwater replenishment deliveries
- Draw on contractual groundwater storage programs in the region
- Draw on SWP terminal reservoir storage (per Monterey Agreement)
- Call for extraordinary drought conservation and public education
- Reduce IAWP deliveries
- Call on water transfer options contracts
- Purchase transfers on the spot market
- Implement an allocation of Metropolitan's imported supplies to its member agencies

Even with dedicated programs to meet the reliability goal for the region, proper management and operations of these resources is critical to ensure reliability. The prioritization of both surplus and shortage actions need to account for several important criteria. It is also important to recognize that these criteria will need to be balanced. The criteria include:

Location: Out-of-region storage is more vulnerable than in-basin-storage due to the risks of seismic events. To only maximize out-of-region storage will put reliability at risk.

Take capacity: Surface reservoirs generally have the ability to be filled and drawn down very quickly. Certain groundwater storage programs have limited take capacities--requiring several years at full take capacity to withdraw **all** available storage. Stored water will be balanced so that dry year supplies are maximized.

Cost: Programs vary with respect to their marginal operating costs. Program actions will be taken to maximize supply reliability while minimizing cost.

Flexibility: Not all storage programs and transfers offer the same flexibility to Metropolitan. Some programs can only meet specific overlying demands, while others can meet demands anywhere in the system.

DESCRIPTIONS OF RESOURCE ACTIONS

Draw on storage in the Eastside Reservoir Project: Withdrawals from the Eastside Reservoir Project would provide a flexible supply for meeting a shortage. Eastside Reservoir Project supplies can be drawn upon quickly. The amount of water drawn from the Eastside Reservoir Project before exercising other shortage actions will depend on the severity of the shortage and the overall condition of other resources available to Metropolitan.

Draw on out-of-region storage in Semitropic and Arvin-Edison programs: Out-of-region programs such as Semitropic and Arvin-Edison provide cost-effective shortage supplies. These supplies also provide flexibility, as they can be distributed as effectively as any SWP supplies coming into Metropolitan's service area. Exercising these programs relatively early in the order of actions reduces the risk of leaving supplies out-of-region. Based upon the ratio of storage capacity to take capacity, these programs will generally provide supplies over several years. This provides the rationale for calling on these programs relatively early in a shortage.

Reduce Long-Term Seasonal and Replenishment Deliveries, and call on cyclic storage accounts: Certain interruptible supply programs provide benefits during shortage. Reducing deliveries to interruptible programs established for storage purposes, while continuing expected levels of groundwater production, allows limited supplies to go toward meeting direct consumptive uses. In addition, calling on cyclic storage accounts can extend the replenishment needs for several years. Most replenishment supplies would be expected to be interruptible for a minimum of two years before agencies would be allowed to claim a local supply adjustment on such supplies. Some programs have longer interruption requirements. For example, most Groundwater Recovery Programs are governed by contracts that require supply production through a three-year interruption in service.

Draw on contractual groundwater storage programs: In-region contractual groundwater programs provide cost-effective supplies that would be drawn upon during shortages. These programs are also limited by their take capacities and generally have several years of withdrawals in storage. For this reason, these programs might be called upon before withdrawing heavily from surface reservoir storage.

Draw on SWP terminal reservoir storage: The storage available in the SWP terminal reservoirs provides a flexible and cost-effective shortage supply. Supplies withdrawn from this program must be replaced within five years of withdrawal. For this reason, the storage in these reservoirs would be reserved for more serious shortage conditions and would be utilized after the programs and facilities listed above were used to meet the shortage.

Call for extraordinary drought conservation: Voluntary conservation programs have historically been effective in reducing water demand during drought. However, voluntary conservation programs are not without impact to the retail customer and can be perceived as a failure of water agencies to properly plan for shortages. Therefore, the call for extraordinary drought conservation will only be taken with the consent of Metropolitan's Board of Directors.

Reduce agricultural deliveries: The Interim Agricultural Water Program (IAWP) offers interruptible water to southern California's agricultural industry at discounted rates. These supplies will be interrupted as part of Metropolitan's shortage actions. Metropolitan will work with IAWP participants to provide as much advance warning of interruption as possible. The IAWP reflects current policies toward agricultural water users. The policies underlying this program are due to be reviewed during the ten-year period of the WSDM Plan. The WSDM Plan will be changed accordingly.

Call on water transfer option contracts: Transfer options programs provide cost-effective supplies when the region is faced with reducing deliveries to meet consumptive demands. These programs might also be used to increase storage levels in Metropolitan storage facilities. Replenishment of these facilities reduces the risk of leaving available supplies outside the region and helps to protect the region during extended shortages.

Purchase transfers on the spot market: During the 1987-92 drought, the Drought Water Bank proved to be one mechanism for California to reduce the overall impacts of the shortage. However, the cost of spot market supplies may cause Metropolitan to use them as a last increment of supply before the region implements reductions in M&I deliveries. It is likewise possible that availability and cost will make spot market options more favorable under certain conditions. If this occurs then spot market supplies will be sought prior to calls on option transfers. However, participation in the spot market may be restricted to those agencies that have already taken significant actions in response to the shortage.

Implement allocation plan: As the final stage in responding to shortages, Metropolitan will implement an allocation plan to deliver reduced supplies to its member agencies. The issues of allocation and the methods of allocation are outlined in the following section.

ALLOCATION OF SUPPLY FOR M&I DEMANDS

The equitable allocation of supplies is addressed by the Implementation Goals established for the WSDM Plan, with the first goal being to "avoid mandatory import water allocations to the extent practicable." The second fundamental goal is to "equitably allocate imported water on the basis of agencies' needs." Factors for consideration in establishing the equitable allocation include retail and economic impacts, recycled water production, conservation levels, growth, local supply production, and participation and investment in Metropolitan's system and programs. In the event of an extreme shortage an allocation plan will be adopted in accordance with the principles of the WSDM Plan.

INTEGRATED RESOURCE MANAGEMENT STRATEGY

Throughout the Integrated Resources Planning process and the development of the WSDM Plan, extensive analysis of resource management strategies focused on maximizing supply reliability while minimizing overall resource costs. Various management strategies were analyzed under shortage scenarios based on historical hydrologic data. Certain strategies yield high reliability but incur very high costs. This is the case for strategies that utilize relatively costly transfer programs early in a shortage while maintaining high storage levels. If a shortage is short, this results in high transfer costs and shortage storage programs that are not fully utilized. Other strategies draw more heavily on storage early in a shortage and do not use options transfer programs. Later in a shortage, the yields from these transfer programs, combined with low yields from depleted storage facilities, might not make up for continuing or deepening shortages. Overall, such approaches may be inexpensive to pursue at the wholesale level but have high costs associated with retail level impacts. The resource management framework presented results from extensive analysis of various strategies for managing available resources under a variety of surplus and shortage conditions. Although the extent to which various actions are exercised may still vary depending on specific shortage conditions, the ordering presented does reflect Metropolitan's anticipated order of actions during shortages.

RESOURCE MANAGEMENT FRAMEWORK

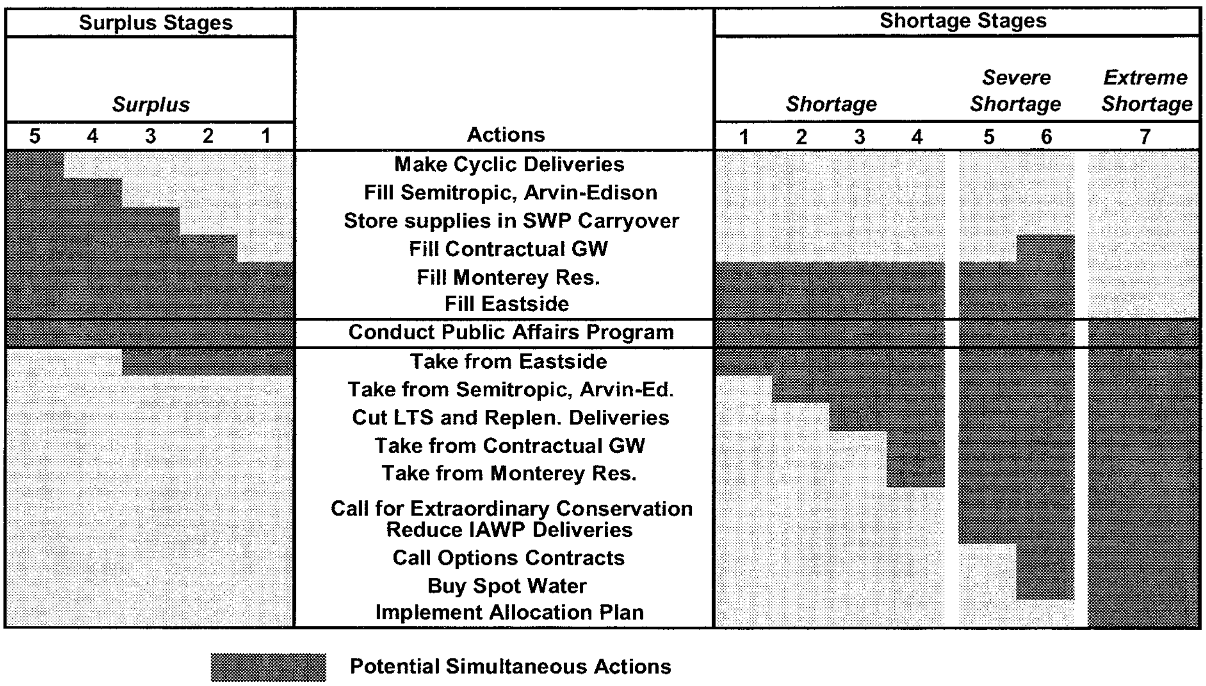
The analysis of surplus and shortage actions yields a water management framework that accounts for the degree or "stage" of surplus and shortage. These stages are defined by parameters such as storage levels and expected SWP supplies. Each stage has associated actions that could be taken as part of the response to prevailing shortage conditions. For example, Surplus Stage 1 might have as associated actions to place water in the highest-priority storage resources. Figure 8 shows the mapping between actions and stages. The darkly shaded diagonal area identifies actions that can be undertaken concurrently, while the lightly shaded areas show actions that will not be taken. For example, Metropolitan will not withdraw water from most storage resources during a surplus.

Figure 8 highlights several aspects of the WSDM Plan's approach to supply management. First and most importantly, it does not dictate a response to shortage or surplus. The framework recognizes the complexity and variety of conditions that could require various responses. Supporting this framework are general "rule curves" that dictate the extent to which particular actions are taken in various stages of surplus or shortage. For example, the rule curves indicate approximately how much water should be taken from the Eastside Reservoir Project before calling on supplies from the Semitropic or Arvin-Edison storage programs. If a shortage were greater than the desired initial withdrawal from the Eastside Reservoir Project, then Stage 2 actions would be taken. The rule curves for a particular resource would take into account shortage stage, monthly delivery requirements, and when various supplies are available.

Surplus and Shortage Stages are determined by the total amount of water that would be stored or produced by exercising the actions in that Stage. Overall storage levels in each stage are determined by the extent to which storage is increased or reduced by earlier actions. Therefore, each Stage is defined by supplies (stored or produced) and an approximate overall level of storage remaining in all resources. Up through Shortage Stage 4, the actions taken will not result in negative impacts to any consumptive uses. Shortage Stages 1 through 4 constitute shortage management without retail level impacts. The conservation efforts and reductions in IAWP deliveries in Shortage Stage 5 will result in retail impacts.

Action by the Metropolitan Board of Directors would be required before actions corresponding to Stages 5, 6, and 7.

Figure 8. Resource Stages and Actions Matrix



The Stages and Actions Matrix (Figure 8) is read from the center moving outward. Moving from the center to the left, are actions that Metropolitan will take during surplus conditions. For instance, in a Stage 3 Surplus, Metropolitan will be adding water to the Eastside Reservoir Project, the Monterey Reservoirs (if any water is due for repayment), Contractual Groundwater Programs, and carryover storage on the State Water Project. Moving from the center to the right are actions that Metropolitan will take during periods of shortage. For instance, in a Stage 3 Shortage, Metropolitan will be pulling water from the Eastside Reservoir Project, the Semitropic and Arvin Edison programs, and interrupting deliveries of Long-Term Seasonal and Replenishment program water. In addition, the Stages and Actions Matrix allows for surplus actions to be taken during shortages and vice versa, but these actions are strictly a result of prudent water management. For example, in a Stage 6 Shortage, Figure 8 shows Metropolitan potentially filling the Eastside Reservoir Project, the Monterey Reservoirs, and contractual groundwater programs while calling on spot transfers and buying spot water. Through these actions Metropolitan will be ensuring that water supply opportunities during a drought are realized--ultimately adding to the drought reserves of southern California.

Figure 8 also highlights the on-going efforts by Metropolitan and its member agencies in the conduct of public outreach and active conservation programs. Through all conditions, effective pubilc outreach and conservation programs are an integral part of Metropolitan's management of resources. In addition to ongoing conservation and water efficiency programs, Stage 5 of the Stages and Actions Matrix calls for participation of the citizens of southern California to take extraordinary conservation measures to cut water demand during droughts.

As with the listing of shortage actions earlier in the report, the Stages/Actions matrix in Figure 8 only highlights certain programs and response actions. However, unlike the discussion of actions earlier, Figure 8 is intended to convey Metropolitan's currently anticipated ordering for those actions listed. As the supply and demand outlooks, programs, and other factors continue to change, the analysis of the ordering of actions will continue during the ten-year period of the WSDM Plan.

SUPPLY CERTAINTY AND THE TIMING OF RESOURCE ACTIONS

One of the fundamental trade-offs in dealing with supply shortages is the need to maintain flexibility while providing supply certainty to member agencies and consumers. A central focus of the WSDM Plan is the analysis of information about supplies and demands. When do various pieces of information about the supply/demand balance become more certain? When should this information impact policy-making and trigger various resource actions? The WSDM Plan addresses these questions and the actual implementation of the Plan during a shortage.

Figure 9 shows a hypothetical shortage year. With respect to the supply and demand outlook, a typical shortage year will have periods of certainty and stability, and other periods of relative uncertainty and transition. Important supply components--such as the SWP, CRA, Los Angeles Aqueduct (LAA), and local supplies--are closely monitored through the early part of the year. These supplies and demands are fairly well-known through the April-September period. Storage is assessed in the post-summer period and decisions about certain programs, such as long-term (LT) seasonal deliveries could be made at this time.

Figure 9. Water Supply Outlook Throughout the Year

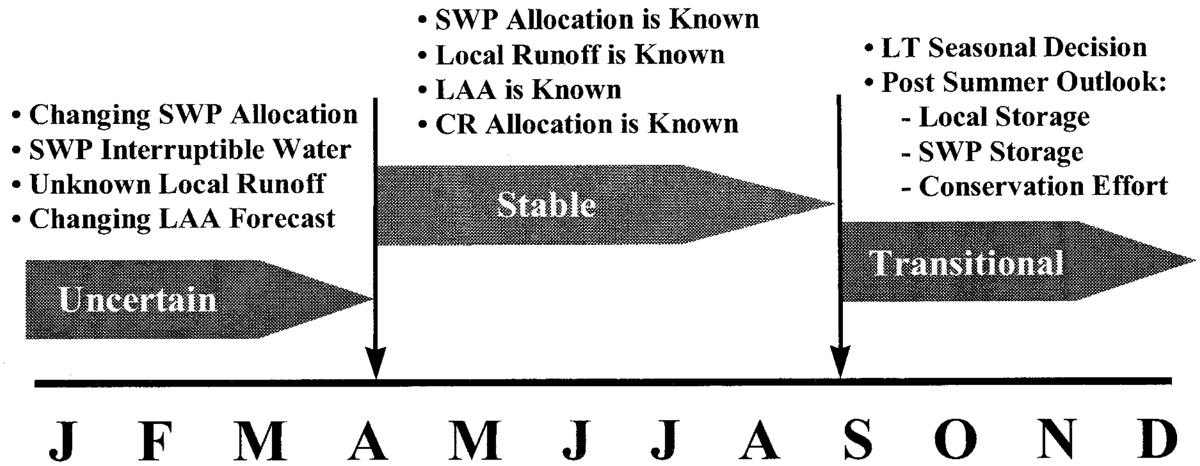
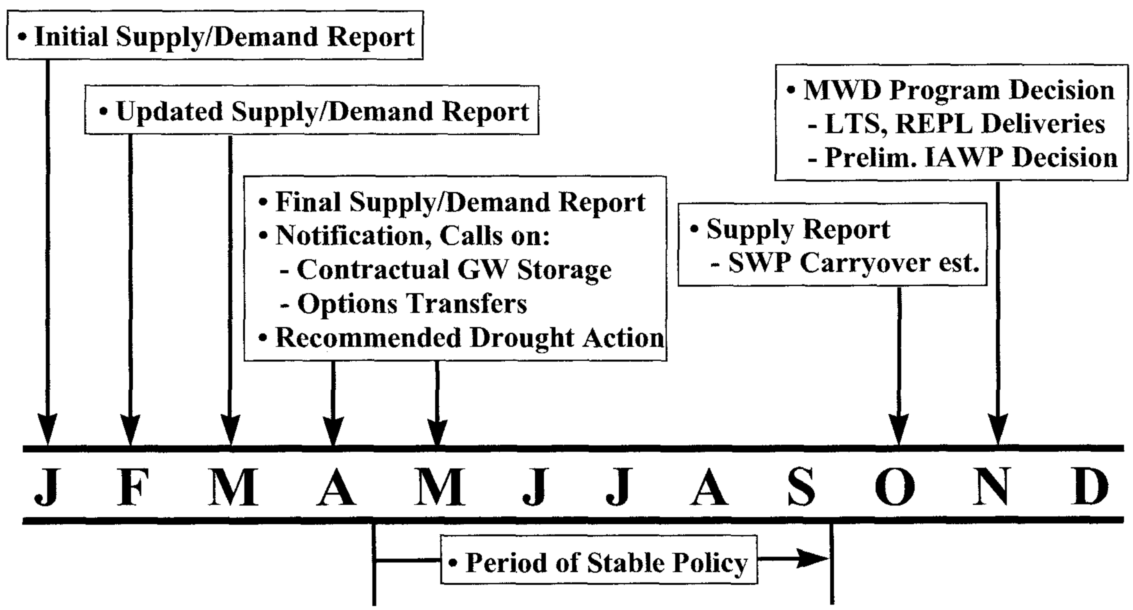


Figure 10 presents the annual schedule for actions taken in response to shortage conditions. Starting in January, an initial supply/demand report will be presented to the Metropolitan Board of Directors. SWP allocations are still only estimates in January and become more certain towards April and May. Demands for Metropolitan deliveries depend in part on how the winter hydrology develops and the condition of local supplies. These factors start to become known during the February-March period and will be reported to the Board in the Supply Report Update. By April-May, the outlook for imported supplies is known to a fairly high degree of certainty and a Final Supply Report will be produced. The May-September period will be one in which the import supply situation does not change drastically and drought policies can be implemented. Demands can be more or less than anticipated as a result of unusually hot or cool weather. At the end of summer, carryover SWP storage will be determined. October through December is a transitional period during which early assessments of available supplies for the following year will be made. During this period, Board actions would determine the management of various Metropolitan programs such as long-term seasonal (LTS) and IAWP deliveries. The following list presents major information and decision points during the year.

Month	Information/Action
January	Initial Supply/Demand Reports
February, March	Updated Supply/Demand Reports
April, May	Final Supply/Demand Report
	Notification on Contractual GW and Options Transfer Programs
	Recommended Drought Actions
May-September	Stable Policy Period
October	Supply and Carryover Storage Report
November	MWD Program Decisions - LT Seasonal, Replenishment, IAWP

Figure 10. One Year of a Hypothetical Shortage - Supply and Demand Reports and Response Actions



PUBLIC OUTREACH AND CONSERVATION

Mechanisms are already in place to implement most of the water management actions and programs that are addressed in the WSDM Plan. Under the majority of supply and demand conditions, the actions of Metropolitan's Board of Directors, the General Manager, the operational activities of Metropolitan, and its member agencies would constitute all actions necessary to mitigate the shortage. Several aspects of the WSDM Plan, however, require additional attention to the administration of programs and actions. In particular, a shortage contingency requires special programs in the areas of public and governmental affairs and conservation. Metropolitan maintains an on-going public information program to encourage efficient water use. Public outreach programs are conducted at all times under both surplus and shortage conditions (see Figure 8). The actions discussed in this section constitute special actions in times of shortage.

During shortage conditions, public outreach will play a critical role in shaping consumer response. Public information campaigns need to send clear signals if extraordinary drought conservation is to achieve needed reductions in demands. Given Metropolitan's diverse set of customers and the varying impacts that shortages can have on different consumer groups, an effective public information campaign will require a joint effort among Metropolitan and its member agencies. Under this Plan, the administration of the Public Information and Government Affairs programs will be the responsibility of a Drought Program Officer (DPO). The DPO will be responsible for integrating the various activities in these areas, coordinating efforts with Metropolitan's Board of Directors and member agencies, and designing the region-wide messages for the general public and various target audiences. Important constituencies that have been identified in the process are residential users, business interests, agricultural users, elected officials, officials of various agencies (such as the Department of Water Resources), and the media.

Many conservation programs, such as Metropolitan's ultra-low flush toilet rebate program, are driven by member agency requests. Based on history, Metropolitan expects member agency requests to increase during droughts. Metropolitan is committed to increasing overall conservation program funding to meet member agency requests during droughts and attain higher levels of savings. These programs will be implemented by Metropolitan and member and local agency conservation staff. As many of the short-term conservation objectives during a shortage would be dependent upon an effective public information program, the Drought Program Officer will also be responsible for monitoring the effectiveness of the augmented conservation programs. A monthly conservation reporting process will be implemented. Quarterly estimates of regional conservation will be developed to track the progress of various actions in mitigating the shortage.

APPENDIX A: RESOURCE AND STORAGE SIMULATION

The Water Surplus and Drought Management Plan (WSDM Plan) uses the Stages and Actions Matrix (Figure 8) as a guide for the operation of storage and transfers for the next ten years, 1999-2008**.** Metropolitan asserts that the investments that Metropolitan and its member agencies have made in water supply and storage, managed in a coordinated manner as presented in the WSDM Plan, will be sufficient to assure that retail firm water demands will be met 100% of the time through the year 2008. Metropolitan performed an extensive analysis of projected water demands, current and expected water supplies, along with hydrologic variations to support this assertion. Appendix A presents a summary of this analysis which includes statistical probabilities of actions under the WSDM Plan and two illustrative examples of how supply resources may be used in the future under worst-case drought events. Although the WSDM Plan is intended to be in effect through 2008, for the purposes of analysis the planning horizon was extended through 2010.

The WSDM Plan seeks to define the operational envelope for the Metropolitan system into the near future. Although the WSDM Plan only looks out ten years, it nonetheless involves the operation of some storage and water transfer projects that have not yet become fully operational. This makes the estimation of storage and transfers operations difficult. Compounding this problem is the lack of certainty around future demands, economic conditions, or even the weather over the next ten years. To manage these uncertainties, Metropolitan has developed a computer based simulation model called the Integrated Resources Planning Simulation Model or IRPSIM.

IRPSIM uses a modeling method known as sequentially indexed monte-carlo simulation. Simply put, the model looks at projected regional retail demand and supplies of water over the next twelve years and adjusts each, up or down, based on an assumed pattern of future weather. For instance, if Metropolitan expected the weather over the next twelve years (1999-2010) to be the same as the last twelve years (1987-1998), then IRPSIM would adjust the projected 1999 demands and supplies based on the historical 1987 hydrology, and adjust the projected 2000 demands and supplies using the historical 1988 hydrology, and so on. One obvious drawback to this approach is that Metropolitan does not know what future weather will be. Therefore, Metropolitan runs the models over and over again until all recorded hydrologies, 70 in all, have been tried. In this way, Metropolitan can look at probabilistic results of being in shortage year by year through 2010.

Although the projections of water supplies used in this analysis required certain assumptions to be made, they were based on most likely or probable outcomes. In most cases, projected water supplies represented projects that are currently operational, under construction, or in the final stages of negotiations. The following represents a summary of these assumptions:

- Local recycling and groundwater recovery: assumes currently operational projects with expected increases in supply yield as demand increases

- Conjunctive use groundwater storage: assumes Las Posas (under final stages of construction) and implementation of similar programs which are under negotiation (such as Raymond, Orange, and Chino Basins)

- Semitropic and Arvin-Edison storage: assumes use of both programs which are operational with water already stored

- Eastside Reservoir Project: assumes use of non-emergency storage from the reservoir currently under construction and an initial fill projected to start in approximately one year

- The Monterey Reservoirs: assumes use of State Water Project terminal reservoir supplies, Castaic and Perris Reservoirs, per the Monterey Amendment

- Colorado River Aqueduct: assumes a full aqueduct through the implementation of the California Plan (including lining of All American and Coachella canals, SD/IID water transfer/exchange, conjunctive use off-aqueduct storage, and river re-operations)

- State Water Project: assumes continuance of Bay-Delta Accord (with only current facilities)

One way of viewing the result of Metropolitan's WSDM Plan analyses is by summary statistics. Table A- 1 gives the probabilities of shortage actions over the next twelve years.

Table A-1. Probability of Shortage Stage[1] by Forecast Year

1999	13%	13%	11%	7%	3%	0%	O%
2000	13%	13%	11%	9%	3%	O%	0%
2001	19%	17%	13%	10%	6%	O%	0%
2002	19%	17%	13%	10%	4%	1%	0%
2003	19%	19%	14%	11%	4%	0%	0%
2004	20%	19%	16%	13%	4%	0%	0%
2005	21%	19%	17%	13%	6%	O%	O%
2006	21%	19%	19%	13%	6%	0%	0%
2007	23%	20%	19%	13%	4%	0%	0%
2008	26%	21%	19%	16%	6%	1%	0%
2009	26%	24%	19%	17%	6%	1%	0%
2010	26%	26%	19%	19%	6%	1%	O%

Table A-1 can be read in one of two ways, by column or row. The Stage 7 column indicates that there are no historical weather conditions that require allocation over the next twelve years. This is the single most important conclusion of the WSDM Plan analysis. The Stage 6 column indicates that only in a few years--2002, and 2008 through 2010--would Metropolitan need have a need for option or spot transfer water. Read by row, Table A-1 indicates that in the year 2008 there is a 21% likelihood of taking some water from the Eastside Reservoir Project, a 19% likelihood of taking water from Semitropic or Arvin-Edison storage programs, a 17% likelihood of interrupting long-term seasonal and replenishment deliveries for two years, and so on. It should be noted that these probabilities represent the best current estimates by Metropolitan, but are based entirely on historical weather conditions. Conditions that fall outside of historical ranges, either in duration or severity, are not represented by this data.

Another way to view the WSDM Plan analysis is by observing the operation of a single hydrology. Table A-2 provides an example of resource operations for the period 1999 through 2010 assuming a repeat of the 1923 through 1934 hydrology. The table provides descriptions of hydrologic conditions to aid in understanding the example.

[1] Stage 1 consists of withdrawal from the Eastside Reservoir Project. Stage 2 consists of the above plus withdrawals from the Semitropic and Arvin-Edison water storage and transfer projects. Stage 3 consists of the above plus an interruption of Long-Term Seasonal and Replenishment discount water. Stage 4 consists of the above plus withdrawal from contractual groundwater programs and the Monterey Reservoirs. Stage 5 consists of the above plus a call for extraordinary drought conservation and interruption in agricultural discount water. Stage 6 consists of the above plus calls on option contract water and purchases of water on the open market. Stage 7 consists of the above plus allocation of remaining shortages. For a full description of stages and action, see Surplus and Shortage Resource Actions section and Figure 8 above.

For instance, 1923 was considered to be a dry year in southern California (defined as less than 9 inches of rain at the Los Angeles Civic Center) and is categorized by the California Department of Water Resources (DWR) as a below normal year for State Water Project deliveries. In this example, 1923 weather increases southern California's demand for water and decreases imported State Water Project supplies. The Colorado River Aqueduct supplies are influenced by yet another hydrologic indicator, but for the next ten year Metropolitan expects the Aqueduct to be full.

Table A-2 indicates that retail water demands in 1999, assuming a 1923 hydrology, will be 3.979 million acre-feet (maf). Adding expected long-term seasonal and replenishment demands of 0.165 maf gives a regional total water demand of 4.144 maf. After subtracting local supplies of 2.192 maf, which are also adjusted for 1923 weather, Metropolitan expects to see a demand of 1.952 maf. In 1999, under a 1923 hydrology, Metropolitan expects to see 2.954 maf of supply. This is enough to meet all expected demands and put over 1.0 maf into storage.

The 1923 through 1934 hydrology is significant because it starts and ends dry with little recovery in the middle. However, even in these most adverse conditions the actions proposed by the WSDM Plan provides the region with enough water to avoid shortage allocation. Again the most important result of this example is read from the last line, which indicates that there are no remaining shortages through 2008

Table A-3 provides a second example of using the 1980 through 1991 hydrology. This hydrology contains the most significant drought in recent record, ending with a critically dry year on the State Water Project that is expected to yield a mere 0.389 maf. However, even under these conditions the WSDM Plan provides a method to avoid firm water allocation.

The analyses performed using the prioritized action of the Stages and Actions Matrix support Metropolitan's assertion that water supply reliability can be attained through the use of regional storage, interruption of discounted water supplies, and transfers. And, through the implementation of the WSDM Plan, Metropolitan does not expect to allocate firm water deliveries for at least the next ten years.

Table A-2. A Simulation of Water Supplies and Demands 1923-1934 Hydrology

Forecast Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Hydrology Year	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934
Hydrologic Conditions												
Southern California Year Type	Dry	Dry	Dry	Wet	Wet	Dry	Dry	Normal	Wet	Normal	Wet	Normal
Sacramento River Index D1630 Year Type	Below Normal	Critically Dry	Dry	Dry	Wet	Above Normal	Critically Dry	Dry	Critically Dry	Dry	Critically Dry	Critically Dry
Demands												
Retail Demand	3.979	4.152	4.149	4,018	4.005	**4.249**	4.237	4.223	4.280	4.280	4.407	4.500
Long-term/Replenishment Demand	0.165	0.182	0.226	0.188	0.149	0.176	0,213	0.203	0.164	0.175	0.141	0.163
Total Demand	4.144	4.334	4.375	4.205	4.154	4.425	4.450	4.426	4,443	4.455	4.548	4,663
Local Supplies												
Groundwater Production	1.529	1.545	1.537	1.288	1.299	1.575	**1.568**	1.434	1.307	1.439	1.318	1.454
L. A. Aqueduct Production	0.383	0,287	0.304	0.316	0.392	0.302	0,245	0.235	0.174	0,324	0.251	0.220
Recycling Production	0.152	0.162	0.174	0.186	0,197	0.207	0.217	0.230	0,242	0.254	0.266	0.277
Surface Production	0,128	0,089	0,076	0.116	0.154	0.147	0.108	0.094	0,133	0,136	0.151	0.145
Total Local Supply	2,192	2.084	2.091	1.905	2,043	2.231	2,139	1.993	1.856	2.153	1.986	2,097
Total MWD Demand	1.952	2.250	2,284	2,300	2.112	2.194	2.311	2.433	2.587	2.302	2.562	2.566
MWD Supply Sources												
Colorado River Aqueduct Supply	1.200	1.200	1.200	1.200	1.200	**1.200**	1.200	1.200	1.200	1.200	1.200	1.200
State Water Project Supply	1.754	0.812	0.783	1.280	1.678	1.438	0,764	1.163	0,589	0.843	0.559	0.620
MWD Cyclic Groundwater Deliveries	0.000	0.060	0.060	0.000	0.000	0,000	0.060	0,060	0.060	0.059	0.000	0.000
Eastside Reservoir	0.000	0.066	0.058	0.000	0.000	0.000	0,060	0.010	0.425	0.023	0.219	0.041
Arvin/Semitropic Groundwater Storage	0.000	0.111	0.115	0,000	0.000	0,000	0,119	0,000	0.115	0.117	0.059	0.041
Longterm Seasonal Demand Cuts	0.000	0,000	0,166	0.000	0.000	0.000	0.153	0.000	0.104	0,116	0.000	0.000
Cyclic Benefits	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0,000	0,000	0,000	0.060	0.060
Contractual Groundwater Storage	0.000	0.000	0.000	0,000	0.000	0.000	0.000	0,000	0.095	0.000	0.095	0.084
DWR Reservoirs (Monterey Agreement)	0.000	0.000	0,000	0.000	0.000	0.000	0.000	0.000	0,000	0,000	0.131	0.088
Voluntary Conservation	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0,000	0.000	0.206	0.210
MWD Ag Cuts	0.000	0.000	0.000	0.000	0.000	0,000	0.000	0.000	0.000	0.000	0.033	0.031
Central Valley Transfers	0.000	0.000	0,000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.193
Storage Puts	1.003	0.000	0.097	0.180	0.549	0.438	0.045	0.000	0,000	0.056	0.000	0.000
Remaining Shortage	0,000	0,000	0.000	0,000	0.000	0.000	0.000	0,000	0.000	0.000	0.000	0.000

Table A-3. A Simulation of Water Supplies and Demands 1980-1991 Hydrology

Forecast Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Hydrology Year	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934
Hydrologic Conditions												
Southern California Year Type	Wet	Normal	Normal	Wet	Dry	Dry	Wet	Normal	Normal	Dry	Dry	Normal
Sacramento River Index D1630 Year Type	Above Normal	Dry	Wet	Wet	Wet	Dry	Wet	Dry	Critically Dry	Dry	Critically Dry	Critically Dry
Demands												
Retail Demand	3.781	4.170	3.930	3.647	4.308	4.250	4.151	4.281	4.380	4.550	4.663	4.497
Lon£1-term/Replenishment Demand	0.105	0.141	0.171	0.101	0.136	0.187	0.183	0.201	0.191	0.219	0.224	0.214
Total Demand	3.886	4.311	4.101	3.748	4.444	4.437	4.334	4.483	4.572	4.769	4.887	4.712
Local Supplies												
Groundwater Production	1.292	**1.440**	**1.381**	1.248	1.546	1.565	1.275	1.413	1.438	1.588	1.600	1.446
L. A. Aqueduct Production	0.462	0.372	0.499	0.529	0.516	O.367	0.472	0.400	0.326	0.278	0.213	0.223
Recycling Production	0.152	0.162	0.174	0.186	0.197	0.207	0.217	0.230	0.242	0.254	0.266	0.277
Surface Production	0.225	0.175	0.154	0.194	0.195	0.151	0.115	0.116	0.115	0.081	0.068	0.081
Total Local Supply	2.131	2.149	2.208	2.156	2.455	2.290	2.081	2.159	2.122	2.200	2,146	2.027
Total MWD Demand	1.755	2.162	1.894	1.591	1.989	2.147	2.253	2.324	2.450	2.569	2.741	2.684
MWD Supply Sources												
Colorado River Aqueduct Supply	1.200	1.200	1.200	1,200	1.200	1.200	1.200	1.200	**1.200**	1.200	1.200	1.200
State Water Project Supply	1.561	1.441	1.725	1.886	1.643	1.590	1.441	1.292	0.611	1.285	0.877	0.389
MWD Cyclic Groundwater Deliveries	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.060	0.060	0.060	0.060
Eastside Reservoir	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.199	0.024	0.222	0.209
Arvin/Semitropic Groundwater Storage	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.115	0.000	0.122	0.104
Long-term Seasonal Demand Cuts	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.131	0.000	0.164	0.154
Cyclic Benefits	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Contractual Groundwater Storage	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.133	0.000	0.095	0.085
DWR Reservoirs (Monterey Agreement)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.216
Voluntary Conservation	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.235
MWD Ag Cuts	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.032
Central Valley Transfers	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Storage Puts	1.006	0.260	0.344	0.240	0.200	0.200	0.388	0.168	0.000	0.000	0.000	0.000
Remaining Shortage	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

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APPENDIX A.5
Local Projects

Table A.5-1

Groundwater Recovery Projects

Existing	Ultimate Yield/Capacity Acre-Feet	Online Date
City of Beverly Hills		
Beverly Hills Desalter Project	2,600	
City of Burbank		
Burbank Lake Street GAC Plant	2,744	
Burbank Operable Unit/Lockheed Valley Plant	14,517	
Central Basin Municipal Water District		
Water Quality Protection Project	5,807	
Eastern Municipal Water District		
Menifee Basin Desalter	3,360	
Perris Desalter	4,500	
Foothill Municipal Water District		
Glenwood Nitrate	1,600	
City of Glendale		
San Fernando Basin - Glendale Operable Units	7,300	
Verdugo Basin - Verdugo Wells A & B	2,750	
Inland Empire Utilities Agency		
Chino Basin Desalter 1	6,000	
Chino Basin Desalter 2	8,000	
Municipal Water District of Orange County		
Arlington Basin Groundwater Desalter Project	2,000	
IRWD DATS Potable (Exempt)	8,000	
IRWD Irvine Desalter Project	11,200	
Mesa Colored Water Treatment Facility	11,300	
SJC San Juan Desalter GRP Project	4,800	
So Coast WD Capistrano Beach Desalter	1,300	
Tustin Desalter 17th St.	3,200	
Tustin Main Street Nitrate	2,000	
Well 28	4,300	
San Diego County Water Authority		
Lower Sweetwater Desalter	3,600	
Oceanside Mission Basin Desalter	6,500	
Three Valleys Municipal Water District		
City of Pomona VOC Plant	4,678	
Pomona Well #37	1,100	
City of Torrance		
Madrona Desalter (Goldsworthy)	2,400	
West Basin Municipal Water District		
West Basin Brewer Desalter No. 1	1,524	
Western Municipal Water District of Riverside County		
Arlington Basin Groundwater Desalter Project	4,100	
Chino Basin Desalter 1	2,000	
Chino Basin Desalter 2	8,000	
Temescal Basin Desalting Facility Project	10,000	

Table A.5-1

Groundwater Recovery Projects

Full Design & Appropriated Funds	Ultimate Yield/Capacity Acre-Feet	Online Date
Inland Empire Utilities Agency		
Chino Basin Desalter 2	11,760	2016
San Diego County Water Authority		
Lower Sweetwater Desalter	5,200	2020

Advanced Planning (EIR/EIS Certified)	Ultimate Yield/Capacity Acre-Feet	Online Date
Calleguas Municipal Water District		
Oxnard GREAT Program	15,500	2016
City of Los Angeles		
Tujunga Well Treatment	24,000	2014
Municipal Water District of Orange County		
SJC San Juan Desalter GRP Project	3,363	2014
Tustin Legacy Well # 1	2,200	2014
Wells 21 & 22	7,900	2014
San Diego County Water Authority		
Middle Sweetwater River Basin Groundwater Well System (Capacity)	1,000	2018
Rancho del Rey Well Desalination	500	2016

Feasibility	Ultimate Yield/Capacity Acre-Feet	Online Date
Municipal Water District of Orange County		
IRWD Wells 51,52,53, 21& 22 Potable (Non-exempt)	12,700	2018
Mesa Colored Water Treatment Facility	5,650	2018
San Diego County Water Authority		
Mission Valley Brackish Groundwater Recovery Project	1,760	2016
Oceanside Mission Basin Desalter	5,600	2016
Otay Mesa Lot 7 Well Desalination	400	2016
San Diego Formation / Balboa Park Pilot Production Well	1,300	2018
San Diego Formation / Diamond BID Pilot Production Well	1,600	2015
San Dieguito Reservoir Seepage Recovery Feasibility Study	150	2015
San Paqual Brackish Groundwater Recovery Project	3,360	2016
San Vicente & El Capitan Seepage Recovery	1,400	2015
Sweetwater Authority/Otay WD San Diego Formation Recovery	3,900	2020
City of San Marino		
San Marino GWR Project	2,500	2018
West Basin Municipal Water District		
West Basin Brewer Desalter No. 1	156	2018
Western Municipal Water District of Riverside County		
Chino Basin Desalter 3	10,000	2018

Table A.5-1

Groundwater Recovery Projects

Conceptual	Ultimate Yield/Capacity Acre-Feet	Online Date
City of Beverly Hills		
Shallow Groundwater Development	500	2020
Calleguas Municipal Water District		
Camarillo (City of) Groundwater Treatment Facility	4,000	2020
Camrosa Brackish Water Reclamation Project (CSUCI)	1,050	2020
Camrosa Santa Rosa Basin Desalter	5,040	2020
Golden State Desalter	1,668	2020
Somis Desalter (District 19)	2,800	2020
South Las Posas Desalter	5,000	2020
West Simi Desalter (District 8)	2,800	2020
Eastern Municipal Water District		
Perris Desalter	5,585	2020
Municipal Water District of Orange County		
So Coast WD Capistrano Beach Desalter	700	2020
City of Pasadena		
Sunset Reservoir Well Treatment,IX	1,500	2020
San Diego County Water Authority		
San Dieguito River Basin Brackish GW Recovery and Treatment	500	2015
City of Torrance		
Madrona Desalter (Goldsworthy)	2,600	2020
Western Municipal Water District of Riverside County		
Arlington Basin Groundwater Desalter Project	8,000	2020

Table A.5-2
Recycled Water Projects

Existing	Ultimate Yield/Capacity Acre-Feet	Online Date
City of Burbank		
Burbank Reclaimed Water System Project	850	
Caltrans and BWP Power Plant	1,520	
Calleguas Municipal Water District		
Camrosa Water District Recycling System	1,680	
City of Simi Vally/VCWWD No. 8 Reclaimed Water Distribution System	1,100	
Conejo Creek Diversion Project	14,000	
Lake Sherwood Reclaimed Water System	250	
Oak Park/North Ranch Water Reclamation Project	1,300	
VCWWD No. 1/Moorpark WWTP Reclaimed Water Distribution System	5,040	
Central Basin Municipal Water District		
Century/Rio Hondo Reclamation Program	10,500	
Cerritos Reclaimed Water Project	4,000	
Lakewood Water Reclamation Project	440	
Montebello Forebay	50,000	
Eastern Municipal Water District		
Eastern Regional Reclaimed Water System	56,000	
EMWD Recycled Water Pipeline Reach 1 Phase II	1,700	
EMWD Recycled Water Pipeline Reach 16	820	
Rancho California Reclamation	6,450	
Foothill Municipal Water District		
La Canada-Flintridge Country Club	224	
City of Glendale		
Glendale Forest Lawn Water Reclamation Expansion Project	500	
Glendale Grayson Power Plant Project	600	
Glendale Verdugo-Scholl Brand Park Reclaimed Water Project	2,225	
Inland Empire Utilities Agency		
Carbon Canyon/IEUA Regional Recycled Water Distribution System	38,500	
Las Virgenes Municipal Water District		
Calabasas System	4,700	
Decker Canyon Recycled Water Line Extension Project	300	
Las Virgenes Reclamation Project	2,700	
Las Virgenes Valley Reclaimed Water System	500	
City of Long Beach		
Alamitos Barrier Reclaimed Water Project	3,025	
Long Beach Reclamation Project	6,550	
THUMS	1,429	
City of Los Angeles		
Environmental Use	28,500	
Griffith Park and MCA/Universal	2,920	
Hansen Area Water Recycling Project Phase 1	2,500	
Harbor Water Recycling Project	3,600	
Los Angeles Greenbelt Project	900	
Sepulveda Basin Water Reclamation Project	1,500	
West Basin Water Reclamation Program	1,000	

Table A.5-2

Recycled Water Projects

Existing	Ultimate Yield/Capacity Acre-Feet	Online Date
Municipal Water District of Orange County		
El Toro WD Recycling	375	
Green Acres Reclamation Project	6,200	
Irvine Ranch Reclamation Project	10,000	
IRWD Los Alisos Water Reclamation Plant	1,500	
IRWD Michelson & LAWRP Reclamation Upgrades	8,500	
IRWD Michelson Reclamation Project	8,200	
MNWD Moulton Niguel Water Reclamation Project	9,746	
OCWD Groundwater Replenishment System	72,000	
San Clemente Water Reclamation Project	1,610	
SJC Capistrano Valley Non-Domestic Water System Expansion	3,460	
SMWD Chiquita Reclamation Project	2,772	
SMWD Oso Reclamation Expansion Project	3,600	
SMWD purchase from IRWD	321	
South Coast WD South Laguna Reclamation Project	1,450	
Trabuco Canyon Reclamation Expansion Project	1,330	
San Diego County Water Authority		
Camp Pendleton	1,700	
Carlsbad MWD Encina Basin Water Reclamation Program - Phases I and II	5,000	
Escondido Regional Reclaimed Water Project	2,800	
Fairbanks Ranch	308	
Fallbrook Reclamation Project	1,200	
North City Water Reclamation Project	17,500	
Oceanside Water Reclamation Project	200	
Olivenhain Recycled Project - SE Quadrant	1,888	
Otay Recycled Water System	7,500	
Padre Dam Reclaimed Water System	850	
Ramona MWD - San Vicente Water Pollution Control Facility	585	
Ramona MWD - Santa Maria Water Reclamation Project	400	
Rancho Santa Fe Water Pollution Control Facility	500	
RDDMWD Recycled Water Program	4,074	
San Diego Wild Animal Park	168	
San Elijo Water Reclamation System	1,600	
Skyline Ranch	28	
South Bay Water Reclamation Project	1,670	
Valley Center MWD - Lower Moosa Canyon	476	
Valley Center MWD - Woods Valley Ranch	300	
Whispering Palms	448	
City of Santa Ana		
Green Acres Reclamation Project	800	
City of Santa Monica		
Santa Monica Urban Runoff Recycling Facility (SMURRF)	280	
Three Valleys Municipal Water District		
City of Industry Regional Water System	2,584	
Pomona Reclamation Project	9,320	

Table A.5-2

Recycled Water Projects

Existing	Ultimate Yield/Capacity Acre-Feet	Online Date
Three Valleys Municipal Water District (contd)		
Rowland Reclamation Project	2,000	
Walnut Valley Reclamation Project	4,234	
City of Torrance		
West Basin Water Reclamation Program	7,800	
Upper San Gabriel Valley Municipal Water District		
Direct Reuse	3,258	
Los Angeles County Sanitation District Projects	4,375	
Norman's Nursery	100	
West Basin Municipal Water District		
West Basin Water Reclamation Program	46,700	
Western Municipal Water District of Riverside County		
Elsinore Valley/Horse Thief Reclamation	560	
Elsinore Valley/Railroad Canyon Reclamation	730	
March Air Force Base Reclamation Project	896	
Rancho California Reclamation	4,950	
Western Riverside County Regional Water Authority	8,950	

Under Construction	Ultimate Yield/Capacity Acre-Feet	Online Date
Inland Empire Utilities Agency		
Carbon Canyon/IEUA Regional Recycled Water Distribution System	25,000	2015
Three Valleys Municipal Water District		
City of Industry Regional Water System	2,164	2011
Upper San Gabriel Valley Municipal Water District		
City of Industry Regional Water System	3,720	2013
Western Municipal Water District of Riverside County		
March Air Force Base Reclamation Project	448	2012

Full Design & Appropriated Funds	Ultimate Yield/Capacity Acre-Feet	Online Date
Las Virgenes Municipal Water District		
Thousand Oaks Boulevard Extension	176	2010
City of Los Angeles		
Hansen Dam Golf Course Water Recycling Project	500	2011
Municipal Water District of Orange County		
SMWD Canada Gobernadora	725	2013
West Basin Municipal Water District		
West Basin Water Reclamation Program	1,710	2011

Table A.5-2
Recycled Water Projects

Advanced Planning (EIR/EIS Certified)	Ultimate Yield/Capacity Acre-Feet	Online Date
City of Burbank		
Burbank Reclaimed Water System Project	974	2013
Calleguas Municipal Water District		
VCWWD No. 1/Moorpark WWTP Reclaimed Water Distribution System	1,179	2014
Eastern Municipal Water District		
Eastern Regional Reclaimed Water System	12,900	2015
Inland Empire Utilities Agency		
Carbon Canyon/IEUA Regional Recycled Water Distribution System	50,000	2020
City of Long Beach		
Long Beach Reclamation Project	450	2014
City of Los Angeles		
LA-Glendale Storage & Distribution System Water Recycling Project	2,600	2014
Municipal Water District of Orange County		
IRWD Michelson Reclamation Project	11,200	2011
OCWD Groundwater Replenishment System	20,000	2013
San Clemente Water Reclamation Project	1,400	2012
SMWD Arroyo Trabuco Sump	270	2013
SMWD Chiquita Reclamation Project	3,360	2014
San Diego County Water Authority		
Padre Dam Reclaimed Water System	3,304	2015
Upper San Gabriel Valley Municipal Water District		
Direct Reuse	620	2020
Western Municipal Water District of Riverside County		
Elsinore Valley/Summerly	1,380	2011
Elsinore Valley/Wildomar (Phase 1)	300	2011
Elsinore Valley/Tuscany (Phase 1A)	1,225	2013

Feasibility	Ultimate Yield/Capacity Acre-Feet	Online Date
Calleguas Municipal Water District		
City of Simi Vally/VCWWD No. 8 Reclaimed Water Distribution System	50	2018
Eastern Municipal Water District		
EMWD Indirect Potable Reuse	15,000	2018
City of Long Beach		
Alamitos Barrier Reclaimed Water Project	5,000	2018
City of Los Angeles		
Elysian Park Tank & Pumping Station Water Recycling Project	500	2014
Harbor Water Recycling Project	15,500	2015
LA Zoo Water Recycling Project	500	2014
LAX Cooling Towers	240	2018
Terminal Island AWTF and Distriubtion System Expansion Water Recyclng Project	10,000	2019
Tillman Groundwater Replenishment System	15,000	2019

Table A.5-2

Recycled Water Projects

Feasibility	Ultimate Yield/Capacity Acre-Feet	Online Date
Municipal Water District of Orange County		
El Toro AWT Joint project (MNWD, ETWD & IRWD)	400	2018
IRWD Michelson Reclamation Project	5,600	2014
LBCWD Laguna Canyon Blended Recycled Water	100	2014
MNWD Moulton Niguel Water Reclamation Project	600	2014
OCWD Groundwater Replenishment System	30,000	2018
SMWD Chiquita Reclamation Project	5,600	2012
SOCWA J.B. Latham AWT Joint project	7,841	2012
San Diego County Water Authority		
Carlsbad MWD - Mahr Reservoir	151	2015
Olivenhain Northwest Quadrant Recycled Water Project	1,000	2015
Otay Recycled Water System	1,200	2015
Otay WD - North District Recycled Water System	1,100	2020
Ramona MWD - Santa Maria Water Reclamation Project	430	2020
Shadowridge Reclaimed Water System	1,100	2020
Valley Center - Welk WRF	140	2020
Valley Center MWD - Lilac Ranch WRF	60	2020
Upper San Gabriel Valley Municipal Water District		
Direct Reuse	7,000	2018
West Basin Municipal Water District		
Joint Water Pollution Control Plant (JWPCP)	17,500	2012
West Basin Water Reclamation Program	25,540	2012
Western Municipal Water District of Riverside County		
Rancho California Reclamation	13,800	2018

Conceptual	Ultimate Yield/Capacity Acre-Feet	Online Date
City of Anaheim		
Anaheim Water Recycling Demonstration Project	110	2020
Calleguas Municipal Water District		
Thousand Oaks-Camrosa Interconnect	314	2020
Central Basin Municipal Water District		
Joint Water Pollution Control Plant (JWPCP)	45,000	2020
Eastern Municipal Water District		
Hemet Citrus In Lieu Project	5,000	2020
Foothill Municipal Water District		
Arroyo Seco - Flint Wash Project	240	2020
Eaton Canyon Project	500	2025
Verdugo Basin Project	400	2020
Las Virgenes Municipal Water District		
Hidden Hills Outdoor Residential Pilot Project	273	2020
Thousand Oaks Boulevard Extension	250	2020

Table A.5-2

Recycled Water Projects

Conceptual	Ultimate Yield/Capacity Acre-Feet	Online Date
Las Virgenes Municipal Water District (contd)		
Woodland Hills Golf Course Extension	316	2020
City of Los Angeles		
San Fernando Valley/Central City Water Recycling and Reliability Project	1,500	2019
Satellite Plant & Distribution System	4,500	2019
Westside Tier 2A Expansion Water Recycling Project	5,000	2019
Municipal Water District of Orange County		
MWDOC West OC Recycling	6,000	2020
City of Pasadena		
Joint Water Pollution Control Plant (JWPCP)	15,000	2020
San Diego County Water Authority		
Carlsbad MWD Encina Basin Water Reclamation Program - Phases I and II	3,658	2020
Escondido Regional Reclaimed Water Project	1,200	2020
Oceanside Water Reclamation Project	1,300	2020
Olivenhain Joint RW Transmission Project with SFID and OMWD	500	2020
Olivenhain Northwest Quadrant Recycled Water Project	300	2020
Olivenhain Wanket Reservoir RW Conversion	300	2020
Santa Fe ID Evaluating Multiple Options	500	2015
Valley Center MWD - Lower Moosa Canyon	672	2016
Valley Center MWD - North Village WRF	150	2015
Three Valleys Municipal Water District		
Thompson Creek	3,000	2020
City of Torrance		
Joint Water Pollution Control Plant (JWPCP)	5,000	2020
Upper San Gabriel Valley Municipal Water District		
Direct Reuse	4,900	2020
Groundwater Reliability Improvement Project	25,000	2020
Joint Water Pollution Control Plant (JWPCP)	35,000	2020
West Basin Municipal Water District		
Joint Water Pollution Control Plant (JWPCP)	5,000	2020
West Basin Water Reclamation Program	1,008	2015
Western Municipal Water District of Riverside County		
City of Riverside Recycled Water Program	41,400	2015

Table A.5-3

Seawater Desalination Projects

Advanced Planning (EIR/EIS Certified)	Ultimate Yield/Capacity Acre-Feet	Online Date
Municipal Water District of Orange County		
Huntington Beach Seawater Desalination Project	56,000	2012
San Diego County Water Authority		
Carlsbad Seawater Desalination Project	56,000	2012

Feasibility	Ultimate Yield/Capacity Acre-Feet	Online Date
San Diego County Water Authority		
Camp Pendleton Seawater Desalination Project	56,000	2019
Rosarito Beach Seawater Desalination Feasibility Study	28,000	2020
West Basin Municipal Water District		
West Basin Seawater Desalination Project	20,000	2025

Conceptual	Ultimate Yield/Capacity Acre-Feet	Online Date
City of Long Beach		
Long Beach Seawater Desalination Project	10,000	2025
Municipal Water District of Orange County		
South Orange Coastal Ocean Desalination Project	16,000	2015

APPENDIX A.6
RECENT CUWCC FILINGS

Water Supply & Reuse

Reporting Unit:	Year:
Metropolitan Water District of SC	**2005**

Water Supply Source Information

Supply Source Name	Quantity (AF) Supplied	Supply Type
CRA	611128	Imported
SWP	1575911	Imported

Total AF: 2187039

Purchaser Information

Name of Agency	Quantity (AF) Supplied	Retailer or Wholesaler
Anaheim	28073.9	retail
Beverly Hills	11917.8	retail
Burbank	13764.8	retail
Calleguas MWD	113539.8	wholesale
Central Basin MWD	88790.2	wholesale
Compton	2978.8	retail
Eastern MWD	6221.2	wholesale
Eastern MWD	97465.9	retail
Foothill	11651.4	wholesale
Fullerton	17486.5	retail
Glendale	22678.2	retail
Inland Empire UA	97157.2	wholesale
Las Virgenes MWD	21734	retail
Long Beach	47565.2	retail
Los Angeles	250666.6	retail
MWD of Orange County	266938.6	wholesale
Pasadena	21982	retail
San Diego CWA	531535.7	wholesale
San Fernando	500	retail
San Marino	1422.3	retail
Santa Ana	19177.8	retail
Santa Monica	13195.8	retail
Three Valleys	76610.5	wholesale
Torrance	29045.5	retail
Upper San Gabriel Valley MWD	51951.8	wholesale
West Basin MWD	140841.8	wholesale
Western MWD	112991.9	wholesale

Total AF: 2097885.2

BMP 03: System Water Audits, Leak Detection and Repair

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2005**

A. Implementation		
	1. Does your agency own or operate a water distribution system?	yes
	2. Has your agency completed a pre-screening system audit for this reporting year?	yes
	3. If YES, enter the values (AF/Year) used to calculate verifiable use as a percent of total production:	
	a. Determine metered sales (AF)	2060111.1
	b. Determine other system verifiable uses (AF)	0
	c. Determine total supply into the system (AF)	2109000.9
	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
	4. Does your agency keep necessary data on file to verify the values used to calculate verifiable uses as a percent of total production?	yes
	5. Did your agency complete a full-scale audit during this report year?	yes
	6. Does your agency maintain in-house records of audit results or the completed AWWA audit worksheets for the completed audit?	yes
	7. Does your agency operate a system leak detection program?	yes
	a. If yes, describe the leak detection program: Metropolitan's 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 evidence of leaking 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. "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 07: Public Information Programs

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2005**

A. Implementation

1. How is your public information program implemented?
   Wholesaler implements program (none or minimal retailer participation)

2. Describe the program and how it's organized:
   Major advertising and public relations campaign promoting outdoor water use efficiency and California Friendly landscaping. Educational brochures and campaign artwork including bill-stuffers available for retailer and sub-agency use.

3. Indicate which and how many of the following activities are included in your public information program:

Region-Wide Public Information Program Activity	**Yes/No**	**Number of Events**
a. Paid Advertising	yes	3205
b. Public Service Announcement	yes	48
c. Bill Inserts / Newsletters / Brochures	yes	15
d. Bill showing water usage in comparison to previous year's usage	no	
e. Demonstration Gardens	yes	31
f. Special Events, Media Events	yes	8
g. Speaker's Bureau	yes	0
h. Program to coordinate with other government agencies, industry and public interest groups and media	yes	

B. Conservation Information Program Expenditures

1. Annual Expenditures (Excluding Staffing)	2000000

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."
NA

D. Comments

NA

BMP 08: School Education Programs

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2005**

A. Implementation

1. How is your public information program implemented?
   Wholesaler and retailer both participate in program

2. Please provide information on your region-wide 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	25010	337
Grades 4th-6th	yes	21	33346	450
Grades 7th-8th	yes	12	12104	165
High School	yes	12	12909	171

4. Did your Agency's materials meet state education framework requirements?	yes
5. When did your Agency begin implementing this program?	11/1/1983

B. School Education Program Expenditures

1. Annual Expenditures (Excluding Staffing)	605050

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 10: Wholesale Agency Assistance Programs

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2005**

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	61298	**8**	No		0
2	yes	350000	373532	**9**	yes	2000000	1901119
3	No		0	**10**	No		0
4	No		0	**11**	No		0
5	yes	60000	57438	**12**	No		0
6	yes	275000	2664241	**13**	No		0
7	No		0	**14**	yes	5500000	5548600

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

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

BMP 10: Wholesale Agency Assistance Programs

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2005**

3	No	**10**	No
4	No	**11**	No
5	yes	**12**	No
6	yes	**13**	No
7	yes	**14**	No

B. "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."

C. Comments

BMP 11: Conservation Pricing

Reporting Unit: **Metropolitan Water District of SC**		Form Status: **CUWCC Reviewed**	Year: **2005**
A. Implementation			
	Water Service Rate Structure Data by Customer Class		
	Number of schedules:	**Use of classification:**	**Rate structure:**
	For the following accounts, how many rate schedules does agency offer/use?	This agency:	Click link for each rate schedule:
	1. Single-family residential: 0	Does not offer	
	2. Multi-family residential: 0	Does not offer	
	3. Commercial: 0	Does not offer	
	4. Industrial: 0	Does not offer	
	5. Institutional/ government: 0	Does not offer	
	6. Dedicated irrigation (potable water): 0	Does not serve	
	7. Other: 0	Does not offer	
	8. Recycled-reclaimed water: 0	Does not offer	
	9. Raw water (urban use): 0	Uses class	
	10. Wholesale (urban use): 1	Uses class	RATES ENTERED
	Sewer Service		
	11. Does your agency provide sewer service to your water customers?		no
	12. Does all sewer service use conservation rate structures?		no
	13. Has your agency made the required efforts (as prescribed in BMP 11) to have sewer services billed on conservation rates?		no
	14. What water agency activities have been undertaken during the reporting period to achieve waste water agency volumetric billing in your water agency service area?		None
B. "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."		
C. Comments			

BMP 12: Conservation Coordinator

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2005**

A. Implementation		
	1. Does your Agency have a conservation coordinator?	yes
	2. Is a coordinator position supplied by another agency with which you cooperate in a regional conservation program ?	no
	a. Partner agency's name:	
	3. 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	3 years managing unit
	e. Date Coordinator's position was created (mm/dd/yyyy)	8/8/1988
	4. Number of conservation staff (FTEs), including Conservation Coordinator.	10
B. Conservation Program Expenditures		
	1. Staffing Expenditures (In-house Only)	1811000
	2. BMP Program Implementation Expenditures (Total of all BMPs)	10606226
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	

Water Supply & Reuse

Reporting Unit:	Year:
Metropolitan Water District of SC	**2006**

Water Supply Source Information

Supply Source Name	Quantity (AF) Supplied	Supply Type
CRA	611972	Imported
SWP	1625990	Imported

Total AF: 2237962

Purchaser Information

Name of Agency	Quantity (AF) Supplied	Retailer or Wholesaler
Anaheim	31271.4	retail
Beverly Hills	12045.7	retail
Burbank	13031.7	retail
Calleguas MWD	112681.6	wholesale
Central Basin MWD	87261.8	wholesale
Compton	2808.1	retail
Eastern MWD	11850.5	wholesale
Eastern MWD	104225.1	retail
Foothill	10518.3	wholesale
Fullerton	17794.7	retail
Glendale	22317.3	retail
Inland Empire UA	86428.2	wholesale
Las Virgenes MWD	22689.4	retail
Long Beach	44252.7	retail
Los Angeles	208864.1	retail
MWD of Orange County	284399.1	wholesale
Pasadena	21593.5	retail
San Diego CWA	572771.4	wholesale
San Fernado	801.9	retail
San Marino	1208.6	retail
Santa Ana	22007.3	retail
Santa Monica	12885.4	retail
Three Valleys MWD	63447.7	wholesale
Torrance	21337.8	retail
Upper San Gabriel Valley MWD	75565.5	wholesale
West Basin MWD	143485.1	wholesale
Western MWD	89024	wholesale

Total AF: 2096567.9

BMP 03: System Water Audits, Leak Detection and Repair

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2006**

A. Implementation		
	1. Does your agency own or operate a water distribution system?	yes
	2. Has your agency completed a pre-screening system audit for this reporting year?	yes
	3. If YES, enter the values (AF/Year) used to calculate verifiable use as a percent of total production:	
	a. Determine metered sales (AF)	2039602.2
	b. Determine other system verifiable uses (AF)	0
	c. Determine total supply into the system (AF)	2357014.2
	d. Using the numbers above, if (Metered Sales + Other Verifiable Uses) / Total Supply is < 0.9 then a full-scale system audit is required.	0.87
	4. Does your agency keep necessary data on file to verify the values used to calculate verifiable uses as a percent of total production?	yes
	5. Did your agency complete a full-scale audit during this report year?	yes
	6. Does your agency maintain in-house records of audit results or the completed AWWA audit worksheets for the completed audit?	yes
	7. Does your agency operate a system leak detection program?	yes
	a. If yes, describe the leak detection program: Metropolitan's 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 evidence of leaking 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. "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 07: Public Information Programs

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2006**

A. Implementation

1. How is your public information program implemented?
   Wholesaler implements program (none or minimal retailer participation)

2. Describe the program and how it's organized:
   Major advertising and public relations campaign promoting outdoor water use efficiency and California Friendly landscaping. Educational brochures and campaign artworkincluding bill-stuffers available for retailer and sub-agency use.

3. Indicate which and how many of the following activities are included in your public information program:

Region-Wide Public Information Program Activity	Yes/No	Number of Events
a. Paid Advertising	yes	6308
b. Public Service Announcement	yes	0
c. Bill Inserts / Newsletters / Brochures	yes	12
d. Bill showing water usage in comparison to previous year's usage	no	
e. Demonstration Gardens	yes	30
f. Special Events, Media Events	yes	10
g. Speaker's Bureau	yes	0
h. Program to coordinate with other government agencies, industry and public interest groups and media	yes	

B. Conservation Information Program Expenditures

1. Annual Expenditures (Excluding Staffing)	3800000

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."
NA

D. Comments

NA

BMP 08: School Education Programs

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2006**

A. Implementation

1. How is your public information program implemented?
   Wholesaler and retailer both participate in program

2. Please provide information on your region-wide 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	11	28917	378
Grades 4th-6th	yes	22	38556	503
Grades 7th-8th	yes	13	13494	186
High School	yes	14	15	192

4. Did your Agency's materials meet state education framework requirements?	yes
5. When did your Agency begin implementing this program?	11/1/1983

B. School Education Program Expenditures

1. Annual Expenditures (Excluding Staffing)	509450

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 10: Wholesale Agency Assistance Programs

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2006**

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	31780	**8**	No	0	0
2	yes	350000	225460	**9**	yes	25000000	2679214
3	No	0	0	**10**	No	0	0
4	No	0	0	**11**	No	0	0
5	yes	250000	195213	**12**	No	0	0
6	yes	3000000	3047545	**13**	No	0	0
7	No	0	0	**14**	yes	4500000	4159840

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

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

BMP 10: Wholesale Agency Assistance Programs

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2006**

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

B. "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."

C. Comments

BMP 11: Conservation Pricing

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2006**

A. Implementation

Water Service Rate Structure Data by Customer Class

Number of schedules:	**Use of classification:**	**Rate structure:**
For the following accounts, how many rate schedules does agency offer/use?	This agency:	Click link for each rate schedule:
1. Single-family residential: 0	Does not offer	
2. Multi-family residential: 0	Does not offer	
3. Commercial: 0	Does not offer	
4. Industrial: 0	Does not offer	
5. Institutional/ government: 0	Does not offer	
6. Dedicated irrigation (potable water): 0	Does not offer	
7. Other: 0	Does not offer	
8. Recycled-reclaimed water: 0	Does not offer	
9. Raw water (urban use): 0	Does not offer	
10. Wholesale (urban use): 2	Uses class	RATES ENTERED

Sewer Service

11. Does your agency provide sewer service to your water customers?	no
12. Does all sewer service use conservation rate structures?	no
13. Has your agency made the required efforts (as prescribed in BMP 11) to have sewer services billed on conservation rates?	no
14. What water agency activities have been undertaken during the reporting period to achieve waste water agency volumetric billing in your water agency service area?	None

B. "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."

C. Comments

BMP 12: Conservation Coordinator

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2006**

A. Implementation		
	1. Does your Agency have a conservation coordinator?	yes
	2. Is a coordinator position supplied by another agency with which you cooperate in a regional conservation program ?	no
	a. Partner agency's name:	
	3. 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	4 years managing unit
	e. Date Coordinator's position was created (mm/dd/yyyy)	8/8/1988
	4. Number of conservation staff (FTEs), including Conservation Coordinator.	10
B. Conservation Program Expenditures		
	1. Staffing Expenditures (In-house Only)	1811000
	2. BMP Program Implementation Expenditures (Total of all BMPs)	10891889
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	

Water Supply & Reuse

Reporting Unit:	Year:
Metropolitan Water District of SC	**2007**

Water Supply Source Information

Supply Source Name	Quantity (AF) Supplied	Supply Type
CRA	662539	Imported
SWP	1788579	Imported

Total AF: 2451118

Purchaser Information

Name of Agency	Quantity (AF) Supplied	Retailer or Wholesaler
Anaheim	23741.1	retail
Beverly Hills	12775.5	retail
Burbank	13401.4	retail
Calleguas MWD	130688.5	wholesale
Central Basin MWD	119236.9	wholesale
Compton	3694.7	retail
Foothill	12520.8	wholesale
Glendale	23828.8	retail
Inland Empire UA	77717.9	wholesale
Las Virgenes	25372.6	retail
Long Beach	43644.9	retail
Los Angeles	291375	retail
MWD of Orange County	322021.4	wholesale
Pasadena	25309.2	retail
San Diego CWA	609396.6	wholesale
San Fernando	902	retail
San Marino	1572.9	retail
Santa Ana	18427.4	retail
Santa Monica	13472.5	retail
Three Valleys MWD	68454	wholesale
Torrance	21100.3	retail
Upper San Gabriel MWD	15271.7	wholesale
West Basin MWD	149226.4	wholesale
Western MWD	117924.8	wholesale
Eastern MWD	125051.7	retail
Eastern MWD	5210.5	wholesale
Fullerton	16276.6	retail

Total AF: 2287616.1

BMP 03: System Water Audits, Leak Detection and Repair

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2007**

A. Implementation		
	1. Does your agency own or operate a water distribution system?	yes
	2. Has your agency completed a pre-screening system audit for this reporting year?	yes
	3. If YES, enter the values (AF/Year) used to calculate verifiable use as a percent of total production:	
	a. Determine metered sales (AF)	2287617.1
	b. Determine other system verifiable uses (AF)	0
	c. Determine total supply into the system (AF)	2357014.2
	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
	4. Does your agency keep necessary data on file to verify the values used to calculate verifiable uses as a percent of total production?	yes
	5. Did your agency complete a full-scale audit during this report year?	yes
	6. Does your agency maintain in-house records of audit results or the completed AWWA audit worksheets for the completed audit?	yes
	7. Does your agency operate a system leak detection program?	yes
	a. If yes, describe the leak detection program: Metropolitan's 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 evidence of leaking 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. "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 07: Public Information Programs

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2007**

A. Implementation

1. How is your public information program implemented?
   Wholesaler implements program (none or minimal retailer participation)

2. Describe the program and how it's organized:
   Major advertising and public relations campaign promoting outdoor water use efficiency and California Friendly landscaping. Educational brochures and campaign artworkincluding bill-stuffers available for retailer and sub-agency use.

3. Indicate which and how many of the following activities are included in your public information program:

Region-Wide Public Information Program Activity	Yes/No	Number of Events
a. Paid Advertising	yes	5769
b. Public Service Announcement	yes	300
c. Bill Inserts / Newsletters / Brochures	yes	25
d. Bill showing water usage in comparison to previous year's usage	no	
e. Demonstration Gardens	yes	22
f. Special Events, Media Events	yes	13
g. Speaker's Bureau	yes	14
h. Program to coordinate with other government agencies, industry and public interest groups and media	yes	

B. Conservation Information Program Expenditures

1. Annual Expenditures (Excluding Staffing)	1522124

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: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2007**

A. Implementation

1. How is your public information program implemented?
   Wholesaler implements program (none or minimal retailer participation)

2. Please provide information on your region-wide 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	14	8991	86
Grades 4th-6th	yes	25	42958	418
Grades 7th-8th	yes	19	25975	253
High School	yes	16	21978	214

4. Did your Agency's materials meet state education framework requirements?	yes
5. When did your Agency begin implementing this program?	11/1/1983

B. School Education Program Expenditures

1. Annual Expenditures (Excluding Staffing)	488000

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 10: Wholesale Agency Assistance Programs

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2007**

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	50000	49288	**8**	No		
2	yes	30000	29040	**9**	yes	6000000	5265935
3	No			**10**	No		
4	No			**11**	No		
5	yes	2000000	1318574	**12**	No		
6	yes	3000000	2262078	**13**	No		
7	No			**14**	yes	7000000	6485726

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

BMP 10: Wholesale Agency Assistance Programs

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2007**

3. Staff Resources by BMP

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	.5	**8**	No	
2	yes	.5	**9**	yes	2
3	No		**10**	yes	2.5
4	No		**11**	No	
5	yes	2.5	**12**	No	
6	yes	1.5	**13**	No	
7	No		**14**	yes	1.25

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

B. "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."

C. Comments

BMP 12: Conservation Coordinator

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2007**

A. Implementation		
	1. Does your Agency have a conservation coordinator?	yes
	2. Is a coordinator position supplied by another agency with which you cooperate in a regional conservation program ?	no
	a. Partner agency's name:	
	3. 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	5 years managing unit
	e. Date Coordinator's position was created (mm/dd/yyyy)	8/8/1988
	4. Number of conservation staff (FTEs), including Conservation Coordinator.	14
B. Conservation Program Expenditures		
	1. Staffing Expenditures (In-house Only)	2605400
	2. BMP Program Implementation Expenditures (Total of all BMPs)	17581628
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	

Water Supply & Reuse

Reporting Unit:	Year:
Metropolitan Water District of SC	**2008**

Water Supply Source Information

Supply Source Name	Quantity (AF) Supplied	Supply Type
SWP	1312397	Imported
CRA	801018	Imported

Total AF: 2113415

Purchaser Information

Name of Agency	Quantity (AF) Supplied	Retailer or Wholesaler
Anaheim	15271.9	retail
Beverly Hills	12179.3	retail
Burbank	14596.6	retail
Callegua MWD	131364.2	wholesale
Central Basin MWD	59053.6	wholesale
Compton	2237.3	retail
Eastern MWD	104691.5	retail
Eastern MWD	4362.2	wholesale
Foothill	12305.5	wholesale
Fullerton	9224.8	retail
Glendale	21880.6	retail
Inland Empire UA	69040.8	wholesale
Las Virgenes MWD	27064.5	wholesale
Long Beach	35330.1	retail
Los Angeles	422313.8	retail
MWD of Orange County	229682.4	wholesale
Pasadena	25517	retail
San Fernando	.2	retail
San Diego CWA	562208.1	wholesale
San Marino	895.1	retail
Santa Ana	8520.8	retail
Santa Monica	12563.6	retail
Three Valleys MWD	72828.6	wholesale
Torrance	19306.2	retail
Upper San Gabriel MWD	70998.4	wholesale
West Basin MWD	135546.9	wholesale
Western MWD	105945	wholesale

Total AF: 2184929

BMP 03: System Water Audits, Leak Detection and Repair

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2008**
A. Implementation		
	1. Does your agency own or operate a water distribution system?	yes
	2. Has your agency completed a pre-screening system audit for this reporting year?	yes
	3. If YES, enter the values (AF/Year) used to calculate verifiable use as a percent of total production:	
	a. Determine metered sales (AF)	2184929
	b. Determine other system verifiable uses (AF)	0
	c. Determine total supply into the system (AF)	2206548
	d. Using the numbers above, if (Metered Sales + Other Verifiable Uses) / Total Supply is < 0.9 then a full-scale system audit is required.	0.99
	4. Does your agency keep necessary data on file to verify the values used to calculate verifiable uses as a percent of total production?	yes
	5. Did your agency complete a full-scale audit during this report year?	yes
	6. Does your agency maintain in-house records of audit results or the completed AWWA audit worksheets for the completed audit?	yes
	7. Does your agency operate a system leak detection program?	yes
	a. If yes, describe the leak detection program: Metropolitan's 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 evidence of leaking 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. "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		
Voluntary Questions (Not used to calculate compliance)		
E. Volumes		

		Estimated	Verified
	1. Volume of raw water supplied to the system		
	2. Volume treated water supplied into the system		
	3. Volume of water exported from the system		
	4. Volume of billed authorized metered consumption		
	5. Volume of billed authorized un-metered consumption		

BMP 03: System Water Audits, Leak Detection and Repair

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**			Year: **2008**
	6. Volume of unbilled authorized metered consumption			
	7. Volume of unbilled authorized unmetered consumption			
F. Infrastructure and Hydraulics				
	1. Are system input (source or master meter) volumes metered at the entry to the:			
	2. How frequently are system input volumes tested and calibrated:		# months	
	3. Length of mains			
	4. What % distribution of mains are rigid pipes (metal, ac, concrete)			
	5. Number of service connections			
	6. What % of service connections are rigid pipes (metal)			
	7. Are residential properties fully metered?			
	8. Are non-residential properties fully metered?			
	9. Provide an estimate of customer meter under-registration:			
	10. Average length of customer service line from the main to the point of the meter:			
	11. Average system pressure:			
	12. Range of system pressures:			
	13. What percentage of the system is fed from gravity feed:			
	14. What percentage of the system is fed by pumping and re-pumping:			
G. Maintenance Questions				
	1. Who is responsible for providing, testing, repairing and replacing customer meters?			
	2. Does your agency test, repair and replace your meters on a regular timed schedule?			
	a. If yes, does your agency test by meter size or customer category?			
	b. If yes to meter size, please provide the frequency of testing by meter size:			
	• Less than or equal to 1"			# years
	• 1.5" to 2"		# years	
	• 3" and Larger		# months	
	c. If yes to customer category, provide the frequency of testing by customer category:			
	• SF residential		# years	
	• MF residential		# years	

BMP 03: System Water Audits, Leak Detection and Repair

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**		Year: **2008**
	• Commercial	# months	
	• Industrial & Institutional	# months	
	3. Who is responsible for repairs to the customer lateral or customer service line?:		
	4. Who is responsible for service line repairs downstream of the customer meter?:		
	5. Does your agency proactively search for leaks using leak survey techniques or does your utility reactively repair leaks which are called in, or both?		
	6. What is the utility budget breakdown for:		
	• Leak Detection	$	
	• Leak Repair	$	
	• Auditing and Water Loss Evaluation		$
	• Meter Testing		$

BMP 07: Public Information Programs

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2008**

A. Implementation

	1. How is your public information program implemented? Wholesaler implements program (none or minimal retailer participation)		
	2. Describe the program and how it's organized: Major advertising and public relations campaign promoting outdoor water use efficiency and California Friendly landscaping. Educational brochures and campaign artwork including bill-stuffers available for retailer and sub-agency use.		
	3. Indicate which and how many of the following activities are included in your public information program:		
	Region-Wide Public Information Program Activity	**Yes/No**	**Number of Events**
	a. Paid Advertising	yes	27329
	b. Public Service Announcement	yes	531
	c. Bill Inserts / Newsletters / Brochures	yes	26
	d. Bill showing water usage in comparison to previous year's usage	no	
	e. Demonstration Gardens	yes	8
	f. Special Events, Media Events	yes	17
	g. Speaker's Bureau	yes	37
	h. Program to coordinate with other government agencies, industry and public interest groups and media	yes	

B. Conservation Information Program Expenditures

	1. Annual Expenditures (Excluding Staffing)	5958089

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: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2008**

A. Implementation

1. How is your public information program implemented?
   Wholesaler implements program (none or minimal retailer participation)

2. Please provide information on your region-wide 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	12	7594	69
Grades 4th-6th	yes	23	36281	326
Grades 7th-8th	yes	16	21937	198
High School	yes	11	18562	160

4. Did your Agency's materials meet state education framework requirements?	yes
5. When did your Agency begin implementing this program?	11/1/1983

B. School Education Program Expenditures

1. Annual Expenditures (Excluding Staffing)	495000

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 10: Wholesale Agency Assistance Programs

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2008**

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	10000	7363	**8**	No		
2	yes	10000	12543	**9**	yes	6000000	6381198
3	No			**10**	No		
4	No			**11**	No		
5	yes	2000000	3602141	**12**	No		
6	yes	3000000	3456924	**13**	No		
7	No			**14**	yes	6000000	4639325

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

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	.5	**8**	No	
2	yes	.5	**9**	yes	2
3	No		**10**	yes	2.5
4	No		**11**	No	
5	yes	2.5	**12**	No	
6	yes	1.5	**13**	No	
7	No		**14**	yes	1.25

BMP 10: Wholesale Agency Assistance Programs

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2008**

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

B. "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."

C. Comments

BMP 12: Conservation Coordinator

Reporting Unit: **Metropolitan Water District of SC**	Form Status: **CUWCC Reviewed**	Year: **2008**

A. Implementation		
	1. Does your Agency have a conservation coordinator?	yes
	2. Is a coordinator position supplied by another agency with which you cooperate in a regional conservation program?	no
	a. Partner agency's name:	
	3. 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	6 years managing unit
	e. Date Coordinator's position was created (mm/dd/yyyy)	8/8/1988
	4. Number of conservation staff (FTEs), including Conservation Coordinator.	17
B. Conservation Program Expenditures		
	1. Staffing Expenditures (In-house Only)	2521325
	2. BMP Program Implementation Expenditures (Total of all BMPs)	13554507
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		

La Entrada Water Supply Assessment

Appendix A
Water Supply Planning Documents

Part 7
Integrated Water Resources Plan 2010 Update, October 2010

INTEGRATED WATER RESOURCES PLAN

Report No. 1373

2010 UPDATE

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

INTEGRATED WATER RESOURCES PLAN

2010 Update

Prepared by:

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

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Report No. 1373
October 2010

FOREWORD

Planning for a reliable, high quality and affordable water supply has never been such a moving target. Water resources in Southern California are challenged by nature and law and unforeseen circumstances. Emerging challenges include climate change, new environmental regulations and economic unknowns. Embracing the reality of change requires an adaptive strategy that allows water managers to plan for today and the future.

As the wholesale provider of water supplies for a six-county service area consisting of 19 million people, the Metropolitan Water District of Southern California plans for the future through a blueprint known as the Integrated Resources Plan (IRP). The original IRP in 1996 came in the wake of a dry cycle that created the first shortage conditions in Metropolitan history. The 1996 IRP emphasized the construction and creation of a network of water storage facilities, both below and above ground, while investing in a mix of local and imported supply options. An update in 2004 further emphasized conservation and local resource development options and targets through 2025 and included the addition of a 10 percent "planning buffer." This buffer underlined the necessity for a back-up plan to deal with scenarios that eluded worst-case modeling.

However, neither version of the previous IRPs anticipated today's dramatic changes. The Colorado River has experienced below-average precipitation conditions for most of the past decade. And the State Water Project has faced historic regulatory cutbacks significantly reducing its supplies that pass through the Sacramento-San Joaquin Delta in Northern California.

The 2010 IRP manages these challenges. It has three components that begin with baseline efforts – or, the core resource strategy – designed to maintain reliable water supplies. The second component – the uncertainty buffer – activates a suite of buffer actions which help to mitigate short-term changes. If changed conditions turn dramatic and persistent, there is a final component – foundational actions – which detail strategies for securing additional water resources. All three plan components are explained in greater detail in this report.

Like the preparation of previous IRPs, the crafting of the 2010 IRP was a collaborative effort. Metropolitan sought input from its 26 public member agencies, retail water agencies, the public and other stakeholders including water and wastewater managers, environmental interests, and the business community. Metropolitan's board of directors was involved in the 2010 IRP preparation through creation of an IRP board Steering Committee, which met on a regular basis to be briefed by Metropolitan staff and provide input. A Strategic Policy Review was conducted through a series of board workshops to help Metropolitan evaluate its future role for the region.

The 2010 IRP remains true to the original IRP goal of meeting "full service demands at the retail level under all foreseeable hydrologic conditions." It offers the additional steps

FOREWORD

of promoting water use efficiency as a means of greater reliability and advances long-term planning for potential future contingency resources such as stormwater capture and large-scale seawater desalination. The 2010 IRP also recognizes the goals of providing for expected needs while making the most financially prudent responses. This plan, with its aggressive region-wide conservation and water use efficiency targets, serves as a model for meeting California's new goal to lower residential per-capita water use by 20 percent by the year 2020.

Adoption of the 2010 IRP by Metropolitan's Board of Directors marks the culmination of a two-year planning milestone and the start of additional collaborative efforts to meet its goals. This will include development of a long-term conservation plan and a comprehensive review of local needs and projects under consideration or underway.

Metropolitan came into existence in 1928 to respond to changing conditions generated by a fast-growing region in need of water. First on the agenda was the construction and operation of the Colorado River Aqueduct. A generation later in 1960, Metropolitan became the largest contractor to the State Water Project to supplement the region's water needs. Over time, Metropolitan has assumed important roles in addition to operator and contractor, leveraging the resources and expertise of its member agencies to coordinate a regional response to changing water supply conditions.

Metropolitan's 2010 IRP stays true to the District's historic mission while recognizing the need to create a broader, more robust water portfolio to prepare for this era of change. It is a recognition that in water management, nothing remains constant. The 2010 IRP is a flexible plan that will be reevaluated by Metropolitan's board, staff and its member agencies and updated as conditions change and new needs emerge.

Timothy F. Brick
Chairman, Metropolitan Board of Directors

Jeffrey Kightlinger
General Manager

ACKNOWLEDGMENTS

The consensus reached during this multi-year Integrated Water Resources Plan Update process could not have been possible without the dedication of the board, Metropolitan staff, member and retail agencies, groundwater basin and wastewater management agencies, other local agencies, environmental interest groups, and members of the public. A report of this magnitude could not be completed without support on all fronts; those listed here are only a fraction of the staff required to produce this document. Thanks to everyone who contributed to this project.

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Guide to Acronyms

20x2020	Water Conservation Act of 2009 (SB 7)
AB	California Assembly Bill
AF	acre-feet
AMI	advanced metering infrastructure
BDCP	Bay Delta Conservation Plan
BMPs	best management practices
CCP	Conservation Credits Program
CDPH	California Department of Public Health
CEQA	California Environmental Quality Act
CII	commercial, industrial, and institutional
CRA	Colorado River Aqueduct
CUWCC	California Urban Water Conservation Council
CVWD	Coachella Valley Water District
DWCV	Desert Water Agency/Coachella Valley Water District
DWR	California Department of Water Resources
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EMMP	Energy Management Master Plan
EMRS	Energy Management and Reliability Study
ESA	Endangered Species Act
GPCD	gallons per capita per day
HCD	California Department of Housing and Community Development
HR	U.S. House of Representatives Bill
IID	Imperial Irrigation District
IRP	Integrated Water Resources Plan
IRPSIM	Integrated Water Resources Plan Simulation Model
IRWMP	Integrated Regional Water Management Plan
LAA	Los Angeles Aqueduct
LADWP	Los Angeles Department of Water and Power
LRP	Local Resources Program
M&I	municipal and industrial
MAF	million acre-feet
MGD	million gallons per day
MOU	memorandum of understanding
MPAs	marine protection areas
MWD	Municipal Water District
MWD-MAIN	Water Use Forecasting System
MWDOC	Municipal Water District of Orange County
O&M	operation and maintenance
OMP&R	operations, maintenance, power, and replacement
PVID	Palo Verde Irrigation District
QSA	Quantification Settlement Agreement
RO	reverse osmosis
SB	Senate Bill
SDCWA	San Diego County Water Authority
SDP	Seawater Desalination Program
SWP	State Water Project
SWRCB	State Water Resources Control Board
USBR	U.S. Bureau of Reclamation

Table of Contents

INTEGRATED WATER RESOURCES PLAN 2010 UPDATE

BACKGROUND, HISTORICAL CONDITIONS & CURRENT STATUS

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

1 Background, Historical Conditions & Current Status

The Metropolitan Water District of Southern California

Formation & Purpose

The Metropolitan Water District of Southern California is a public agency organized in 1928 by a vote of the electorates of 11 cities located in Southern California. The agency was enabled by the Metropolitan Water District Act that was passed into law by the California Legislature. Metropolitan was formed "for the purpose of developing, storing, and distributing water" to the residents of Southern California.

Metropolitan imports and distributes water from the Colorado River through its Colorado River Aqueduct (CRA) and from the Feather River through the State Water Project (SWP). Metropolitan also develops other water resource and conservation projects throughout the state.

In 1992, Metropolitan 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."

Member Agencies

Metropolitan is currently composed of 26 member agencies, consisting of 14 cities, 11 municipal water districts, and one county water authority. Metropolitan is a water wholesaler with no retail customers, and it provides treated and untreated water directly to its member agencies. **Table 1.1** shows Metropolitan's member agencies and the type of service provided. Fifteen member agencies provide retail service to customers, nine provide only wholesale service, and two provide a combination of both. Metropolitan's member agencies serve residents in 152 cities and 89 unincorporated communities. Throughout Metropolitan's service area, approximately 250 retail agencies supply water to the public.

Metropolitan's member agencies deliver 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. Metropolitan has historically provided between 45 and 60 percent of the municipal and industrial (M&I), and agricultural water used within its service area. The remaining water supply comes from local groundwater basins, local surface water, recycling, the city of Los Angeles' aqueduct (LAA) from the eastern Sierra Nevada, and the San Diego County Water Authority's (SDCWA) water transfers from the Imperial Irrigation District (IID) delivered through an exchange of water supplies with Metropolitan. Member agencies also implement conservation programs that can be considered part of their supplies.

Service Area

Metropolitan's service area covers the Southern California coastal plain, as seen in **Figure 1.1**. It extends about 200 miles along the Pacific Ocean from the city of Oxnard on the north to the international boundary with Mexico on the south, and it reaches as far as 70 miles inland from the coast. The total area served is nearly 5,200 square miles and it includes portions of

Metropolitan is a regional wholesaler that provides water for 26 member public agencies to deliver to 19 million people living in Los Angeles, Orange, Riverside, San Bernardino, San Diego and Ventura counties spanning 5,200 square miles.

Previous Page Photo: The F.E. Weymouth Water Treatment Plant in La Verne is one of five Metropolitan-owned and operated treatment facilities.

Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura counties. **Table 1.2** shows that although only 14 percent of the land area of the six Southern California counties is within Metropolitan's service area, 86 percent of the populations of those counties reside within Metropolitan's boundaries.

Board of Directors & Management Team

Metropolitan's Board of Directors currently consists of 37 directors. Each member agency has at least one representative, with the agency's assessed valuation determining its additional representation and voting rights. Directors can be appointed by the chief executive officer of the member agency with the consent of the governing body of the member agency or be elected by a majority vote of the governing body of the member agency. The board includes business, professional, and civic leaders and meetings are generally held on the second Tuesday of each month and are open to the public.

Throughout its history, the board has delegated certain tasks to Metropolitan staff, which are codified in Metropolitan's Administrative Code. In addition, Metropolitan has developed policy principles to help achieve its stated mission. These policies can be found in a variety of documents including: specific policy statements, board-adopted policy principles, and letters submitted to the board. Policy statements are also embedded in formal board meeting discussions and recorded in meeting minutes. The policies established by the board are subject to all applicable laws and regulations.

The management of Metropolitan is under the direction of its General Manager, who serves at the discretion of the board, as do Metropolitan's General Auditor, General Counsel, and Ethics Officer.

Table 1.1 Metropolitan's Member Agencies by Service Provided

Retail Agencies
Anaheim, City of
Beverly Hills, City of
Burbank, City of
Compton, City of
Fullerton, City of
Glendale, City of
Las Virgenes Municipal Water District
Long Beach, City of
Los Angeles, City of
Pasadena, City of
San Fernando, City of
San Marino, City of
Santa Ana, City of
Santa Monica, City of
Torrance, City of
Retail & Wholesale Agencies
Eastern Municipal Water District
Western Municipal Water District
Wholesale Agencies
Calleguas Municipal Water District
Central Basin Municipal Water District
Foothill Municipal Water District
Inland Empire Utilities Agency
Municipal Water District of Orange County (MWDOC)
San Diego County Water Authority (SDCWA)
Three Valleys Municipal Water District
Upper San Gabriel Valley Municipal Water District
West Basin Municipal Water District

Integrated Resources Planning

Since its creation in 1928, Metropolitan has focused on providing reliable water supply to the people and economy of Southern California. Metropolitan's role in contributing to that broad mission has been shaped by a history of important principles and policies. In 1952, the Laguna Declaration positioned Metropolitan to "provide its service area with adequate supplies of water to meet expanding and increasing needs," and established Metropolitan's leadership role in "closing the gap" between the region's water needs and its locally available water supplies. In 1996 Metropolitan developed its first Integrated Water Resources Plan (IRP) to address the complexity of developing, maintaining, and delivering a reliable supply of water to its member agencies. The IRP established targets for a diversified portfolio of investments in water supply that have provided the foundation for continued water supply reliability during a period of prolonged drought and severe regulatory limitations.

The IRP established a long-term water resources strategy to fulfill Metropolitan's mission of providing a high quality, reliable water supply for its service area by identifying a range of

Figure 1.1 Metropolitan's Member Agencies

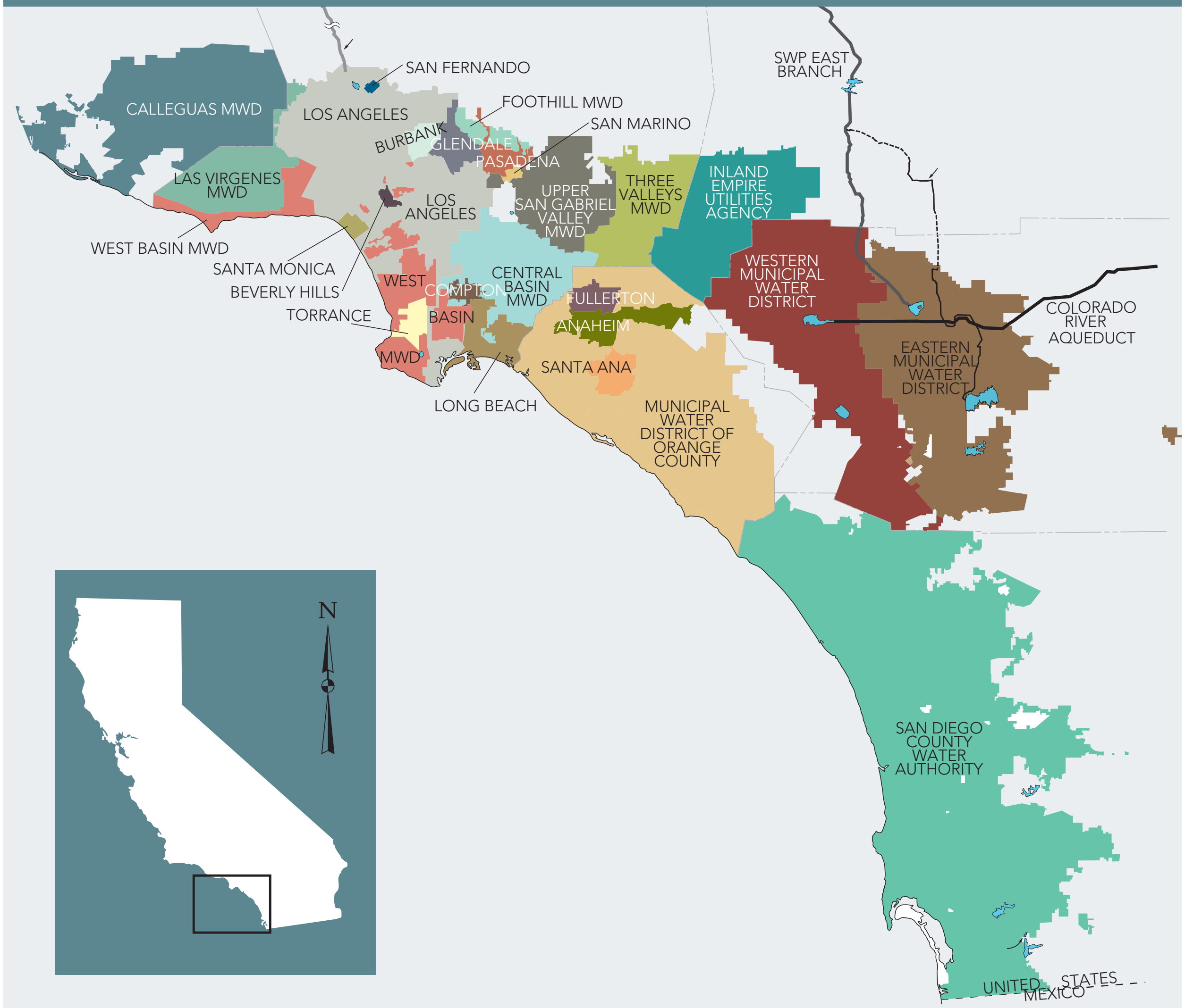


Table 1.2 Area & Population in Metropolitan Service Area

County	*Los Angeles*	*Orange*	*Riverside*	*San Bernardino*	*San Diego*	*Ventura*	*Total*
Land Area (Square Miles)							
County Total	4,061	789	7,208	20,052	4,200	1,845	38,155
Metropolitan Service Area Total	1,408	699	1,057	242	1,420	365	5,191
Percent in Metropolitan	35%	89%	15%	1%	33%	20%	14%
Population							
County Total	10,409,000	3,155,000	2,128,000	2,064,000	3,208,000	841,000	22,805,000
Metropolitan Service Area Total	9,500,000	3,155,000	1,520,000	816,000	3,076,000	617,000	18,684,000
Percent in Metropolitan	91%	100%	71%	40%	96%	73%	86%

Source: California Department of Finance, California Statistical Abstract, and Metropolitan-developed statistics. Data as of July 1, 2009.

potential resource development needs, supply alternatives, adaptation measures, and program implementation blueprints.

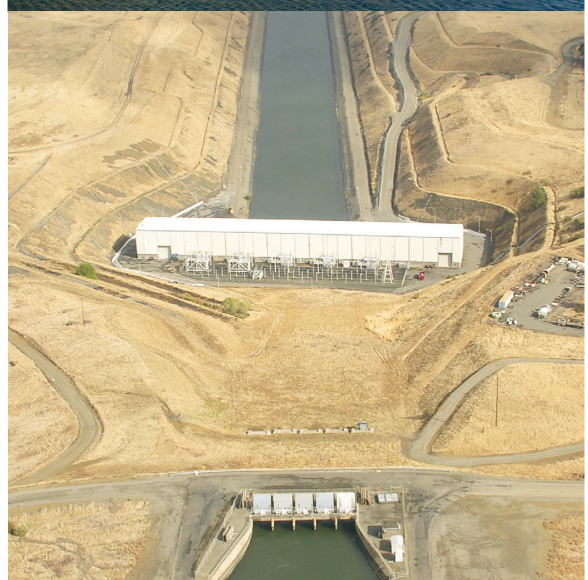
1996 IRP

Metropolitan has gradually shifted from being exclusively a supplier of imported water to collaborating with its member agencies on regional water supply planning issues. After the drought of 1987-1992, Metropolitan recognized the many changing conditions it would be facing in the future and the need to develop a long-term water resources strategy to fulfill its mission. The plan that came out of this process was the IRP. The first IRP was adopted by Metropolitan in 1996. The 1996 IRP was guided by six objectives established by Metropolitan's board early in the process. The goals of the IRP are to acknowledge environmental and institutional constraints, and ensure:

- Reliability;
- Affordability;
- Water quality;
- Diversity; and
- Flexibility.

One of the fundamental outcomes of the 1996 IRP was the understanding that regional water supply reliability could be achieved through the implementation of a diverse portfolio of resource investments and conservation measures. The resulting 1996 IRP strategy is a balance between demand management and supply augmentation. For example, in its dry-year profile, the resource framework counts on an almost equal balance between water conservation and recycled water on one hand and withdrawal from storage and water transfers on the other. The 1996 IRP is also a balance between the use of local resources and imported supplies. In a dry year, about 55 percent of the region's water resources were projected to come from local resources and conservation. Additionally, through the 1996 IRP process Metropolitan found solutions that offer long-term reliability at the lowest cost to the region as a whole.

Having identified the need for a portfolio of different supplies to meet its demands, the 1996 IRP analyzed numerous resource portfolios



Metropolitan imports water from the Colorado River and Northern California to supplement local supplies, and helps its members develop increased water conservation, recycling, storage, and other resource-management programs. The two facilities pictured above mark the beginning of the Colorado River Aqueduct and State Water Project, respectively.

Top Photo: The Whitsett Intake Pumping Plant

Bottom Photo: Harvey O. Banks Pumping Plant before establishing an optimal blend of supplies, referred to as the "Preferred Resource Mix" that would provide the region with reliable and affordable water supplies through 2020.

The analysis of these supplies determined the best mix of resources and the target supply amount based the cost-effectiveness, diversification, and reliability. Establishing the Preferred Resource Mix was an integral part of the 1996 IRP and subsequent updates have continued to diversify Metropolitan's water portfolio and establish broad resource targets for each of the major supplies available to the region, as described in **Table 1.3**.

2004 IRP Update

In 2004, as part of its commitment to continue to evaluate and adjust to changing water supply conditions, the Metropolitan board adopted an updated IRP. The 2004 IRP Update had three objectives:

- Review the goals and achievements of the 1996 IRP;
- Identify the changed conditions for water resource development; and
- Update resource development targets through 2025.

The 2004 IRP Update process fulfilled the new objectives and updated the long-term plan to account for new water planning legislation. The updated plan contained resource development targets through 2025, which reflected changed conditions, including increased conservation savings, planned increases in local supplies, and increased uncertainty. The 2004 IRP Update also explicitly recognized the need to handle uncertainties inherent in any planning process. Some of these uncertainties include:

- Population and economic growth;
- Water quality regulations;
- New chemical contaminants;
- Endangered species affecting sources of supplies; and
- Changes in climate and hydrology.

As a result, a key component of the 2004 IRP Update was the addition of a 10 percent "planning buffer." The planning buffer identified additional supplies, both imported and locally developed, that could be implemented to address uncertainty in future supplies and demands. However, Metropolitan did not implement operational components of the planning buffer to meet any of the aspects of future uncertainty.

IRP & Other Planning Efforts

The IRP is intended as a regional water resource planning document that identifies potential supplies to meet future demands. This also entails contingencies for supply and demand uncertainties. However, Metropolitan recognized that reliable and comprehensive water planning goes beyond resource development. Metropolitan has pursued and developed programs to address emergency response for the Sacramento-San Joaquin Delta (Delta), storage, regional disasters, energy management, long-term financial implications, and coordination with local agencies' own planning efforts.

The IRP sets out a general policy framework only and does not constitute approval of any specific actions by Metropolitan. The IRP process provides flexible planning direction, subject to annual adjustments and periodic updates. Specific initiatives or individually-listed projects are representative only and subject to full environmental study and board deliberation and reconsideration prior to any future approval. Thus, the IRP and its updates do not constitute final, binding decisions by Metropolitan, nor are they projects subject to specific review under the California Environmental Quality Act (CEQA). Potential projects resulting from policies within this 2010 IRP update will be fully analyzed and studied prior to any approval or implementation by Metropolitan. Furthermore, to the extent the IRP serves as the basis for the urban water shortage contingency analysis and is incorporated into Metropolitan's Regional Urban Water Management Plan, its preparation, adoption, and subsequent planning activities are statutorily exempt from CEQA.

Emergency Response

This update to the IRP shows how Metropolitan plans to develop its water resource supply portfolio out to the year 2035, including planning for hydrologic, regulatory and other types of

Table 1.3 Description of Regional Resources

Supply	*Description*	
Colorado River Aqueduct (CRA)	Metropolitan holds a basic apportionment of Colorado River water and has priority for an additional amount depending on availability of surplus supplies. Water management programs supplement these apportionments.	
State Water Project (SWP)	Metropolitan receives water delivered under State Water Contract provisions, including Table A contract supplies, use of carryover storage in San Luis Reservoir, and Article 21 interruptible supplies.	
Conservation	Metropolitan and the member agencies sponsor numerous conservation programs in the region that involve research and development, incentives, and consumer behavior modification.	
	Code-Based Conservation	Water savings resulting from plumbing codes and other institutionalized water efficiency measures.
	Active Conservation	Water saved as a direct result of programs and practices directly funded by a water utility, e.g., measures outlined by the California Urban Water Conservation Council's (CUWCC) Best Management Practices (BMPs). Water savings from active conservation completed through 2008 will decline to zero as the lifetime of those devices is reached. This will be offset by an increase in water savings for those devices that are mandated by law, plumbing codes or other efficiency standards.
	Price Effect Conservation	Reductions in customer use attributable to changes in the real (inflation adjusted) cost of water.
Local Resources	*Groundwater*	Member-agency produced groundwater from the groundwater basins within the service area.
	Groundwater Recovery	Locally developed and operated, groundwater recovery projects treat contaminated groundwater to meet potable use standards. Metropolitan offers financial incentives to local and member agencies through its Local Resources Program for recycled water and groundwater recovery. Details of the local resources programs are provided in **Appendix A.6**.
	Los Angeles Aqueduct (LAA)	A major source of imported water is conveyed from the Owens Valley via the LAA by Los Angeles Department of Water and Power (LADWP). Although LADWP imports water from outside of Metropolitan's service area, Metropolitan classifies water provided by the LAA as a local resource because it is developed and controlled by a local agency.
	Recycling	Recycled water projects recycle wastewater for M&I use.
	Surface Water	Surface water used by member agencies comes from stream diversions and rainwater captured in reservoirs.
Groundwater Conjunctive Use Storage Programs	Metropolitan sponsors various groundwater storage programs, including, cyclic storage programs, long-term replenishment storage programs, and contractual conjunctive use programs. Details of the groundwater storage programs are provided in **Appendix A.4**.	
Surface Water Storage	Metropolitan reservoirs (Diamond Valley Lake, Lake Mathews, Lake Skinner) and flexible storage in California Department of Water Resources (DWR) reservoirs (Castaic Lake, Lake Perris). Details of the surface storage reservoirs are provided in **Appendix A.5**.	
Central Valley Storage & Transfers	Central Valley storage programs consist of partnerships with Central Valley water districts to allow Metropolitan to store SWP supplies in wetter years for return in drier years. Metropolitan's Central Valley transfer programs consist of partnerships with Central Valley Project and SWP settlement contractors to allow Metropolitan to purchase water in drier years. Details of the Central Valley Storage and Transfer programs are provided in **Appendix A.3**.	

uncertainties. However, it does not address other types of emergencies, such as earthquakes, that could negatively affect Metropolitan's delivery of water to its customers. Metropolitan has a long history of emergency planning, and the following describes how Metropolitan organizes and deploys resources to manage emergencies and ensure continuity of water system operations and critical business processes.

Operating Policy A-06 is included as **Appendix A.16**. Under the policies identified, Metropolitan will maintain the following:

- Emergency Response Plan;
- Emergency Response Organization;
- Business Continuity Plan; and
- IT Disaster Recovery Plan.

These policies and resulting plans will ensure that Metropolitan will have the business and organizational capability to continue to deliver water to its customers during an emergency.

The next element of Metropolitan's emergency planning details how Metropolitan will respond to earthquakes within its service area and in the critical Delta. Recognizing the threat of earthquakes to its facilities in Southern California, Metropolitan commissioned Report No. 1335—*System Reliability Plan, Potential Effects of Southern California Seismic Events on Metropolitan's Water Deliveries*. This report provides a perspective on the magnitude of damage that could result from moderate and extreme earthquakes, the corresponding potential impacts on Metropolitan water deliveries, and estimated time frames for restoring service. The report also offers recommendations for reducing the potential impacts of certain significant seismic events.

Metropolitan's board also approved a *Delta Levees Emergency Preparedness and Response Plan* to respond to the risk of a catastrophic failure of the Delta levee system. A copy of this plan is included as **Appendix A.14**.

The final element of Metropolitan's emergency preparedness is its emergency storage program.

Metropolitan established its criteria for determining emergency storage requirements in the October 1991 Final EIR for the Eastside Reservoir, which is now named Diamond Valley Lake. These criteria were clarified in a report to Metropolitan's board titled *Metropolitan's Emergency Storage Requirement*, dated May 11, 2010 and included as **Appendix A.15**.

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 LAA). 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 imported supplies for a period of six months. The emergency plan outlines that under such a catastrophe, non-firm 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 up to half 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.

While it is impossible to completely eliminate the risk of earthquakes and other natural disasters, Metropolitan's planning will significantly reduce the impact of these events to the residents of Southern California.

Energy Management Initiatives

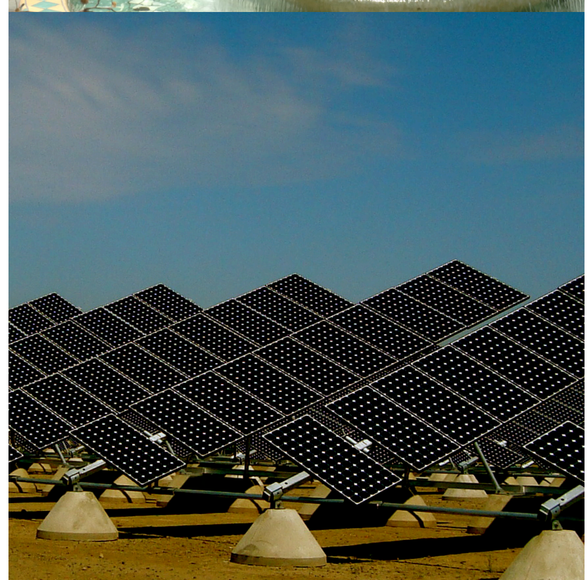
Metropolitan's board established energy as a core initiative at its 2007 board retreat, and subsequently adopted revised Energy Policy Principles in 2008. Since the energy initiative was established, Metropolitan staff has provided a number of energy-related briefings to the board regarding energy reliability and the challenges Metropolitan faces regarding energy independence. In September 2009, the board authorized preparation of an Energy Management and Reliability Study (EMRS)[1]. In January 2010, staff presented a board letter detailing the completed EMRS, and a workshop was held later the same month. The EMRS specifically includes:

- A comprehensive analysis of Metropolitan's power consumption and production profile;
- Identification of cost risks associated with projected power industry rate increases;
- Identification of regulatory and cost risks associated with Senate Bill (SB) 7 legislation;[2]
- Identification of relationships between Metropolitan and potential developers and partners, as Metropolitan proceeds with comprehensive energy management initiatives; and
- Identification of specific programs and projects to help meet the goals of energy reliability, cost containment, and energy independence, with the added benefit of greenhouse gas reduction.

The EMRS identifies potential future actions and serves as a blueprint for an Energy Management Master Plan (EMMP). The EMMP addresses specific actions that may be undertaken immediately, in the near-term, and over a longer term (up to 20 years) to achieve energy reliability, cost containment, and greenhouse gas reduction. Staff has outlined various actions for the EMMP coinciding with three distinct planning phases: immediate (2010-2012), near term (2013-2020), and long-term (by 2030). These proposed actions are aimed at controlling overall operational costs and moving Metropolitan toward energy independence. However, a number of these proposed actions are contingent on various regulatory, legislative, and market-related trigger points that may occur over the three planning phases. Metropolitan's board discussed the adoption of Energy Management Policies in February 2010.

Metropolitan staff presented to the Board of Directors the revised Energy Management

1. MWH Americas, Inc. "Energy Management and Reliability Study, Report No. 1352, Project No. 104194, December 2009.
2. For more information on SB 7 see Sections 2 and 3.



Metropolitan recognizes the need to model conservation in business practices and to nurture new technologies and approaches that will help Southern California achieve long-term sustainability.

Top Photo: An annual Spring Green Expo showcases water and energy saving technologies and innovations for home and business.

Bottom Photo: Metropolitan completed the installation of its first large-scale solar energy project at the Skinner Water Treatment Plant in Winchester, CA which underscores a commitment to renewable energy and marks the first of similar installations.

Policies at the July 2010 Engineering and Operations Committee. Following discussion by the committee, and an update of one policy, the policies were adopted in July 2010 and the Engineering and Operations Committee passed a motion to approve the policies at the adjourned August 2010 board meeting.

Consistent with the aforementioned board discussions, the proposed Energy Management Policies are based on the following overriding objectives for any and all future energy-related projects:

- Contain costs and reduce exposure to energy price volatility;
- Increase operational reliability by providing system redundancy;
- Provide a revenue stream to offset energy costs; and
- Move Metropolitan toward energy independence.

The specific policies are as follows:

- Water/Energy Nexus: Identify collaborative programs and initiatives between the water and energy industries, constructing sustainable partnerships to reduce costs and provide enhanced reliability;
- Regulatory: Track federal and state greenhouse gas regulations and develop strategies to hedge against price and regulatory risks to Metropolitan;
- Legislation: Pursue legislation to protect or enhance reliability of energy supply and mitigate energy cost risk;
- Contracts: Maintain maximum flexibility on existing and future contracts with Hoover and other energy contracts to hedge against cost and regulatory risks;
- Projects/Partnerships: Pursue cost-effective renewable energy projects and partnerships to hedge against energy price increases and regulatory risks, while reducing Metropolitan's carbon footprint;
- Revenue Stream: Pursue revenue-stream renewable energy facilities on operational lands to assist in cost containment;
- Economic & Environmental Stewardship: Develop cost-effective programs, projects and initiatives to control operational costs and move Metropolitan towards energy independence, based on projected economic and regulatory conditions. Implementation of proposed Energy Management Plan activities would result in substantial reductions in greenhouse gas emissions; and
- Energy Management Updates: Return to the board on a regular basis to deliver staff reports on the Energy Management Master Plan and the suitability of these policies, in light of changing regulatory and economic conditions.

Metropolitan is currently embarking on energy management initiatives aimed at working toward operating its facilities in the most energy-efficient and cost-effective manner, and enhancing its ability to provide long-term power reliability. Metropolitan has completed the audit and certification of its 2008 carbon footprint with the California Climate Action Registry as a registered member and submitted emissions data to the Air Resources Board, which is the state agency mandating emissions reporting annually. In May 2009, Metropolitan completed a 10-acre field of solar panels at Metropolitan's Robert A. Skinner Water Treatment Plant in the Temecula Valley of southwestern Riverside County. The 1-megawatt solar installation is designed to generate approximately 2.4 million kilowatt-hours of clean, renewable energy a year, equal to the power used by about 250 homes annually. Metropolitan will receive more than $5 million in rebates during the first five years of the facility's operation. Based on projected power costs, the capital expenditure for this project will be recovered in approximately eight years. Metropolitan also started final design activities for a 2-megawatt solar installation at its F.E. Weymouth Water Treatment Plant. This planned solar installation would meet up to 25 percent of the Weymouth plant's expected daily power consumption. A total of 10-megawatts of solar power generation are proposed for the Joseph Jensen, Henry J. Mills, Weymouth, and Skinner water treatment plants, including the existing 1-megawattt facility at Skinner.

Long Range Finance Plan

The ability to ensure a reliable supply of high quality water for Metropolitan's 26 member agencies depends largely on Metropolitan's ongoing ability to finance O&M, maintain and augment local and imported water supplies, fund replacements and refurbishment of existing infrastructure, and invest in system improvements. Metropolitan's Long Range Finance Plan is the planning document upon which Metropolitan and its member agencies base future capital and operating decisions. As such, it includes a forecast of future costs and the revenues necessary to support operations and investments in infrastructure and resources that are derived from this IRP Update while conforming to Metropolitan's financial policies. These financial policies, which address reserve levels, financial indicators, and capital funding strategies, ensure sound financial management and fiscal stability as Metropolitan implements this IRP Update.

Integrated Regional Water Management Plans

In 2002, SB 1672 created the Integrated Regional Water Management Plan Act (IRWMP) to encourage local agencies to work cooperatively to manage local and imported water supplies to improve the water quality, quantity, and supply reliability. In November 2002, California voters passed Proposition 50, the Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002, which provided $500 million to fund competitive grants for projects consistent with an adopted IRWMP. Four years later, California voters passed Proposition 84, the Safe Drinking Water, Water Quality, and Supply, Flood Control, River and Coastal Protection Bond Act, which provides $1 billion for IRWMP Planning and Implementation.

As a result of the above legislation and resulting bond funding, DWR administers an IRWMP Grant Program. Senate Bill x2-1 repealed and replaced the Integrated Regional Water Management Act and guided DWR in establishing the current criteria and standards for its IRWMP Grant Program. DWR establishes guidelines for establishing Regional Water Management Groups and standards for an acceptable IRWMP.

DWR defines a Regional Water Management Group to consist of three or more agencies, at least two of which have a statutory authority over water supply or water management, as well as those persons who may be necessary for the development and implementation of an IRWMP and have been accepted through a regional accepted process. Grant funding opportunities from Propositions 50 and 84 are awarded to Regional Water Management Groups to implement projects consistent with their adopted IRWMPs.

Currently DWR has accepted seven Regional Water Management Groups that cover portions of Metropolitan's service area. They are:

- Watershed Coalition of Ventura County;
- Greater Los Angeles County;
- Gateway Region;
- Santa Ana Watershed Project Authority;
- South Orange County Watershed Management Area;
- Upper Santa Margarita Planning Area; and
- San Diego Region.

Metropolitan has been monitoring and providing technical assistance as requested to its member agencies that belong to various Regional Water Management Groups within the service area in the development of their IRWMPs. As a result, Metropolitan's IRP Update 2004 has been used as a base document for the IRWMPs that have been adopted by groups within the service area. In general, the IRWMPs have water supply and demand management projects, as well as water resources objectives consistent with Metropolitan's IRP.

The Regional Water Management Groups also identified potential projects during the development of the IRWMPs. Project lists from adopted IRWMPs have been updated by Metropolitan member agencies and included as potential local resources in this IRP Update.

Since 2006, Metropolitan has been participating as the surface water management area representative on the Greater Los Angeles County region leadership committee. In addition, Metropolitan staff has actively participated in technical workgroups in the development of

Metropolitan has the responsibility of ensuring the Southland's water supplies are both reliable and safe.

Top Photo: Metropolitan's water quality laboratory samples for more than 120 constituents and performs more than 270,000 quality tests each year. The lab is one of the most sophisticated in the nation.

Bottom Photo: Fast-replicating quagga mussels present water quality and operational challenges in the Colorado River Aqueduct system.

Santa Ana Watershed Project Authority's One Watershed, One Water Plan adopted in 2010.

Metropolitan will continue to work with the Regional Water Management Groups as they update their IRWMPs.

Challenges & Changed Conditions

Metropolitan provides water to a broad and heterogeneous service area with water supplies from a variety of sources and geographic regions. Each geographical area and each particular supply has a unique set of benefits and challenges. The dry hydrology experienced during the last three years has resulted in diminished snow melt and runoff levels in each of the watersheds supplying Metropolitan's water supplies. In addition, severe environmental restrictions were imposed on water imports from the Delta. By the end of 2009, mandatory conservation was in place across much of Metropolitan's service area.

Operations & Water Quality

The region faces challenges in water quality and operations on a variety of fronts. The presence of quagga mussels in the CRA will increase operations and maintenance (O&M) costs and reduce operational flexibility. Salt and concentrate balance from a variety of sources may impact the long-term operation of local groundwater basins. Environmental issues in the Owens Lake and Lower Owens River continue to affect the supply availability in the LAA system. A number of stressors ranging from invasive species to water diversions to wastewater discharges have contributed to the decline of the Delta ecosystem and have triggered a wave of litigation and new pumping restrictions that have dramatically altered water supplies for Metropolitan. Since the early 1990s, layers of new pumping restrictions are in place to address the various migration patterns of Delta smelt, winter- and spring-run salmon, steelhead and other fish species. Pumping restrictions now exist in the Delta for nine out of 12 months in the year. The result is a loss of supply of approximately 30 percent in an average year, compared to delivery levels of 2005. The greatest loss of supply comes in wetter years, meaning that Metropolitan will find it more difficult to replenish its storage when supplies are available. Prior to these restrictions, Metropolitan could anticipate replenishing its reserve system in seven out of 10 years. With these restrictions, and without enhancing conservation and other water supplies, Metropolitan stands to draw on its reserve system seven out of 10 years.

Policy & Permitting

Besides the challenges presented by changing climatic conditions, there remains considerable uncertainty with regards to future water policies and their effect on Metropolitan's supplies. Difficulty in obtaining and meeting the requirements for environmental review certification, documentation, and permitting for multi-year transfer agreements, recycled water projects, and seawater desalination facilities may hinder regional supply development.

Demand

Metropolitan has historically faced, and will continue to face, key demand uncertainties associated with population and economic growth. The recent economic downturn, coupled with calls for conservation and generally cooler weather, has, as expected, driven down Metropolitan's demand. A robust economy with increased economic activity could cause increased demands in the future. The location of future population growth, which is largely driven by economics, is also a large uncertainty.

Climate & Hydrology

A significant uncertainty in Metropolitan's future is the impact of climate change. Metropolitan's water supply planning has relied upon almost 100 years of hydrological data regarding weather and water supply. This history of rainfall data has provided a sound foundation for forecasting the frequency and severity of future drought conditions, as well as the frequency and abundance of above-normal rainfall. However, analysis of historic climate variability for thousands of years, along with models of potential future climate, indicate that future weather patterns may fall outside the range of the historic data used in Metropolitan's planning models. For example, tree ring data suggest longer and more severe droughts have occurred in the past than have been experienced in the last 100 years. Additionally, the current drought on the Colorado River is more severe than any drought measured during the 20th century[3]. Changes in weather patterns could significantly affect water supply reliability, irrespective of the causes of such changes.

As has already been experienced in Australia, where further declines in rainfall are projected due to climate change, weather patterns can be expected to shift dramatically and unpredictably[4]. These changes in weather significantly affect water supply planning, irrespective of the debate associated with the effects of greenhouse gases on climate.

Summary

Over its more than 80-year history, Metropolitan has faced many uncertainties in fulfilling its mission of providing a reliable, high-quality water supply to Southern California. In its 1996 IRP, Metropolitan established a water resource portfolio with real targets for each of the resources within the preferred mix. In the 2004 IRP Update, as uncertainties continued to grow, Metropolitan established a planning buffer concept to its resource mix to address uncertainty in water resource development. Now, under the strategy of this IRP Update, Metropolitan will continue to develop programs to meet its reliability within its traditional core supplies, collaborate with member agencies to develop a buffer to address uncertainty, and pursue foundational actions to address other future supply vulnerabilities and uncertainties.

3. http://www.ncdc.noaa.gov/paleo/drought/drght_data.html
4. www.climatechange.gov.au

INTEGRATED WATER RESOURCES PLAN 2010 UPDATE

A PROCESS OF REGIONAL COLLABORATION

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

2 A Process of Regional Collaboration

Metropolitan's resource strategy has been based on its IRP, which was first adopted in 1996 and updated in 2004. The IRP has been both a planning framework and a guide for developing resource programs. Past plans were formulated with input from key stakeholders and Metropolitan again sought input from member agencies; retail water agencies; water, wastewater, and groundwater managers; environmental interests; businesses; and the community for this IRP update.

Recognizing that the conditions for developing and maintaining water supply reliability have changed, Metropolitan set out not only to update the IRP, but to examine how best to adapt to the new water supply paradigm. This section describes in detail the regional collaborative process of defining the issues, examining the current state of affairs (including vulnerabilities and uncertainties), understanding Metropolitan's role in those issues, and developing a new road map to regional water supply reliability.

Regional Participation

Metropolitan sought a variety of participants to identify key areas of concern, gather input on important foci, and learn detailed challenges of resource development from experts.

This planning process was implemented through a structured process that organized the various tasks of gathering regional data and input, performing analysis, and establishing future directions, as illustrated in **Figure 2.1**.

Board Oversight & IRP Steering Committee

To provide more direct involvement of the Metropolitan board in the IRP Process, the board created a special committee, the IRP Steering Committee, which is made up of five Metropolitan directors. Each of the directors is also a member of the Water Planning and Stewardship Committee. This IRP Steering committee met on a regular basis to receive information and briefings from Metropolitan staff. The purpose of this Committee is to:

- Develop and recommend policy options to the Water Planning and Stewardship Committee and the board;
- Review proposed planning approaches, resource strategies, and recommendations from Metropolitan staff and the Technical Oversight Committee; and
- Provide a public forum to receive input from stakeholders, including the public, on issues and concerns pertaining to this IRP Update.

Stakeholder Forums

Because of the diverse needs and interests of the institutional entities within the region, this IRP Update was developed through an open and participatory process that involved the major stakeholders. In fall 2008, Metropolitan, its board, member agency managers, elected officials, and community groups collectively discussed strategic direction and regional water solutions at a series of four stakeholder forums with nearly 600 participants.

Previous Page Photo: Reverse osmosis filters at the Groundwater Replenishment System, operated by the Orange County Water District.

Reverse osmosis filters are commonly used to purify degraded water sources which include wastewater, contaminated groundwater, and ocean water. The treatment process allows previously unusable water to be added to the local resource mix. Conservation and water-use efficiency are one of four core resources in Metropolitan's strategy to meet projected levels of demand.

The stakeholder forums were facilitated, half-day workshops. The first part of the workshops were presentations by Metropolitan staff that provided an overview of water demands and supplies in the region and identified the challenges facing Southern California in continuing to provide reliable, high-quality water. Stakeholders at each of these forums were then split into four smaller breakout groups to address specific water planning issues. **Table 2.1** is a list of questions asked of the participants and a summary of the responses.

Participants emphasized the importance of local resources development and resolving issues with the Delta. Participants suggested that Metropolitan should take a leadership position in several areas including:

- Communicate with legislators concerning needs for water supply reliability and quality improvements;
- Facilitate development of concentrate lines to enhance recycled water use;
- Foster partnerships with energy utilities;
- Strengthen relationships with the environmental community;
- Research and develop new technologies; and
- Assist retail agencies in technical analysis.

Public Forums

The collaborative planning process also involved Metropolitan staff seeking input and presenting ideas at a variety of regional forums, including from member agencies' boards, retail water agencies, local interest groups, community gatherings and business meetings. These forums provided valuable feedback and guidance regarding the preferred water resource strategy and reviewed the technical analyses supporting the decision-making process.

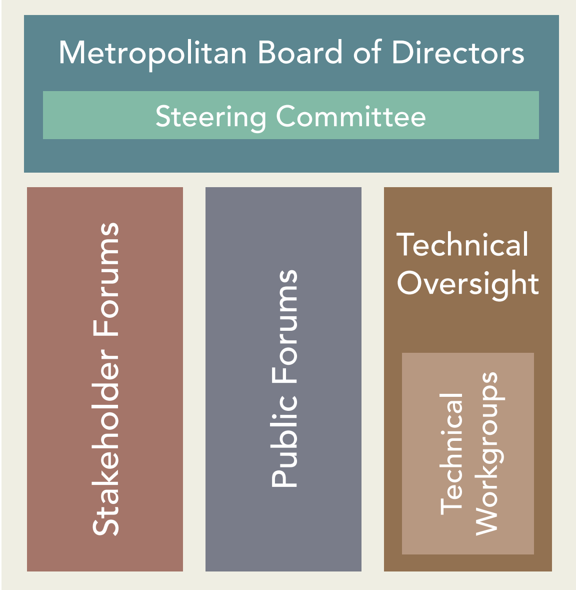
Technical Process

The following section outlines the technical process for gathering data and information for this IRP Update.

Technical Oversight Committee

The Technical Oversight Committee, consisting of member agency managers and high level staff, oversaw the technical aspects of the IRP. This committee met several times during the course of the technical process as detailed in **Table 2.2**. The specific role of the Technical Oversight Committee is as follows:

Figure 2.1 Organization of IRP Update Process



- Provide overall oversight and steering of technical analysis;
- Develop criteria to evaluate new alternatives; and
- Provide input on uncertainty planning strategy.

To accomplish these objectives, the Technical Oversight Committee established and assigned tasks to technical workgroups to provide information to support resource alternative development. It also directed Metropolitan staff to work directly with member agency staff to create a comprehensive list of existing and planned local resource projects throughout the region. The list of recycled water, groundwater recovery, and seawater desalination projects provided the backbone for further analysis and for setting resource targets (see **Appendix A.6**). The member agency managers then met to discuss the policy implication of that information.

Table 2.1 Summary of Questions and Responses from Stakeholder Forums

Category	*Question*	*Summary of Responses*
Supply Options & Criteria	What new water supply and conservation strategies should the region evaluate for implementation during the next 50 years, and what criteria should be used when evaluating them?	New strategies for the following areas: • Conservation • Seawater desalination • Education • Stormwater • Groundwater • Recycling Water • Transfers • Graywater
Growth & Development	Through various ways (such as connection fees) development has helped pay for new water supplies. In the future, what other ways can development (whether new growth or infill) help mitigate the impacts of growth on water supply? (Examples might include conservation offsets or mixed use development.)	Mitigation mechanisms included: • New development should pay for or offset the costs of additional water demand • New requirements to drive smart, green, water saving development • Development of shared standards for local government and utilities • Encouragement of smart development and technology • Environmental restoration credits • Conservation offsets for annexed areas • Promotion of high density residential development to reduce per capita water use • Elimination of front and back yards from new development designs and install more neighborhood parks so people have alternatives to their own yards • Provision of incentives
Uncertainty	We know the future will not be as projected. And planning for every possible contingency would be financially impractical. Given the challenges presented earlier, what do you think are the most important uncertainties that should be incorporated into the IRP?	Most important uncertainties included: • Natural disasters • Climate change • Environmental concerns • Economic conditions • Regulatory changes • Demographic changes • Water quality • Global and domestic shifts in agricultural land use • Changes in public attitude • Energy availability and cost

Willingness to Pay	The monthly water bill (not including sewer) for an average home in Southern California is about $45. What more would you be willing to pay in the future to ensure 100 percent reliability for essential purposes (such as drinking water, fire protection)? (10 percent more, 20 percent, 30 percent)? What about for landscaping or other outdoor water use? How much more would you be willing to pay not to have this water be interrupted?	• People would be willing to pay more for water supply reliability
		• Significant rate increases (up to 100 percent) or implementing a regional water surcharge would motivate people to use California native landscaping
		• People would be receptive to learning about ways to reduce their water use as an alternative to service interruptions
		• Service interruptions should be prioritized
		• The groups brought up several caveats about increasing rates and options beyond increased rates:
		  • 100 percent reliability can never realistically be achieved. A natural disaster can cut off water supplies, and no increase in water rates can prevent that
		  • Some participants said they would be more willing to make changes to the way they use water in order not to pay more.
		  • Rate increases would need to be justified (new pipelines, etc.) and communicated to enhance customer knowledge and support
		  • The additional amount people would be willing to spend will vary greatly depending on income level
		  • Incentives should be given to encourage conservation, and people who do not conserve water should pay higher rates

Table 2.1 Summary of Questions and Responses from Stakeholder Forums

Category	Question	Summary of Responses
Fostering Partnerships	Because our resources (natural and financial) are limited, it is important to develop multi-benefit projects (e.g., supply, flood control, environmental enhancement, etc.). How can Metropolitan foster equitable partnerships with other utilities (including wastewater, stormwater, and energy) to implement multi-benefit projects?	• Metropolitan should take the lead broadening the number and scope of its partnering arrangements • Partnerships should bridge the gap between environmental groups and water management groups/industries to foster a more collaborative process • Partnerships should be portrayed as mutually beneficial • Partnerships should be formed to develop a uniform educational message about water. There should be incentives or a point system to encourage agencies to participate

Technical Workgroups

Following the 2008 stakeholder forums and direction from the Technical Oversight Committee, Metropolitan embarked upon a technical workgroup process to further explore some of the issues and opportunities identified by forum participants. To facilitate the workgroup process, the technical discussions were grouped into six resource areas:

- Conservation;
- Groundwater;
- Recycled water;
- Seawater desalination;
- Stormwater; and
- Graywater.

The technical workgroup process provided a forum for review of the issues associated with each area and in-depth discussions with area experts. The workgroups included member agency and retail agency staff, non-governmental organizations, staff from groundwater, wastewater, and stormwater management agencies, as well as Metropolitan staff and consultants. These workgroups met on an as-needed basis throughout the IRP Update process as summarized in **Table 2.3**.

Identifying Challenges to Development of Regional Resources

The technical workgroups studied six resource areas, further exploring the issues and opportunities identified in the stakeholder forums, including in-depth discussions with resource area experts. Each workgroup developed an issue paper summarizing the findings of

Table 2.2 Summary of Technical Oversight Meetings

Date		Topic
2009	January	IRP Update schedule, draft evaluation criteria, Technical Workgroup activities, and analytical approach for modeling uncertainty
	February	Review and discuss updated IRP evaluation criteria
	March	Review and discuss status of technical workgroups and IRP schedule
	April	Review and discuss IRP Update schedule and status of IRP Update technical workgroups, preliminary supply and demand estimates, climate change data, and analytical models
	May	Review and discuss IRP Update schedule, supply and demand estimates, and technical workgroup findings
	June	Review and discuss IRP Update schedule, gap analysis, technical workgroup findings, and the Robust Decision Making (RDM) analytical approach
	September	Review and discuss IRP Update process and schedule, potential policy approaches, and work schedule

Table 2.3 Summary of Technical Workgroup Meetings

Date		Conservation	Groundwater	Recycled	Seawater Desalination	Stormwater	Synergy	Graywater
2008	July		√					
	August		√					
	September		√					
	October		√					
	December	√	√	√	√	√		√
2009	January			√		√		√
	February	√	√	√		√		
	March	√		√		√		√
	April	√		√			√	√
	August				√			
	September					√		
2010	January		√					

these discussions, the current status of local supplies and programs, and recommendations for future opportunities. Below are descriptions and background on these resources along with key findings and recommendations from the workgroup issue papers. The full text of which can be found in **Appendices A.7-13.**

Conservation

Metropolitan encourages water-use efficiency through a comprehensive set of approaches including research and development, financial incentives, programs to influence consumer behavior, education, new plumbing, landscape and compliance codes, support of legislation, and retail-level tiered pricing. These efforts can be classified into active, code-based, and price-effect conservation methods.

Metropolitan's conservation strategy framework includes the efforts of member agencies to develop cost-effective conservation programs and implement tiered pricing to achieve price-effect conservation. In addition, the framework recognizes the intended progression from active to code-based conservation for various devices and approaches. To continue this evolution, the framework encourages development of new, innovative approaches by Metropolitan and member agencies that can be launched as active conservation.

Metropolitan and member agencies pursue these approaches while continuing to develop relationships with other interests and potential partners, which can lead to mutually beneficial conservation efforts. These interests include, but are not limited to, the landscape and irrigation industry, energy utilities, organizations that set building, fixture and equipment standards, developers and home builders, agriculture, watershed organizations, and developers of new water saving technologies.

Active Conservation

Active conservation consists of water agency-funded programs such as rebates, installations, and education. Metropolitan currently provides conservation incentives through two regional programs as well as member agency-administered programs. The regional programs include SoCal Water$mart for residential customers and Save Water, Save A Buck for commercial, industrial, and institutional (CII) customers. Both programs are offered throughout Metropolitan's service area and provide rebates for water-conserving devices directly to customers.

The regional programs are highly effective in influencing consumer purchasing decisions and will be an important element of future active conservation. In July 2008, Metropolitan initiated the region-wide SoCal Water$mart program to increase public access to residential incentives. During its first year of operation, rebate activity exceeded expectations as many residential customers became increasingly aware of the financial incentives available to them to help offset the purchase of water efficient fixtures. In fiscal year 2008/09 Metropolitan issued a record 94,000 rebates for residential fixtures in single and multi-family properties and the Save Water, Save A Buck program provided rebates for 145,000 device retrofits.

Metropolitan provides a wide range of incentives through the regional programs. The devices are evaluated on a regular basis and incentives updated based on water savings, cost, and industry standards.

In addition to regional programs implemented by Metropolitan, member and retail agencies also implement local water conservation programs within their respective service areas and receive Metropolitan incentives for qualified retrofits and other water saving actions. Typical projects include toilet replacements, locally administered clothes washer rebate programs, and residential water audits.

Active conservation will continue to be a fundamental element of Metropolitan's strategy as it establishes the base of public acceptance and water savings data necessary to successfully transition specific approaches to code-based conservation. This interest in Metropolitan programs is echoed in member agency programs throughout the region, all of which help build a foundation for future non-incentive based approaches.

Code-based Conservation

Code-based conservation, formerly described as "passive" conservation, consists of demand reductions achieved through conservation-oriented legislation, building and plumbing codes, ordinances, and usage reductions resulting from increases in the price of water.

Code-based conservation advanced significantly beginning in 2009. As a result of the implementation of Metropolitan's Water Supply Allocation Plan, a wave of new and updated regional water use and conservation ordinances went into effect. Other major advancements are occurring through local implementation of the state's updated model water efficient landscape ordinance, adoption of a state Green Building Code, legislation that requires universal retrofit of inefficient fixtures and other efforts toward SB 7 compliance, described below.

In November 2009, Gov. Arnold Schwarzenegger signed SB 7,[1] the Water Conservation Act of 2009, as part of the historic comprehensive water package designed to address the state's growing water challenges. SB 7 represented the culmination of efforts by water industry leaders (including Metropolitan), non-governmental organizations, and the Legislature to enact legislation that would answer the governor's call for the state to reduce per capita water use 20 percent by the year 2020 (referred to as "20x2020") as part of a larger effort to ensure reliable water supplies for future generations and restore the Delta.

Metropolitan supports legislation consistent with its adopted policies for conservation. In 2009, three conservation bills sponsored by Metropolitan were enacted. The first bill, SB 407, requires the retrofit of inefficient fixtures in residential, multi-family and commercial properties beginning in 2014. The second bill, Assembly Bill (AB) 1061, ensures that common interest developments allow the use of water efficient landscaping. The third bill, AB 474, establishes the use of voluntary contractual assessments to provide financing for water conservation improvements affixed to real property.

Other major milestones that support future conservation include the state's update to its Model Water Efficient Landscape Ordinance in 2009 and the adoption of the California Green Building Code. Beginning in January 2010, cities and counties were required to adopt and enforce local water efficient landscape ordinances that are as effective as the state ordinance. CalGreen, the Green Building Code, will result in new construction that has a 20 percent lower water demand than traditional homes and buildings.

Metropolitan also supports development and enforcement of local ordinances that reduce potable water demand. In June 2008, following Gov. Arnold Schwarzenegger's proclamation of a

1. Unless otherwise noted, all bills refer to state of California legislation.

Metropolitan and its member agencies have long been leaders in water conservation. Water-use efficiency has been encouraged through research and development, financial incentives, programs to influence consumer behavior and support for new plumbing and compliance codes. Residential water saving opportunities have evolved with technology to include many indoor and outdoor fixtures such as the ultra-low-flush toilet, high-efficiency clothes washer, and multi-stream rotary sprinkler nozzle (pictured above left to right).

statewide drought, Metropolitan adopted a Water Supply Alert resolution. Among other provisions, the Alert encouraged cities, counties, and local public water agencies to adopt and enforce local water conservation ordinances. To facilitate ordinance adoption, Metropolitan compiled a library of available local ordinances, developed a model water conservation ordinance, and hosted several workshops. Approximately half of the 19 million residents in Metropolitan's service area are covered by adopted ordinances, and an additional one-third reside in jurisdictions that have taken action toward adoption of ordinances.

Price-Effect Conservation

Price-effect conservation consists of usage reductions resulting from increases in the price of water.

Implementation of Conservation Best Management Practices

These active and code-based programs are closely linked to the efforts of the California Urban Water Conservation Council (CUWCC)—the organization created to administer the Memorandum of Understanding Regarding Water Conservation in California (Urban MOU). As a signatory to the CUWCC's Urban MOU, Metropolitan has pledged to make a good faith effort to implement prescribed urban water conservation best management practices (BMPs). Metropolitan provides technical and financial support needed by member agencies in meeting the terms of the Urban MOU.

In December 2008, the Urban MOU BMPs were re-amended and organized into five categories. Two categories, Utility Operations and Education, are referred to as "Foundational BMPs" because they are considered to be essential water conservation activities by any utility. They are to be implemented by all signatories to the MOU as ongoing practices with no time limits. The remaining BMPs are "Programmatic BMPs" and are organized into residential, CII, and landscape categories.

In addition to implementing cost-effective BMPs, Metropolitan actively supports many

CUWCC committee activities. Metropolitan has historically assisted in CUWCC's ongoing efforts to document and increase the effectiveness of BMP-related conservation efforts including supporting research studies. Metropolitan staff members participate in several CUWCC governing committees, including the following:

- Board (formerly Steering Committee);
- CII Committee;
- Residential Committee;
- Landscape Committee;
- Research and Evaluation Committee;
- Governance/ Finance Committee;
- Education Committee;
- Utility Operations Committee; and
- BMP Reporting Committee.

Conservation Funding

Metropolitan's conservation strategy treats conservation as a core local supply, on par with other resources such as water recycling and storage. Therefore, funding is based on Metropolitan's avoided costs for capital, energy, treatment, and water supply.

The stewardship charge in Metropolitan's rate structure provides a funding mechanism for active programs. The stewardship charge funds Metropolitan's Conservation Credits Program (CCP), which provides the basis for financial incentives and funding for urban BMP and other demand management related activities. Established in 1988, the stewardship charge supports Metropolitan's commitment to conservation as a long-term water management strategy.

Metropolitan currently provides financial support for regional incentives and member agency conservation efforts based on one-half of average retail device cost, up to $195/AF. In general, member agency water conservation project proposals funded through the CCP must have demonstrable water savings, reduce water demands on Metropolitan's system, be technically sound, and require Metropolitan's participation to make the project financially and economically feasible.

Between 1990 and 2008, Metropolitan invested more than $223 million in conservation incentives, saving an average of 120,000 AF annually. Metropolitan has extended incentives to residential, commercial, and industrial sectors and public agencies to encourage the use of water efficient technologies and business practices. Incentive-based programs are complemented by public outreach and education activities, many of them tied to the California Friendly® marketing effort launched in 2006. The findings of the Conservation Technical Workgroup are summarized in the group's issue paper provided in **Appendix A.7**.

Conservation programs currently offered by Metropolitan include:

- SoCal Water$mart: region-wide program for residential customers to identify and apply for product rebates;
- Water Savings Performance Program: provides incentives for documented water savings for landscape and irrigation process improvements;
- Save Water, Save A Buck Program: region-wide program for commercial, industrial, and institutional customers providing incentive for efficient plumbing fixtures, irrigation equipment, food-service equipment, and medical equipment;
- Innovative Conservation Program: encourages research and development of new and creative ways to conserve water. Individuals and organizations can participate;
- Enhanced Conservation Program: provides funding directly to Metropolitan's member agencies to encourage new and creative approaches to implement urban water conservation;
- Bewaterwise.com®: Web site portal that contains information on Metropolitan's rebate programs and tips to save water;
- California Friendly Landscape Training: offers in-person and online courses in irrigation efficiency and water-wise garden design through its California Friendly Landscape Training Program. Since the program's inception in 1994, more than 50,000 people have participated in the classes. Courses are conducted in English and Spanish;

- Community Partnering Program: provides co-sponsorships to support water-related and community education projects, programs, and events; and
- Support for Member Agency Programs: several conservation programs are implemented by Metropolitan's member agencies but receive technical and financial support from Metropolitan.

Research, Evaluation & Technical Assistance

Metropolitan encourages research and development of new and creative ways to conserve water through both active and code-based conservation. Metropolitan staff will pursue research and testing of new technologies in cooperation with other interests, including testing provided by industry organizations. The Innovative Conservation Program provides funding to individuals and organizations to test new technologies.

Metropolitan's staff regularly evaluates conservation programs and projects and has served as technical advisor for a number of state and national studies involving the quantification and valuation of water savings. Efforts to measure water savings and evaluate programs and technologies serve 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; and
- Documenting the results and effectiveness of Metropolitan-assisted conservation efforts.

Estimating Conservation Savings

Challenges exist in understanding and quantifying actual water savings from various approaches, such as weather-based irrigation controllers and water efficient landscaping. With the 20x2020 requirement to measure

Water-saving opportunities have extended to the commercial and public sector with the introduction and support for new technologies such as the waterless urinal, pre-rinse spray head and centralized irrigation controller (pictured above left to right).

progress through gallons per capita per day (GPCD) reductions, Metropolitan will need to focus on the data gaps and refine water savings assumptions in its water conservation model as data become available.

Currently, conservation savings estimates are based on the professional knowledge and expertise of Metropolitan and member agency staff in evaluating water conserving technologies and approaches. Regional conservation targets for Metropolitan's service area use 1980 as a base year and project active, code-based, and price-effect conservation savings from this baseline.

There are no targeted savings quantities estimated for public awareness campaigns and education. It has been widely accepted that such separate programs are essential and beneficial to prompt consumers to install water saving fixtures and increase the region's conservation savings, which are captured by the savings categorized above.

Conservation Outreach Campaign

Public outreach and education activities increase the effectiveness of these other approaches. The desired outcome is to influence consumer behavior and encourage development of a conservation ethic that will increase adoption of water saving devices and strategies.

Metropolitan has conducted annual advertising, education, and community outreach campaigns since 2003 under its Bewaterwise.com and California Friendly brands to urge Southern California consumers and business owners to make permanent changes in their everyday uses of water. From 2007 through 2010, the board authorized an expansion of these efforts in order to meet the critical water supply crisis facing the state. Outreach campaigns in the latter part of the decade reflected these unprecedented challenges with more urgent calls for water conservation behavior. Creative campaigns such as "Time to Get Serious" and "Cut Your Water Use" were seen and heard across more media outlets at higher frequency levels and over longer periods of time than pre-2007 campaigns. Metropolitan was a lead sponsor of the "California's Water: A Crisis We Can't Ignore" statewide campaign with the Association of California Water Agencies in fall 2007. Leading up to the summer of 2009, Metropolitan's "Move the Needle" outreach campaign (featuring a water supply gauge nearing empty) communicated the change from voluntary to mandatory water conservation in many Southern California cities and communities.

Other activities include:

- Annual reports to the legislature;
- Maintaining and updating the Bewaterwise.com web site in English and Spanish, with more than 1.4 million individuals visiting the site for information on water conservation from 2005 to 2010;
- Maintaining nine California Irrigation Management Information System stations; and
- Conducting consumer focus groups and surveys to measure effectiveness of outreach efforts.

Summary of Recommendations

Achieving additional demand reduction will require local and regional investments and the Technical Workgroup had the following recommendations to encourage more regional conservation:

Regional Benefits

- Reassess existing conservation programs to present a focused and tactical approach to conservation that avoids free ridership, provides good customer service, and continues to facilitate market transformation, while keeping program costs at reasonable levels;
- Refocus the conservation program on regional efforts that benefit all member agencies equally, such as regional education and public outreach, legislative advocacy, and provision of technical assistance within the scope of Metropolitan's expertise;
- Continue to work with federal and state agencies for technical and financial assistance opportunities;
- Bundle conservation incentives programs;

- Streamline Industrial Process Improvement Program criteria for small-scale projects;
- Encourage legislation to establish regional or statewide conservation transfer markets;
- Collaborate with regulatory agencies to coordinate programs and policies; and
- Work with member agencies to have region-wide compliance with state laws and to coordinate conservation programs to optimize regional savings and streamline reporting requirements.

Water Efficiency Standards

- Pursue legislation for standards in water saving devices; and
- Support regional or statewide adoption of a model ordinance to prohibit wasteful water devices.

Member & Local Agency Efforts

- Rely on member agencies to provide local conservation programs appropriate to the circumstances of the member agencies, including conservation-based rate structures, Advanced Metering Infrastructure (AMI) and other improvements to local infrastructure, and customer incentives;
- Assist member agencies with the cost of conducting water system audits;
- Assist local agencies with start-up costs to develop water budgets;
- Offer technical assistance to member agencies seeking help with implementing water budgeting systems and consider mechanisms for funding support and build on existing water budget efforts;
- Encourage AMI by assisting member agencies with co-funding and loans and by lobbying for state grant funding to be eligible for AMI projects and serving as a clearinghouse for technical information on AMI; and
- Continue support for water conservation gardens through Metropolitan's Community Partnering Program.

Research

- Lead an investigation to analyze and evaluate different types of water pricing and rate

Metropolitan's Water Savings Performance Program provides financial incentives for commercial water customers with documented water savings tied to landscape irrigation and industrial process improvements. More than a dozen agreements have been signed with customers that include a paper company (pictured left) and a fresh-cut produce packaging company (pictured right).

structures and make findings available to member agencies; and

- Conduct a region-wide market saturation study of indoor plumbing fixtures for both residential and commercial customers.

Education & Outreach

- Promote efforts to increase brand-name awareness of the U.S. Environmental Protection Agency's WaterSense™ label; and
- Partner with professional associations to inform industry and the public of conservation operations.

Groundwater

Many people in Southern California depend on groundwater as a significant source of drinking water. Effective use of local groundwater basins must be a significant component of any comprehensive water supply plan for Southern California. Although Metropolitan does not own or control the groundwater basins in Southern California, it has played, and must continue to play, a critical role as the region's supplemental water supplier.

In 2007, Metropolitan prepared the Groundwater Assessment Study in collaboration with its member agencies and with groundwater basin managers. This study evaluated the potential for groundwater storage and identified the challenges in developing additional storage programs. To follow up on the findings of the Groundwater Assessment Study, Metropolitan initiated a series of seven groundwater workshops, described in **Table 2.4**, to discuss challenges for increasing conjunctive use and to develop recommendations for addressing the challenges.

The goal of these workshops was to develop a set of broadly supported concepts and recommendations concerning groundwater management and conjunctive use, which can be implemented consistent with the court adjudications and other laws that govern the management of groundwater. Discussions focused on:

- Review of existing policy principles for conjunctive use and a determination of how they can be updated;
- Identification of primary challenges to increased storage and conjunctive use, and potential ways Metropolitan, its member agencies, groundwater producers, and basin managers can overcome these challenges; and

Table 2.4 Stakeholder Participation in Groundwater Process

Date		*Groundwater Workshop*	
2008	July	1	Initiate process, set ground rules and identify discussion topics
	August	2	Review IRP context, review availability of surplus imported water for groundwater recharge
	September	3	Continued review of availability of surplus imported water for groundwater recharge; discussion of groundwater basin production capabilities
	October	4	Continued discussion of groundwater basin production capabilities
	December	5	Review of opportunities; discussion of Groundwater Workgroup policy recommendations for IRP Update
2009	February	6	Continued discussion of policy recommendations for IRP Update
	April		Synergy Workshop between Groundwater, Recycled Water, and Stormwater Technical Workgroups Groundwater Basin Module Meeting with Orange County Basin
	September		Groundwater Basin Module Meeting with Orange County Basin Groundwater Basin Module Meeting with Central and West Coast basins
	November		Groundwater Basin Module Meeting with Main San Gabriel Basin Groundwater Basin Module Meeting with Chino Basin
2010	January	7	Review initial modeling outcomes using groundwater basin modules; Finalize Groundwater Workgroup policy recommendations for the IRP Update
	March		Groundwater Basin Module Meeting with Main San Gabriel Basin

- Exploration of other conjunctive use opportunities Metropolitan may wish to address.

The workshops were well attended by Metropolitan member agencies and sub-agencies, groundwater basin managers and groundwater producers, stakeholders, and Metropolitan staff, with up to 50 people attending meetings.

Recommended Policy Principles

From these discussions the group put together a series of recommendations to encourage further development, also found in **Appendix A.9**:

Sustainable Water Supplies

Both surface water and groundwater are critical to future sustainable water supplies for Southern California. Groundwater managers must have access to sufficient water supply resources to recharge and replenish groundwater basins, including recycled and stormwater resources that meet regional, state and federal water quality standards.

Regional Storage & Benefit

Storage by Metropolitan of imported water in reservoirs and groundwater basins is a critical method to provide water for Southern California in dry periods. Surface and groundwater storage programs should provide specified regional benefits at an agreed-upon cost to increase dry-year supply (in accordance with the IRP).

Current Yield

Maintaining the current yield of groundwater basins should be a priority; where possible, the yield should be enhanced.

Groundwater Basin Protection

Programs and policies that protect and encourage the cleanup of degraded groundwater basins should be enhanced and expedited.

Replenishment

Metropolitan imported water should continue to be a component in the management of Southern California groundwater basins.

Recycled water and groundwater are two of six resources that were studied for their potential development as part of the IRP assessment. Also included were conservation, seawater desalination, stormwater, and graywater.

Top Photo: West Basin Municipal Water District's Edward C. Little Water Recycling Facility produces five different qualities of recycled water, including three types that undergo reverse osmosis treatment.

Bottom Photo: Reverse osmosis treatment is used in the pilot operation of the Yuma Desalting Plant near the Colorado River to desalt agricultural drainage water and reclaim up to 29,000 AF of water annually.

Use of Excess Water

Excess imported water should first be allocated to the Metropolitan storage portfolio in quantities to allow Metropolitan to meet the region's full service demands.

Recharge

Recharge of water into groundwater basins is a critical element in the maintenance of a healthy groundwater system. Depth to water, the containment of contaminant plumes, and maintenance of recharge facilities should be considered when decisions are made regarding the availability of water for recharge.

In-Lieu Replenishment

In-lieu groundwater storage is a cost-effective way to provide for storage in Southern California's groundwater basins. Under in-lieu groundwater storage, an agency takes surface water deliveries "in-lieu" of pumping groundwater, resulting in the un-pumped groundwater effectively "stored" in the groundwater basin. It is an efficient method for storing excess imported supplies and recharging local groundwater basins. By turning off wells and providing excess treated supplies when available to its member agencies, Metropolitan, working with basin managers, can put additional supplies into storage within the region. Greater participation should be encouraged in this program. In-lieu replenishment can occur during periods when surface recharge basins cannot be replenished with imported water due to the availability of local water for recharge.

Address Local Needs & Control

Metropolitan will honor and respect local control, legal requirements and existing water rights. Metropolitan should consider the individual needs of a groundwater basin, and local communities. Programs that are implemented should consider issues such as water quality, financial benefits and groundwater levels.

Storage Agreements

Metropolitan should continue the approach to conjunctive use that is grounded in agreements between Metropolitan, its member agencies and local groundwater managers. Agreements should be customized to meet the specific needs of both Metropolitan and other parties to the contract.

Board Policies

Storage agreements should be based upon generally applicable board policy principles, which have strong regional and local support.

Shared Risk

There are risks associated with developing any water resource program, including groundwater storage. Metropolitan should assess the risk of implementing groundwater storage programs and contract with local entities so that benefits are commensurate with the risks for all concerned.

Pricing Signals

Metropolitan will commence a study of data that is expected to help the agency and its partners understand correct pricing signals for replenishment water and storage investments in Southern California. There will be major changes in supply reliability and cost in future years. The issue of storage and conjunctive use needs to be assessed in light of and as part of these changes.

Coordination

Coordination on legislation, regulation and funding issues should be enhanced between Metropolitan, its member agencies, groundwater basin managers and producers.

Recycled Water

Recycled water, formerly called reclaimed water, is wastewater that has been treated so that it can be used beneficially again for a variety of purposes, including agriculture and landscape irrigation, toilet flushing, certain industrial processes, and groundwater recharge. As compared to some of the alternative water supplies, recycled water has the major benefit of being a drought-proof supply since wastewater as a supply source is not subject to the weather-based fluctuations impacting local and imported water supplies. Even though Southern California is recognized as a leader in water recycling, there is significantly more wastewater produced that could potentially be recycled. The U.S. Bureau of Reclamation's (USBR) Southern California Comprehensive Water Reclamation and Reuse

Study estimated that Southern California could have a total recycled water potential of 747,800 acre-feet (AF) by 2040.

Discharges from inland wastewater treatment plants often get used by downstream entities or enhance aquatic habitat. Some of these discharges cannot be re-used because of the quality of the incoming water. The wastewater that can be reused is treated to varying levels depending on its intended recycled water use:

- Tertiary Treatment: Most of the recycled water used in this region is treated to a disinfected tertiary level, also known as Title 22 standards, which refers to Title 22, Chapter 3 (Water Recycling Criteria), Division 4 of the California Code of Regulations. Title 22 recycled water can be used for irrigating parks and playgrounds and for other non-potable uses such as toilet flushing. Based on customer needs, recycled water can be tailored to fit specific commercial and industrial non-potable applications. Both of these require a distribution system (pipelines, pump stations, etc.) and storage facilities for the recycled water completely separated from the potable water system; and
- Advanced Treatment: Advanced treated recycled water is treated to an even higher level, removing salt and other undesirable constituents and is currently used for industrial applications, seawater intrusion barriers, and groundwater recharge.

For example, West Basin MWD currently offers five types of recycled water including:

- Title 22 for a wide variety of industrial and irrigation uses;
- Nitrified water for industrial cooling towers;
- Secondary treated wastewater purified by micro-filtration, followed by reverse osmosis (RO), and disinfection for groundwater recharge;
- Pure RO water for refinery low-pressure boiler feed water; and
- Ultra-pure RO water for refinery high-pressure boiler feed water.

Advanced treated recycled water can be percolated into groundwater aquifers or surface reservoirs and blended with potable water. This blended water can later be pumped out and used as potable water or to maintain seawater barriers. Examples of such “indirect potable” uses are Los Angeles County’s Montebello Forebay Groundwater Recharge Program and Los Angeles County's West Coast Basin seawater barrier injection system, which currently blends 25 percent potable water and 75 percent recycled water and soon will be 100 percent recycled water. Another example is Orange County Water District’s Groundwater Replenishment System, which uses a high level of treatment to replenish its groundwater supplies with recycled water.

This Technical Workgroup found that barriers to further development of recycled water fall into two general categories: regional challenges and operational challenges as detailed in **Appendix A.10**.

Regional Challenges to Development

Regional challenges include public outreach and political support, local ordinances and regulatory measures, legislation, and permitting processes. For example, in the past, projects have been shelved because of public outcry often fueled by those who have an ulterior motive for not supporting recycled water use (e.g., property values, growth issues, market share of their products, etc.), and permitting for recycled water requires a significant amount of time, effort, resources, and money. Thus, recycled water projects are often faced with delays and difficulties.

Public Outreach & Political Support

In general, the public perception of using recycling water is favorable, particularly in light of current restrictions on imported water supply. Historically, the controversy of using recycled water has focused on direct and indirect potable reuse. Recent successes of indirect potable reuse projects have helped improve public awareness and perception of recycled water use in the region.

The Water Environment Research Foundation funded an interdisciplinary and comprehensive social science study on public perception and

Local water agencies have largely led the development of water recycling and groundwater recovery projects with newer projects incentivized by Metropolitan's Local Resources Program. Pictured left to right, Orange County Water Replenishment District's Groundwater Replenishment System and the Chino Basin Desalter Project.

participation in water reuse within the U.S.[2] It employed a three-phased research protocol consisting of:

1. Literature review and three comprehensive case studies, including interpretive white papers from five different social science disciplines and public health and environmental engineering experts;

2. A multi-stakeholder workshop to promote comprehensive, interdisciplinary analysis of the literature and case study findings; and

3. Peer review among 21 social science and water resource management experts. The case studies included examples of potable and non-potable reuse, with elements of success and failure. Five themes were identified as critical to building and maintaining public confidence in water resource management and water reuse decision-making, which will be instrumental in performing the public outreach:

   a. Managing information for all stakeholders;
   b. Maintaining individual motivation and demonstrating organizational commitment;
   c. Promoting communication and public dialogue;
   d. Ensuring a fair and sound decision-making process and outcome; and
   e. Building and maintaining trust.

To date, most public outreach has consisted of localized efforts to implement local projects and this study helped to identify specific public outreach actions that can supplement those already in existence. Southern California can largely benefit from a regional campaign promoting recycled water, including a general public marketing campaign and a K-12 educational campaign. Metropolitan could form partnerships with wastewater agencies and environmental groups to assist in developing and operating marketing and educational programs and economies of scale can be achieved by launching in conjunction with similar marketing and educational campaigns and utilizing the

2. Hartley, Troy W. , Ph.D. "Water Reuse: Understanding Public Perception and Participation. Water Environment Research Foundation, 2003.

same design, production, and distribution channels.

Local Ordinances & Regulatory Measures

Coordination of a proactive, unified approach to regulation for the region, including ordinances and building standards, will be a critical aspect of implementation.

On February 3, 2009, the State Water Resources Control Board (SWRCB) adopted the highly anticipated Recycled Water Policy. The new policy is intended to support the SWRCB's strategic plan to increase sustainable local water supplies. The purpose of the new policy is to increase the beneficial use of recycled water from municipal wastewater sources in a manner that fully implements state and federal water quality laws. The document is particularly instrumental in addressing salt management, emerging constituents, anti-degradation, and incidental runoff issues. In addition, the new policy establishes consistency on how individual regional water quality control boards should interpret recycled water policy.

In July 2009, the SWRCB also adopted a General Permit for landscape irrigation. The General Permit is consistent with the Recycled Water Policy, state and federal water quality laws, including the statewide water quality standards established by the California Department of Public Health (CDPH). The General Permit facilitates the streamlining of the permitting process and reduces the overall costs normally incurred by producer, distributors, and users of recycled water.

Also in July 2009, the Los Angeles Regional Water Quality Control Board adopted a general use order for non-irrigation uses of recycled water. This general order intends to streamline the permitting process and delegate the responsibility of administrating water reuse programs to local agencies to the fullest extent possible."[3] Although these activities have aided the development of recycled water, the technical workgroup proposed the following actions to address regulatory challenges:

3. California Water Quality Control Board Los Angeles Region. (2009). Non-Irrigation General Water Reuse Order No. R4-2009-0049.

- Work with the WateReuse Association or similar associations to develop local ordinance templates;
- Encourage local ordinances and building codes that promote the use of recycled water;
- Pursue a statewide irrigation and non-irrigation order for recycled water;
- Establish a statewide dual-plumbing or best technology requirement on new buildings;
- Develop funding mechanisms, such as water bonds, that provide matching grants to developers for both dual-plumbing of new development projects and other on-site retrofit expenses, and incentives to agencies for planning;
- Encourage homeowner associations and community groups to support recycled water use on outdoor landscaping of community green areas of an acre or more; and
- Request a lead staff at regulatory agencies to expedite the permitting process for projects in Metropolitan's service area.

Legislation

Legislative support is imperative for creating funding, streamlining processes, and increasing opportunities in which recycled water can be utilized. Legislation can influence the implementation of ordinances and codes, directly affecting recycled water use in the region. Legislative developments on recycled water are ongoing and have been consistent with Section 13512 of the California Water Code that states that California will "undertake all possible steps to encourage development of water recycling facilities so that recycled water may be made available to help meet the growing water requirements of the state."

In 2006, the state Legislature passed AB 32, the Global Warming Solutions Act, which encourages recycled water development and implementation as a means to reduce greenhouse gas emissions by offsetting the need for imported water because recycled water requires less energy to treat and distribute than imported water. Since recycled water projects are a valuable asset to the region's diverse water portfolio, Metropolitan has assisted in funding recycled water projects, resulting in 59 projects generating 1,323,000 AF since the 1970s.

Within this framework, the Technical Workgroup identified specific areas to develop and support with regards to recycled water legislation. The following list summarizes these proposals:

- Establish legislation that requires the SWRCB to work with regional and local recycled water entities to develop a permit for non-irrigation recycled water use;
- Support legislation that would require revisions to Title 22 to make the recycled water regulations consistent with the proposed revisions to the plumbing code for indoor recycled water use;
- Create legislation that offers federal tax breaks to water agencies for the development of recycled water projects; and
- Work with the Public Utilities Commission to amend its code to allow for recycled water to be incentivized through water rates.

Permitting Processes

Permitting for recycled water requires a significant amount of time and resources. Currently, the regional water quality control boards issue permits in conjunction with the CDPH. CDPH also requires each county health department to conduct its own project inspection, prior to project approval. In some cases, CDPH has delegated the responsibility to review and approve projects directly to the water supplier, where the supplier has demonstrated the ability to implement such a program. Offering this flexibility has significantly streamlined the review process for those agencies, thus reducing development time and cost associated with these procedural requirements.

As discussed above, the recently adopted SWRCB Recycled Water Policy will create a uniform policy for permitting requirements. However, since this policy is fairly new, recycled water purveyors are still evaluating its effect. A key provision of this Recycled Water Policy is the requirement to develop stakeholder-driven salt management plans. The intent is for these plans to ease requirements on recycled water suppliers by taking a more comprehensive and balanced approach to salt management. Acceptance of the stakeholder plans will require active participation of the regional water quality control boards. Metropolitan expects to play a supporting role at the member agencies' request in encouraging active regional board participation and use of reasonable standards in the development of salt management plans.

Operational Challenges to Development

Operational challenges include diurnal and seasonal demands, groundwater recharge and reservoir augmentation, salt and concentrate management, and retrofitting costs.

Diurnal & Seasonal Demand

The demand and supply patterns associated with irrigation and wastewater production, respectively, create challenges in operating a recycled water system. Since diurnal and seasonal wastewater production and irrigation demand patterns are not in sync, storage is needed to accommodate the gap in time-of-production and time-of-use. In addition, conveyance systems need to accommodate larger demand peaks related to the irrigation demands as compared to peaks associated with potable water demands. The Technical Workgroup's recommendations on this challenge are as follows:

- Partnerships should be created so that recycled water storage and demand can be regulated and/or produced in one area and sold in another;
- Focus efforts on areas with new development or little or no existing recycled water infrastructure; and
- Identify other recycled water users, like industries, that can take their water deliveries during the day or encourage users, like golf courses, to develop on-site storage to alleviate the need for diurnal storage.

Groundwater Recharge & Reservoir Augmentation

Reservoirs and groundwater basins must deal with times of extremely high storm flow, reservoir maintenance, basin blend requirements, and emerging constituents. Several agencies within the region rely on groundwater basins to regulate seasonal demand of recycled water by taking recycled water when demand is low and augmenting supplies with pumped groundwater to meet peak recycled water demand. However, these basins also serve multiple purposes, e.g., flood control and groundwater replenishment. Interagency coordination is necessary to overcome these scheduling challenges. The Technical Workgroup recommends the following:

- Water agencies and associations should communicate research results and work with the CDPH to address health concerns while promoting recycled water use, including adjustment of CDPH's recycled water recharge and reservoir requirements guidelines; and
- Support monitoring for presence of emerging constituents and work with CDPH and the regional water quality control boards and focus on developing a communication strategy to present the information to the public appropriately.

Salt & Concentrate Management

Salt management plays a crucial role in maintaining water quality in local groundwater basins. Production of recycled water typically requires brine concentrate disposal. In many cases, regional concentrate lines are used to provide concentrate disposal for multiple agencies. Limited concentrate line locations, permitting requirements, and high discharge fees present challenges in sustaining regional salt management objectives. Recommendations from the Technical Workgroup:

- Encourage agencies to pursue state and federal grants through Integrated Regional Water Management Planning processes and other grant programs for concentrate management and recycled water in general;
- Streamline and ease concentrate discharge regulations; and
- Support and facilitate partnerships between utilities to combine discharge lines that would reduce permitting requirements and number of ocean outfalls.

Recycling and groundwater recharge projects reduce or prevent new demand on Metropolitan's imported water supply. Pictured left City of Los Angeles public golf course in Sepulveda Basin. Pictured right Chino Basin spreading grounds.

Retrofitting Costs

Recycled water development can have varying region-wide costs and benefits, both monetary and social. Recycled water may be priced less than the incremental cost of importing more water from other regions, but many private businesses have a difficult time overcoming the large initial investment coupled with the long-payback period to recover costs for dual-plumbing or recycled water retrofits. Retrofits are often more costly than incorporating dual plumbing into new construction and funding is difficult to find for private developers. However, dual-plumbing is not an option for many areas with low potential for new construction.

Construction of recycled water infrastructure can be promoted through various methods. Las Virgenes MWD, Central Basin MWD, West Basin MWD, and others have encouraged recycled water participation by financing the retrofit costs and then charging the customer potable water rates rather than recycled water rates until the loan is paid off. Recommendations to address these costs include:

- Develop funding mechanisms that assist end users with the cost of retrofits. Under Metropolitan's Public Sector Program, about $1.1 million was invested for 85 site retrofits that will use up to 3,300 AF/year of recycled water;
- Develop funding programs, along with wastewater and land use agencies, to help address additional construction costs to install dual-plumbing and distribution lines and additional maintenance and replacement; and
- Revisit the value of recycled water as replacement for imported supply more frequently under Metropolitan's Local Resources Program (LRP).

The region includes a multitude of agencies with unique functions, capabilities, and jurisdictions. In order to optimize existing assets and competencies, the region needs to collaborate on facility operations, management, and planning.

Recycled water has played a crucial role in meeting regional water demands, particularly in time of drought-limited imported water supply. Through advancement in wastewater treatment technology and public health research, recycled water use will continue to expand and diversify.

Seawater Desalination

The Seawater Desalination Issue Paper, found in **Appendix A.11,** identified more than 10,000 seawater desalination facilities worldwide producing more than 13 million AF/year (MAF/year).[4] There are numerous methods for desalting seawater, but the most common involve thermal distillation and membrane separation processes, including RO, the dominant technology in the United States.

Metropolitan has been considering seawater desalination as a potential new supply since the 1960s. Initial efforts included developing a large regional facility near Huntington Beach. In the early 1990s Metropolitan developed and pilot tested its own thermal distillation technology. A companion integration study evaluated potential sites for a Metropolitan facility that would have been co-located with coastal power plants.[5] However, the cost of seawater desalination was not competitive with other resources at that time. The 1996 IRP considered seawater desalination a future resource due to its high cost relative to other available supplies. In the past 10 years, rapid improvements in membrane performance, energy recovery technology and process design have lowered seawater desalination costs to the point where it is now more competitive with other new supply options.

In response to member agency interest, Metropolitan created the Seawater Desalination Program (SDP) in 2000 and in 2001 released a competitive bid process to solicit projects from among its 26 member agencies. Five member agencies—Long Beach, LADWP, Municipal Water District of Orange County (MWDOC), SDCWA, and West Basin MWD—submitted projects totaling a projected yield of 142,000 AF/year. As with Metropolitan's LRP for recycling and brackish groundwater recovery, Metropolitan authorized uniform sliding-scale incentive agreements with these agencies for up to $250/AF produced. Metropolitan's SDP represents a potential investment of about $900 million over

4. www.desaldata.com
5. A brief history of Metropolitan's activities is contained in the May 26, 2009 board presentation item 2a.

25 years for about 3.5 MAF of desalinated supply, depending on which projects move forward. The 2004 IRP set a target for seawater desalination of 150,000 AF by 2020, to help establish a planning buffer supply.

Seawater desalination represents a new local supply that could be used to fill future identified gaps between imported water availability and the overall regional water supply need. It represents a significant opportunity to diversify the region's water resource mix with a new, locally controlled, drought-resistant supply. Seawater desalination produces high-quality potable water that can be delivered through existing distribution systems directly to customers. Like other new local supplies, seawater desalination could help relieve pressure on constrained sources of water like the Delta and Colorado River.

As with other new resources considered for inclusion in this plan, the development of seawater desalination poses a number of unique opportunities and challenges. Challenges to further development of seawater desalination in Southern California fall into three general categories: cost, permitting/regulatory challenges, and planning challenges. Cost challenges include high capital and energy costs. These costs vary by project based on the need for new intake/outfall infrastructure and distribution system facilities. Permitting/regulatory challenges involve the potentially lengthy process to permit a seawater desalination facility, as well as several ongoing state regulatory processes that could affect the future implementation of seawater desalination. Planning challenges include issues related to: site location and system integration, water quality and mitigation for marine organisms, and energy use and greenhouse gas emissions.

Cost

Over the past decade, advancements in membrane design, process configuration, and energy recovery technology have reduced the costs of seawater desalinated supplies relative to other new resource options. However, the high development costs, capital costs, and operating costs could be an obstacle for some agencies. The operating cost of seawater desalination is largely driven by the energy-intensive RO process, but distribution costs may also be significant depending on the conveyance and lift needed. Although per-unit costs have also been reduced, they are still a factor in planning and developing potential projects. Recent estimates for Southern California range from $1,300 to $2,000/AF depending on project size, intake/outfall infrastructure, and distribution integration costs.

Capital Costs

Capital costs associated with desalination projects can vary by site depending on location, as well as the need for intake/outfall infrastructure and distribution pipelines. To reduce capital costs, several proposed projects in Metropolitan's service area are considering siting adjacent to coastal power plants (co-location) to take advantage of existing intakes, outfalls, and industrial-zoned land. Major capital costs are described below:

- Land: Potential sites for seawater desalination plants in Southern California are limited by the availability and cost of coastal real estate;
- Treatment: Costs associated with desalination facilities involve pre-treatment facilities; RO equipment, including membranes; post-treatment; and supporting infrastructure;
- Intakes & outfalls: The cost of new intakes and outfalls can be a significant element of the total project cost. Siting desalination facilities near coastal power plants may avoid these costs by taking advantage of existing open water intakes and outfalls. New regulations developed by the SWRCB may lessen the advantages of co-location for new seawater desalination facilities. The new regulation are described below; and
- Integration: Project size and location significantly affect the cost of integrating desalinated product water into existing distribution systems. Locations requiring long transmission pipelines or elevation gains to tie-in points would have higher integration capital costs.

Operating Costs

Seawater desalination operating costs are largely driven by energy use, but also include membrane replacement, maintenance, chemicals, and labor. Environmental mitigation costs may also contribute to total operating costs. The total power costs of a project will depend on the price of electricity, as well as with pre-treatment and distribution pumping energy requirements. Increasing the energy efficiency of seawater desalination reverse osmosis is still an area of active research that could potentially reduce energy use by 20 percent or more, though there is a minimum energy needed to overcome osmotic pressure. Technologies currently under development include membranes imbedded with specialized nano particles and nano filtration in a two-pass configuration.

Cost Recommendations

The member agency Technical Workgroup suggests securing funding to research and develop more cost-effective technologies. Additionally, the region should acquire potential desalination treatment plant sites to reduce future costs.

Permitting & Regulatory Challenges

The unclear and potentially lengthy permitting process, along with several ongoing state regulatory processes, are key challenges facing the development of seawater desalination

Permits & Approvals

Seawater desalination plants in California must obtain more than 20 federal, state, and local permits and approvals in a complicated process where some regulatory agencies defer review until other agencies approve a project. Many required permits are related to coastal and ocean resources and from a water resource perspective are unique to seawater desalination. In many cases, there is overlap, redundancy and/or inconsistent or unclear regulatory guidance over key resource issues such as marine biology, air quality, land use, and water quality. Since both the California Coastal Commission and CDPH require approvals from other state agencies before issuing permits, they will typically be the last approvals needed prior to construction. **Table 2.5** lists the major permits and approvals that may be required depending on the location of the seawater desalination project.

Streamlining permitting processes has been identified by the member agency Technical Workgroup as a critical factor needed to facilitate seawater desalination project development. This could be accomplished in a variety of ways, including but not limited to: establishing a state desalination commission, similar to the Coastal or Energy commissions, that would centralize the permitting in one agency; forming a watermaster-like permitting coordinator for desalination that could bring together regulatory agencies and desalination developers; or developing a SWRCB policy for the permitting process.

Some of the current obstacles preventing more efficient permitting include a general lack of data for developing standards and regulations that would apply to all seawater desalination projects and a lack of regulatory agency staff time and expertise to process available data. Potential joint work shares between desalination experts and regulatory agencies in reviewing permits and working on developing data-based standards could improve this issue and relieve pressure on permitting agency staff.

Regulatory Process

Legislation can influence the implementation of seawater desalination by changing regulatory and permitting requirements. For example, U.S. House of Representatives Bill (HR) 21, the Ocean Conservation, Education, and National Strategy for the 21st Century Act, if passed, could significantly alter the governance and policy of ocean resources in the U.S. and have major implications for future desalination projects. The goal of HR 21 is to establish a national policy "promoting ecologically sustainable ocean resource use and management." Among other things, it sets guiding principles for protecting and restoring ocean and coastal waters, Great Lakes, and related resources, requires all federal agencies to update regulations to be consistent with the policy, establishes a council of advisors on ocean policy to advise the president, and designates nine ocean regions to promote coordinated regional efforts to implement the national ocean policy.

Table 2.5 Agency Permits & Approvals for Seawater Desalination Projects

	Agency	*Permit or Approval*
Local	Local jurisdiction (city, water agency, etc.)	CEQA, Local Coastal Development Permit (in some cases), encroachment permits, operating agreements, other permits/approvals
State	Coastal Commission	Coastal Development Permit and/or Local Coastal Program Amendment; Consistency with coastal zone management program
	State Lands Commission	State land use lease/amendment
	SWRCB	National Pollutant Discharge Elimination System discharge permit; Waste Discharge Requirements
	Regional Water Quality Control Boards	Section 401 water quality certification
	California Energy Commission	Application for Certification Amendment reviews changes to regulated power plants for co-located desalination facilities
	CDPH	Drinking water permit and Federal Surface Water Treatment Rule
	Public Utilities Commission	For private water utilities
	Department of Parks and Recreation	Encroachment permits
	Department of Fish and Game	California Endangered Species Act permit/consultation, Marine Life Protection Act and Areas of Special Biological Significance consultation
	Caltrans	Encroachment permits
	SWRCB/Division of Water Rights	Surface/groundwater
	Air Pollution Control District – South Coast Air Quality Management District/San Diego County Air Pollution Control District	Permit to construct/operate
Federal	U.S. Coast Guard	Regulates structures in navigable waters
	U.S. Army Corps of Engineers	Section 404 permit for construction in navigable waters; Section 10 permit for structures in navigable waters
	National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service/U.S. Fish and Wildlife Service	Review for potential impacts to endangered species marine mammals, migratory birds, essential fish habitat, and national marine sanctuaries
	Bureau of Land Management/Department of Defense	Encroachment on federal lands
	USBR/Bureau of Land Management/ Environmental Protection Agency	National Environmental Policy Act compliance

Besides the federal efforts, there are several ongoing state regulatory processes that could affect the future development of seawater desalination:

SWRCB – 316b Regulations

The SWRCB finalized implementation guidelines for federal regulations of existing open water intakes used by power plants in May 2010. Section 316b of the Clean Water Act provides that the design of structures used for once through cooling must "reflect the best technology available for minimizing adverse environmental impact."[6] The new SWRCB requires existing power plants to re-power using closed-cycle wet cooling systems or reduce seawater intake by 93 percent of historical average flows. Power plants in Southern California have compliance deadlines that range from 2011 to 2022. Next steps for the regulations are evaluation and final approval by the Office of Administrative Law. Although seawater desalination is not addressed in the proposed regulations, how the new regulations are implemented could affect

6. The Clean Water Act. 33 U.S.C. §1251 et seq. (1972). Available at *http://epw.senate.gov/water.pdf*

projects that are being planned to co-locate with coastal power plants.

SWRCB –California Ocean Plan & Seawater Desalination

The SWRCB is responsible for reviewing water quality standards in the California Ocean Plan and for modifying and adopting standards in accordance with the federal Clean Water Act and the California Water Code. In its 2008 triennial review of the California Ocean Plan, the SWRCB originally intended to set new standards for seawater desalination concentrate discharges. Instead, the SWRCB has indicated it may initiate a process to develop a comprehensive set of regulations for seawater desalination concentrate discharges and intakes in late 2010.

Department of Fish & Game – Marine Protection Areas

The Marine Life Protection Act was passed by the California Legislature in 1999 to better evaluate California's coastal waters and to direct the state to create and manage a network of marine protection areas (MPAs) along the California coastline. The purpose of MPAs is to protect critical marine habitats by limiting resource extraction including the "taking" of marine life. MPAs could affect or limit the location, design and operations of new seawater desalination intakes and outfalls in Southern California. The state Department of Fish and Game forwarded new MPA proposals for the Southern California coastline to the California Fish and Game Commission for final consideration in December 2009. In June 2010, the Fish and Game Commission released the Environmental Impact Report (EIR) for the proposed MPAs. Final approval is expected in the winter of 2010.

Steelhead Recovery Plan

In July 2009, the National Marine Fisheries Service released the public review draft of its Southern California Steelhead Recovery Plan. In 1997, the Southern California steelhead was first listed an endangered species under the federal Endangered Species Act of 1973 (ESA). The over-arching goal of the Recovery Plan is the recovery of the Southern California steelhead and its removal from the federal Endangered Species List. These efforts may effect regulations or siting of outfall/intakes for facilities, so it is important to take this into account when investing in land.

Member agency recommendations for regulatory processes are similar to those recommended for the permitting process. Compliance with regulations is challenging because of the variety of agencies and regulations, and there is potential for streamlining, coordination, and consolidation. Recommendations included encouraging a science-based, statewide policy or legislation in support of desalination in order to assist the process further and remove significant hurdles. Additionally, up-front partnerships with environmental groups on desalination projects and public outreach could stem some of the contention and effectively address potential concerns.

Planning Challenges

Site location and system integration, water quality, environmental mitigation, energy requirements, and greenhouse gas emissions are planning issues that need to be addressed by potential project proponents.

Siting & System Integration

A number of variables affect the siting of potential seawater desalination projects, including the availability of suitable coastal land, the location of existing ocean intakes and outfalls, the proximity of system integration delivery points, overlying water demands, water quality requirements, and suitable geological conditions for alternative intakes if used.

The siting of seawater desalination plants with coastal power plants has several advantages, including the use of existing ocean intake/outfall infrastructure and land zoned for industrial use. Using existing infrastructure theoretically reduces intake and outfall costs and can result in minimal new marine life impacts from desalination operations when power plants are running. However, in recent years, co-location has become controversial with key permitting agencies and environmental groups. As described earlier, the SWRCB has developed regulations limiting the use of open water intakes by power plants. The new requirements would reduce many of the environmental benefits and potentially some of the cost savings associated with co-location.

Metropolitan completed a System Integration Study in 1994 that considered 12 seawater desalination facilities, with project capacities ranging from 20 million gallons/day (MGD) to 100 MGD, and four integration options, including local distribution systems, regional feeders, a combination of local distribution and regional feeders, and construction of new coastal feeders. In general, the study concluded that smaller projects located near water demand centers may integrate effectively into existing local distribution systems while minimizing distribution costs. Larger regional projects or projects located away from demand centers may require conveyance to a regional pipeline, new coastal feeders, or distribution infrastructure to bring supplies to demand centers.

Marine Life Protection

Marine life impacts associated with seawater desalination include impingement and entrainment of marine organisms related to seawater intake system, and impacts to salt-sensitive species due to concentrate discharges. Several member agencies are researching alternative intake technologies with the potential to minimize impingement and entrainment impacts, including Long Beach's sub-surface infiltration galleries, MWDOC's slant-drilled beach wells, SDCWA's deep-infiltration gallery tunnel collector wells, and West Basin MWD's wedgewire screens for open water intakes and sub-surface infiltration gallery pilot study. Sub-surface technologies also have the potential to reduce pre-treatment needs.

Challenges with alternative subsurface technologies include the availability of favorable geologic conditions at the selected desalination plant site, the low permeability of ocean-floor sediments, high construction costs, the uncertain long-term performance yield, maintenance accessibility, replacement costs, and scalability for a large scale project.

Energy Use & Greenhouse Gas Emissions

Greenhouse gas emissions associated with seawater desalination's energy use have become an important planning issue in California. Despite recent advances in energy efficiency, seawater desalination still requires more energy per AF than most other supply options available to Southern California. However, the gap between desalination and imported water supplies is decreasing.

Although minimal greenhouse gases are emitted directly by seawater desalination plants, they cause indirect emissions through electricity use. Until recently, water projects have not been required to be carbon neutral. However, the California Coastal Commission and California State Lands Commission both required a recent project to be carbon neutral by offsetting its "net" greenhouse gas. Although the legislative basis for municipal water projects to be carbon neutral is unclear, it is possible that the recent greenhouse gas emission offset requirements will be a precedent for subsequent seawater desalination projects.

The member agency Technical Workgroup suggested that agencies should continue to pursue energy reduction technologies in addition to exploring future possibilities including exploring alternative and renewable energy sources on a regional scale, e.g., solar panels on Metropolitan-owned land in the desert, or pursuing a policy that desalination energy use be treated comparable to other water resources with regard to required offsets.

Stormwater

Stormwater is an integral part of the hydrologic cycle. Stormwater originates from rainwater that becomes surface runoff or naturally percolates into the ground to replenish groundwater basins. As California has grown and developed, the amount of stormwater flowing off impervious surfaces into surface water streams and flood channels has increased, thereby reducing water allowed to infiltrate into groundwater aquifers and increasing water flowing to the ocean. Systems were engineered to convey stormwater runoff as quickly as possible from populated areas to waterways to reduce flooding. Although this system is efficient in reducing flooding and protecting property, it may also exacerbate local water supply issues experienced today in many of the region's groundwater basins due to the decrease in natural percolation. The depletion of local storage water, along with other environmental factors, has spurred a change in how local agencies approach stormwater.

The concept of capturing stormwater for groundwater infiltration and reuse is not new. From 1995 to 2004, an average of about 477,000 AF per year of stormwater runoff was captured in spreading basins or other centralized facilities for groundwater recharge within the Metropolitan service area.[7] Despite the advances in stormwater capture, in the urban areas alone, there is estimated to be an average of more than 1 million AF/year of stormwater that is not captured in the Metropolitan service area.[8]

Many local agencies are designing and implementing integrated watershed projects and plans to enhance stormwater and dry-weather recharge and direct use. These projects and plans generally incorporate multiple benefits, such as reduced flooding, increased water supply, enhanced recreational opportunities and wildlife habitat, and reduced stormwater pollution. Projects can incorporate centralized or distributed facilities. Examples of centralized facilities include spreading grounds, wetlands, large underground infiltration or storage tanks, dams, retention basins, median retrofits, urban runoff recycling facilities, surface water reservoirs, and other large-scale projects that collect stormwater runoff from multiple parcels. Distributed single parcel projects involve the implementation of stormwater BMPs such as rain barrels, cisterns, rain gardens, and drain spouts diversions. The Stormwater Technical Workgroup prepared a Stormwater/Urban Runoff Issue Paper (**Appendix A.12**) that identifies issues that need to be addressed, or require further research, to facilitate wide-scale adoption. The issue paper also identifies recommendations to overcome these obstacles and ultimately enhance stormwater runoff capture and use to augment the local water supply.

7. Source: MWD Groundwater Assessment Study: September 2007
8. Source: Stormwater/Urban Runoff Issue Paper

Issues

Quantifying Yield, Costs, & Benefits

One of the largest impediments to investing and relying on local stormwater projects as a water supply resource is that a quantified relationship between stormwater capture and production yield has not yet been determined. Variables include specific groundwater basin geology, water quality (groundwater and stormwater), infiltration and evaporation losses specific to each project, and the groundwater basin management structure. The effects of these variables on production yield are currently not quantified and need further study. Stormwater direct use projects also consist of an assortment of currently unknown variables. Until variables are quantified, investment in stormwater projects may be considered risky because the potential conversion rate from captured stormwater to yield can be anywhere between 0 and 100 percent.

Beyond determining the water supply yield of a project, the cost-effectiveness and economic feasibility of a project is difficult to determine at this time. Stormwater projects generally encompass multiple objectives that incorporate a variety of costs and benefits, many of which overlap, making isolating the water supply component cost problematic. Additionally, there are multiple approaches to calculating the monetary value of the water supply benefit. This quantification is needed to compare benefits to costs, and to make informed investment decisions.

Water Quality

Stormwater projects potentially affect – and are affected by – both surface water and groundwater quality. The extent of this effect varies per project and further study is needed to understand the optimal balance of water quality and water supply.

Legislation & Regulations

Current regulatory and management structures may limit the water supply yield of a stormwater capture and use project. For example, in some groundwater basins, legal rights to extract groundwater may not allow increased production, regardless of increased stormwater recharge. More dialogue is needed to refine existing regulatory and management structures to maximize the water supply benefit.

Regional coordination is also needed to present a unified front and more effectively influence legislation.

Funding

Total project costs for stormwater projects vary greatly, as do the scopes for each project. Depending on the project scope, these total costs incorporate components to provide a water supply benefit, but also a multitude of other related benefits, such as flood reduction, surface water quality improvements, and habitat and recreational enhancements. The more variety and quantity of benefits the project provides, the more the project tends to cost in total. However, the multiple benefits potentially bring in multiple funding partners, which effectively reduces the individual cost burden to provide each benefit. This holds true for both capital funds and maintenance responsibilities. For example, many of the agencies that have funds to cover capital costs (through their capital budgets and through grant funding) struggle with the ensuing maintenance responsibilities due to a restrictive maintenance budget.

Technical Workgroup Recommendations

- Begin to identify and study various pilot projects within the next year to develop a model to quantify the relationship between capture and production, to quantify water supply component costs and benefits, to optimize partnerships, and to better understand regional challenges;
- Model, per basin, the effect of increased active stormwater recharge on production yield (using IRPSIM);
- Determine a business case and an accurate cost/benefit analysis for providing regional incentives/rebates based on the study of various pilot projects;
- Take the lead in coordinating a proactive, unified approach to legislation and regulation for the region, including ordinances and building standards;
- Continue to encourage enhanced stormwater recharge/use partnerships to educate the public on the benefits and uses of stormwater, including the relationship between stormwater quality and drinking water supply, and facilitate coordination of information to increase message consistency;
- Continue to provide an avenue for open regional discussion on enhanced stormwater capture and use as a water supply resource;
- Create/continue a dialogue between stormwater, water supply, and groundwater managers to refine existing groundwater and surface water management, and maximize stormwater runoff as a local water supply;
- Collectively develop a set of monitoring guidelines to increase technical knowledge; and
- Encourage information sharing of challenges and lessons learned to improve future water supply augmentation efforts, including:
  - Technological improvements;
  - Water quality data;
  - Information gained from the study of pilot projects;
  - Examples of governance;
  - Regulatory processes; and
  - Operations and maintenance.

Synergy (Groundwater, Recycled Water, Stormwater)

During the technical workgroup process, several of the workgroups noticed that they had identified similar recommendations with respect to Metropolitan's participation in legislative affairs, public outreach, and funding efforts. To streamline these ideas, a "synergy" workshop was held on April 20, 2009 that included participants from the groundwater, recycled water, and stormwater technical workgroups. Improved synergy amongst the groundwater, stormwater, and recycled water agencies can enhance basin yield, reduce imported water demands, and normalize water blending targets for use in recycled water spreading throughout the region.

The concept of synergy is reflected by the SWRCB Recycled Water Policy that sets mandates for increased use of recycled water and stormwater, requires salt/nutrient management plans for all groundwater basins, and encourages less stringent monitoring and regulatory requirements for stormwater treatment projects.

Summary of Recommendations

Synergy Workshop participants identified opportunities to work together to optimize the use of groundwater, recycled water, and stormwater in the Metropolitan service area. These include legislative and regulatory issues, education and public support, and funding cooperation and are detailed in **Appendix A.13**.

- Metropolitan should take a leadership role in coordinating with its regional partners to effectively lobby the state Legislature to develop improved policies regarding the treatment and use of recycled water and stormwater. Ensure that legislators are educated on issues before they pass additional rules and requirements. Ensure that new legislation come with funding to help local agencies implement new requirements;
- Stormwater, recycled water, groundwater, and imported water are interrelated. Yet, the public message among the various interests is inconsistent and should be better coordinated to provide maximum impact. For example, a water supply education campaign at a school could also include information about stormwater, recycled water, and groundwater to educate the public on the entire water picture and on ways an individual can be part of the overall solution. Additionally, "cash for grass" and other landscape conservation programs could be augmented to include rain gardens and downspout re-directs for recharge, and rain barrels for direct use. Metropolitan should take a leadership role in coordinating with its regional partners to improve public outreach, education, and support for enhanced stormwater and recycled water use. Metropolitan and other water agencies, flood control agencies, public health agencies, and other partners should work together to develop a clear and consistent message to the public regarding the safety of drinking water and how water supply systems are integrated (recycled water, groundwater, and stormwater); and
- Metropolitan should seek funding partners for stormwater and recycled water projects. Metropolitan should also consider a business model to develop incentives related to use of stormwater.

Graywater

During the 2008 stakeholder forum process, various stakeholders requested that graywater be included in this IRP update and examined as a potential resource for Southern California. To this end, the Technical Oversight Committee created a technical workgroup to determine the challenges to graywater development. The workgroup and Metropolitan staff concluded that graywater is not a significant, viable water supply for Metropolitan in the foreseeable future. In addition to issues with cost and existing regulations, there is the added issue of graywater projects negatively impacting wastewater and recycled water infrastructure. For these reasons, this IRP Update does not recommend action in the area of graywater beyond feasibility studies.

The 2007 California Plumbing Code defines graywater as:

"untreated waste water which has not come into contact with toilet waste. Graywater includes waste water from bathtubs, showers, bathroom wash basins, clothes washing machines, and laundry tubs, or an equivalent discharge as approved by the Administrative Authority[9]*. It does not include waste water from kitchen sinks, photo lab sinks, dishwashers, or laundry water from soiled diapers."*

In California, graywater is currently used for irrigation of landscaping at the site of generation, although graywater still cannot be put to indoor beneficial use, such as flushing toilets and urinals, unless it is treated to Title 22 tertiary recycled water standards[10].

9. This "Administrative Authority" is the same as the "Enforcing Agency" in the HCD regulations in Appendix A.8.b, both of which refer to whatever local or regional government agency has jurisdiction over the proposed graywater location.
10. "Title 22," the California Department of Public Health standard for recycled water, is in reference to Title 22, Chapter 3, Division 4 of the California Code of Regulation.

Graywater was not identified as a water supply component in the 2004 IRP Update. However, the Graywater Technical Workgroup prepared a Graywater Issue Paper, which is provided in **Appendix A.8** that discusses graywater activities, regulations, potential as a resource, and challenges to further development, discussed below.

Background

Historically, California has had one of the strictest plumbing codes when it comes to installation of graywater systems.

SB 1258, signed by the governor into law on July 22, 2008, directed the California Department of Housing and Community Development (HCD) to be the state agency responsible for proposed building standards for the construction, installation, and alteration of residential graywater systems. The bill requires HCD to adopt building standards for residential graywater systems and to submit such standards to the California Building Standards Commission for approval. SB 1258 also modified the existing Health and Safety Code to allow cities, counties, or other local agencies to adopt building standards (after a public hearing and enactment of an ordinance or resolution) that either prohibit entirely the use of graywater or that are more restrictive than the graywater building standards adopted by HCD. Additionally, the California Department of Water Resources (DWR) retained the responsibility for commercial and industrial graywater system standards.

Because graywater is untreated wastewater that can contain pathogens and have a potentially deleterious impact on public health, the California Plumbing Code requires piping, valves, and other graywater components to be separate from potable water systems. Previous versions of the code required that graywater systems must be designed and operated to prevent graywater from reaching the land surface or becoming airborne, restricted graywater use to subterranean irrigation, and prohibited irrigation of vegetables or fruit that grows on the ground. Also, until recent plumbing code changes, the former requirement for subterranean, or subsurface, irrigation entailed drip irrigation lines buried at least nine-inches beneath the ground surface. Because of these restrictions, very few graywater systems were legally installed. It is unclear how many illegal graywater systems have been installed and are operating within the state.

On January 27, 2010, the California Building Standards Commission approved new graywater regulations (Title 24, Part 5, Chapter 16A of the California Code of Regulations), as developed by HCD, that allow for increased use of graywater systems within the state by modifying the subsurface irrigation requirement for graywater drip lines from burial at least nine inches beneath the ground surface to at least two inches beneath mulch, rock or soil, or a solid shield to minimize the possibility of human contact. These regulations are included in **Appendix A.8.b**.

Also, the new regulations created a three-tiered graywater system:

- Clothes Washer System: does not require a construction permit if in compliance with requirements of new regulations;
- Simple System: not including a clothes washer system and discharge capacity is 250 gallons per day or less, but does require construction permit unless specifically exempted; and
- Complex System: not including a clothes washer system or a simple system and discharge capacity is greater than 250 gallons per day, but does require a permit unless specifically exempted.

The new regulations still provide that cities, counties, and other local governments may further restrict or prohibit the use of graywater systems after a public hearing and enactment of an ordinance or resolution.

System Components & Costs

As previously noted, few legal graywater systems have been constructed to date in California. With the recent changes to the California Plumbing Code, local public agencies with permitting authority may still choose to prohibit graywater systems, or enact stricter code regulations that would impact the extent of construction of graywater systems within their jurisdictions. The construction costs for retrofitting existing properties for graywater systems are typically higher than the costs for including graywater systems within new construction.

As was documented in the Graywater Technical Workgroup Issue Paper, the cost of graywater systems varies widely, depending on compliance with code, level of treatment, and size and sophistication of system. Capital costs under the pre-2009 regulations were found to exceed $20,000 for high-end systems, not including the costs for permitting, maintenance, and inspections.

Currently, sources of public funds for graywater systems in the state are limited, especially with the history of stringent standards for graywater systems in California.

Water Quality Issues

Often the public confuses graywater with recycled water and does not realize that graywater is untreated wastewater while recycled water is highly treated to Title 22 standards. Recycled water is suitable to a much wider range of non-potable beneficial uses than graywater. Likewise, the public may confuse graywater with blackwater, which consists of wastewater from kitchen sinks, dishwashers, and toilets.

There are public health issues associated with increased use of graywater. Using graywater does carry the potential risk of transmission of disease-carrying organisms from sick to healthy individuals. Public health departments are concerned that people might inadvertently reconnect graywater systems into the potable water system. There are public health risks if the graywater becomes airborne, or if there is excessive/extending ponding or runoff of graywater. Also, there are concerns that graywater use may have a detrimental impact on the receiving groundwater quality.

Conclusion

The Graywater Technical Workgroup concluded that more research and development is needed to better understand the water quality impact and cost-effectiveness of graywater. Because of the many unknowns and the negative impact on recycled water and wastewater infrastructure, it is unlikely that graywater will become a significant regional supply.

The Graywater Technical Workgroup recommended that Metropolitan not take an active role in providing financial incentives for installing graywater systems at this time due to high costs, lack of data, and uncertain regulatory environment. Additionally, the Graywater Technical Workgroup found that it would be premature to quantify implementation targets for graywater for this IRP Update.

Strategic Policy Review

As Metropolitan's board members, staff, member agencies, members of the public, and stakeholders participated in the collaborative process described earlier to identify regional resources and the challenges for their development, the question emerged: What should Metropolitan's future role be in managing and developing the region's water supplies?

Process

To address this question, Metropolitan held a series of workshops at the board level to evaluate Metropolitan's future role in the region and its mission. As staff developed and presented potential resource options, the IRP Steering Committee shifted focus to planning policies and goals. A forum called the Strategic Policy Review was created to delve into core policies and establish new directives if necessary. This forum allowed stakeholders to evaluate impacts of current and proposed policies, particularly in the manner in which those policies influence Metropolitan's role in regional development. The purpose of the Strategic Policy Review was to examine the impact of different roles for Metropolitan and its member agencies in developing water resources and supply reliability at the retail service level in the future, akin to the Strategic Plan process of 2000 and the 1995 Strategic Assembly process leading up to the 1996 IRP.

Workshops

The process centered on three facilitated board workshops that were designed to clarify, analyze, and discuss the potential impacts for different roles for Metropolitan. A summary of these workshops is shown in **Table 2.6**.

Table 2.6 Strategic Policy Board Workshops

Date		Content	Outcome
2009	August	• Process and schedule • Guiding principles and evaluation criteria • Alternative for new regional supplies	• Input on evaluation criteria • Input on alternatives
	October	• Review evaluation criteria and alternatives • Technical evaluations of project supply yields, cost, issues, and water quality for water supply options	• Understanding technical assumptions and data • Identification of needed revisions
	November	• Evaluation of alternative approaches • Sensitivity to uncertainties	• Understanding assumptions • Concurrence on validity of initial findings • Identification of additional analysis

The workshops revisited the function and importance of a regional agency with access to imported resources, diverse capabilities, and a flexible scope of services. The dialogue was spirited and far-reaching. Board members expressed diverse views regarding the extent to which the region should depend on Metropolitan's actions and initiatives (with the associated costs and commitments) and the degree to which a member agency should accept responsibility and control over its own water supply reliability. No one questioned, however, the importance of reliable and safe water supply for the people and economy of Southern California – only the means by which that uniformly-upheld goal should be achieved.

Examining Potential Roles for Metropolitan

In examining alternative roles for Metropolitan, the board began by looking at the key balance between Metropolitan's role as a water importer and its role in local supply development.

At present, Metropolitan takes an active role in the development of water resources for the region, both on the imported water side and in local development through partnerships and incentives. The current role for Metropolitan is driven by the policies laid out in the Laguna Declaration, Metropolitan's Mission Statement, and previous IRPs. However, this role could change as deemed regionally necessary. For example, at one end of the spectrum, Metropolitan could focus solely on importation, or on the other end of the spectrum, it could import water in addition to maintaining involvement in local resource development.

The extent and manner of Metropolitan's local resource development participation could have divergent regional impacts as well. Historically Metropolitan has incentivized local resources through its LRP program, but there are other options for funding, ranging from offering incentives to establishing full ownership. In this analysis, several options for local resource development were considered by Metropolitan's board, including incentivizing, partial ownership, and full ownership.

For the purpose of analysis and assessment of key differences in alternative roles for Metropolitan, three approaches were developed that incorporated these varying levels of importing and local involvement:

- Current Approach;
- Imported Focus; and
- Enhanced Regional Focus.

Table 2.7 shows key differences for each role, while all approaches assume the following:

- Demands and demographic projections are consistent with methods outlined in **Appendix A.2**;
- Conservation credits continue unchanged and levels of conservation are consistent with retail-level compliance with 20x2020

Table 2.7 Composition of Alternative Roles for Metropolitan

Component	Current Approach	Imported Focus	Enhanced Regional #1	Enhanced Regional #2
Successful Delta Solution	√	√		√
New Local Resource & Conservation Incentives	√			
New Regional Supplies			√	√

legislation.[11] Further details on conservation modeling can be found in **Appendix A.2;**

- Metropolitan will honor its current LRP contracts to expiration and the local resources included are those developed or committed to date, and are shown to grow to estimated full yield through 2035;
- The Carlsbad Seawater Desalination Facility is considered to be "Under Construction" and online in 2012;
- CRA supplies include existing/committed programs along with planned Quantification Settlement Agreement program ramp-up;
- Colorado River transactions are available to supply additional water up to the CRA capacity of 1.25 MAF on an as-needed basis;
- SWP supplies are estimated under restrictions from current Delta smelt and Chinook salmon Biological Opinions until 2012, after which an Interim Delta Solution is implemented to lessen the impact of the Biological Opinions;
- Metropolitan can use its existing storage portfolio capacity of approximately 4.9 MAF[12] of surface and groundwater storage, and any existing/committed water transfers; and
- No access to additional SWP water transfers in addition to any existing/committed water transfers are available, including state Drought Bank supplies.

For the modeling process, these common assumptions are projected out to year 2035 and incorporated into Metropolitan's comprehensive Integrated Water Resources Plan Simulation Model (IRPSIM). IRPSIM is based on 83 years of historical hydrology from 1922 to 2004, and estimates of water surplus and shortage are determined over a 25-year planning period. The IRPSIM model allows the analysis of information as to hydrologic and climatic effects on supplies, demands, and storage capability and use. The information calculated by the simulation model provides time series and probabilistic outcomes of resource use and regional surplus and shortage conditions in frequency and magnitude. Additional details on Metropolitan's IRPSIM model and methodology can be found in **Appendix A.1**.

Once the base assumptions common to all scenarios were established, alternative mixes of potential resource investments and implementation timing were developed for each of the Strategic Policy Review alternative roles. These alternative resource scenarios were added to the base assumptions and then modeled using IRPSIM. For the purposes of reliability comparisons between the alternatives, the key measures of each case were the frequency and magnitude of shortages for years 2015, 2025, and 2035. The cost and rate impacts associated with these roles were also evaluated.

Water Rate Impact Assumptions

The first step in calculating Metropolitan's water rates is to identify the various costs associated with providing water service. Staff used the "cash needs" approach, an accepted industry practice for government-owned utilities, which leads to the fixed and variable costs used in this analysis. All of these costs make up Metropolitan's gross revenue requirement that must be made up through rates and charges. Metropolitan generates income from taxes, interest income, hydroelectric power sales, and other miscellaneous activities that is used to offset the gross revenue requirement resulting in a net revenue requirement that is used to set water rates and charges. Details on each of the costs, revenues and rate setting procedures are discussed below.

11. For more information on retail versus regional compliance with 20x2020, see the following section under Component 1: Core Resources Strategy.
12. This does not include Emergency Storage capacity, described in Appendix A.15.

Fixed Costs

Fixed costs include costs incurred annually, independent of the volume of water sold. The total annual cost is divided by projected sales in order to calculate per-acre-foot rates.

Administration

Administrative costs includes salaries and benefits, professional services, travel, material and supplies, and other miscellaneous expenses. The average annual rate of inflation to 2035 was assumed to be 3.7 percent. This is higher than the regional rate of inflation to reflect higher rates of increase for medical and retirement expenses.

Various O&M

Various O&M costs include operating equipment, performance programs, insurance, leases, association dues, property taxes, other post-employment benefits, and contingency. For all of the categories the inflation rate was assumed to be 3.5 percent with the exception of contingency and other post-employment benefits funding. The 2010 and 2011 contingency is assumed to be zero and one percent annually after that. Other post-employment benefits funding levels are still undetermined, so the funding level is assumed to be zero for 2010 and 2011 but is forecast to be funded at $10 million for 2012, $15 million in 2013, and $20 million from then forward. Other O&M costs are expected to increase an annual rate of 5.4 percent through 2035.

SWP

Fixed costs for the SWP include capital charges, minimum operations, maintenance, power, and replacement (OMP&R) charges, and off-aqueduct power charges. The majority of these costs are derived from estimates provided by DWR. However, for the scenarios that included a Delta fix, costs were calculated assuming Metropolitan would be responsible for 23 percent of the total $10 billion capital project leading to an annual cost of $148 million/year over 15 years. Overall, the total fixed SWP with the Delta fix costs are expected to increase at an annual rate of 2.4 percent through 2035. Part of the reason for this relatively low rate of increase is that over this time frame, the off-aqueduct facilities are paid off.

Capital Program Financing

Capital program financing is the same for each scenario and is estimated to increase at an average annual rate of 4.3 percent. An annual average of $374 million in capital investment is assumed, in accordance with the five-year financial summary from the current 2010 budget. The capital investment costs past 2015 are created by combining a forecast of capital for new facilities and replacement and refurbishment of the current system. The new facilities are estimated by taking the 2014 capital requirements for new facilities of $168 million and escalating it at three percent. The replacement and refurbishment component is estimated using Metropolitan's Replacement Planning & Asset Valuation Model, which bases replacement and refurbishment capital requirements on a list of Metropolitan's assets paired with their estimated life. This model calculates the annual replacement and refurbishment capital requirements at $196 million in 2015, increasing to more than $300 million by 2017, and leveling off at roughly $350 million in 2027.

Metropolitan also has General Obligation bond debt service decreasing from $48 million in 2010 to $3 million in 2023 as the bonds are redeemed.

Required Reserves

In additional to the expenditures incurred by Metropolitan to run and maintain the water system, Metropolitan is also required to maintain minimum fund balances to pay for operating costs. When these operating costs increase, the required minimum fund balance also increases. This increase in required reserves needs to be funded by rates and charges at an estimated $30 million/year increasing at 3.5 percent.

Variable Costs

These are costs dependent on the volume of water and are incurred by AF.

Treatment

Costs associated with variable treatment include the cost of power, chemical, and solids handling incurred at the five treatment plants run by Metropolitan. The cost is estimated by multiplying the total treated AF by the unit cost of treatment. The 2010 and 2011 unit cost was assumed to be $22/AF. Thereafter it was assumed to increase at an annual rate of 6.4 percent for 5 years, reflecting recent rates of increase, and 3.5 percent through 2035. This results in an average annual rate of inflation of 3.9 percent through 2035.

SWP Power

Power sources will need to be replaced in the time frame of the analysis, resulting in higher variable power costs for the SWP. These variable power costs differ for each Strategic Policy Review, based on SWP flow assumptions. However, the Imported Focus, Enhanced Regional #2, and the Current Approach scenarios have roughly the same unit rate of $127/AF escalated at an average of 5.2 percent as a result of similar SWP flows. The Enhanced Regional #1 scenario has significantly lower SWP flows and therefore a lower unit rate, also beginning at $127/AF in 2010 but escalated at an average annual rate of 4.4 percent.

CRA Power

The core power supplies for the CRA come from power plants along the Colorado River that provide roughly enough energy to pump 750,000 AF of water into the service area. Any additional CRA water must be pumped with energy priced at higher market rates. As a result, the more water is pumped, the higher the melded CRA power rate.

Since the Imported Focus, Enhanced Regional #2, and the Current Approach scenarios have roughly the same CRA flows, these scenarios have similar CRA unit costs. Each starts with $35/AF in 2010 and escalates at an average annual rate of 4.9 percent. The Enhanced Regional #1 scenario has somewhat lower CRA flows and therefore lower unit costs.

Supply Program Costs

The supply program costs consist of transfers, exchanges, and groundwater storage programs. The use of these programs in the analysis was determined by the need identified in the IRPSIM analysis. The unit costs of these programs are escalated at inflation unless otherwise dictated in the program contract. In 2015, the four scenarios had almost the same supply program costs, ranging from $76 million to $77 million. By 2035 there was more variance; the Enhanced Regional #1 scenario had less need for these supplies, incurring a cost of $71.1 million, while the Imported Focus scenario relied more heavily on supply programs and incurred $81.3 million in costs.

Demand Management Programs

The Demand Management Programs are comprised of the LRP and the CCP. The LRP provides financial assistance to its member agencies for the development of local water recycling and groundwater recovery projects. The base LRP costs for all four scenarios are an average of $43 million through 2020 and then decrease steadily to $18 million in 2035 as contracts expire. The desalination costs are assumed to be fixed at $14 million for all but the Current Approach scenario, in which it increases to $26 million.

The CCP provides financial assistance for the development of conservation. The CCP costs are $20 million annually, escalated at an average annual rate of 3.5 percent.

Enhanced Regional Programs

The enhanced regional programs in the Enhanced Regional approaches were assumed to cost $1,500/AF in 2009 and escalated at an average annual rate of 3.5 percent. This unit rate was assumed to cover both O&M and capital financing costs.

Revenue Generating Programs

The revenue generated from taxes, interest income, hydroelectric power sales, and other miscellaneous items is used to offset the costs that are met by rates. These other revenue sources, in essence, lower the water rates and charges. The revenue offsets were assumed to be the same for all four scenarios in this report. In 2015, these revenues are estimated to generate $137 million, including $63 million from property taxes and annexation charges, $30 million from interest income, $23 million in hydroelectric power sales, and $21 million from the Build America Bonds Interest Subsidy Payment, Coachella Valley Water District (CVWD) Agreement, leasing fees, and other miscellaneous income. By 2025 these offsets have decreased to $89 million as Metropolitan lowers the tax rates to match the General Obligation bond payment. By 2035, the revenue offsets are assumed to be picking up slightly as a result of inflationary increases in the hydroelectric power sales.

Technical Findings

The resource investment assumptions, implementation timing, reliability impacts and water rate impacts for each of the Strategic Policy alternatives are as follows:

Current Approach

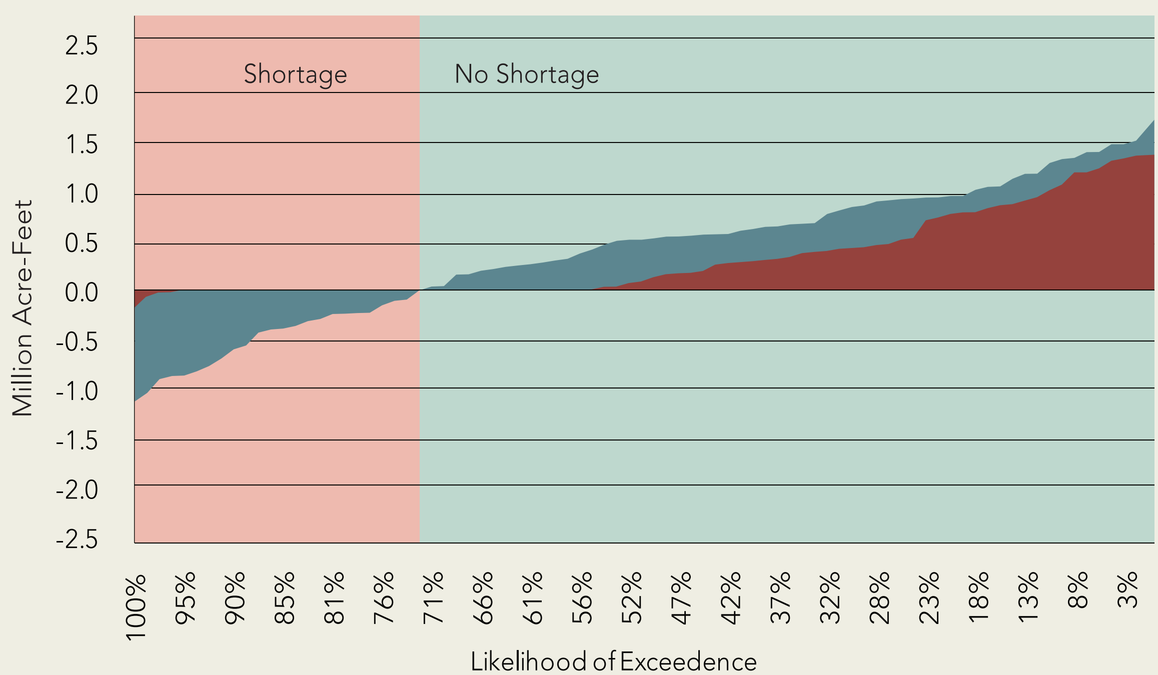
In this approach, Metropolitan and its member agencies would develop future water resources in a manner similar to the path taken following the 1996 IRP and 2004 IRP Update. Metropolitan would take the lead in developing projects and programs to improve the reliability of the SWP and the CRA, maintain existing water management assets and storage, and develop new assets if needed. Member and local agencies would develop local resources and implement conservation with financial incentives provided by Metropolitan. Metropolitan and the member agencies would also continue to work together to develop in-basin groundwater conjunctive use programs.

Under the Current Approach, supplies are assumed to be augmented through a balanced implementation of Delta improvements and moderate additional local resource development. Specific assumptions include:

- Additional local groundwater recovery or seawater desalination of up to 46,000 AF are implemented beginning in 2015 and increasing to full yield in 2025, accounting for the additional $12 million in Demand Management Programs and decreased sales; and
- A Delta fix is implemented in 2022, improving the SWP to yields approximating those estimated prior to the court rulings and Biological Opinions to protect Delta smelt and Chinook salmon.

Figure 2.2 shows reliability in 2035 under the Current Approach. The dark blue area shows supply reliability before storage is utilized, resulting in a regional supply shortage 28 percent

Figure 2.2 Dry-Year Water Supply Reliability Under the Current Approach in 2035



of the time, up to a maximum of 1.1 MAF. The red area shows supply reliability after storage is utilized. With the use of storage, regional supply shortages are reduced to occurring 4 percent of the time, with a maximum shortage of 190,000 AF. This is the lowest magnitude of shortage in 2035, and this option also has low magnitude of shortages in 2015 and 2035.

The Current Approach has the lowest costs between the options in 2025 and 2035 and mid-range costs in 2015. The 2035 costs under this approach are nearly the same as inflation.

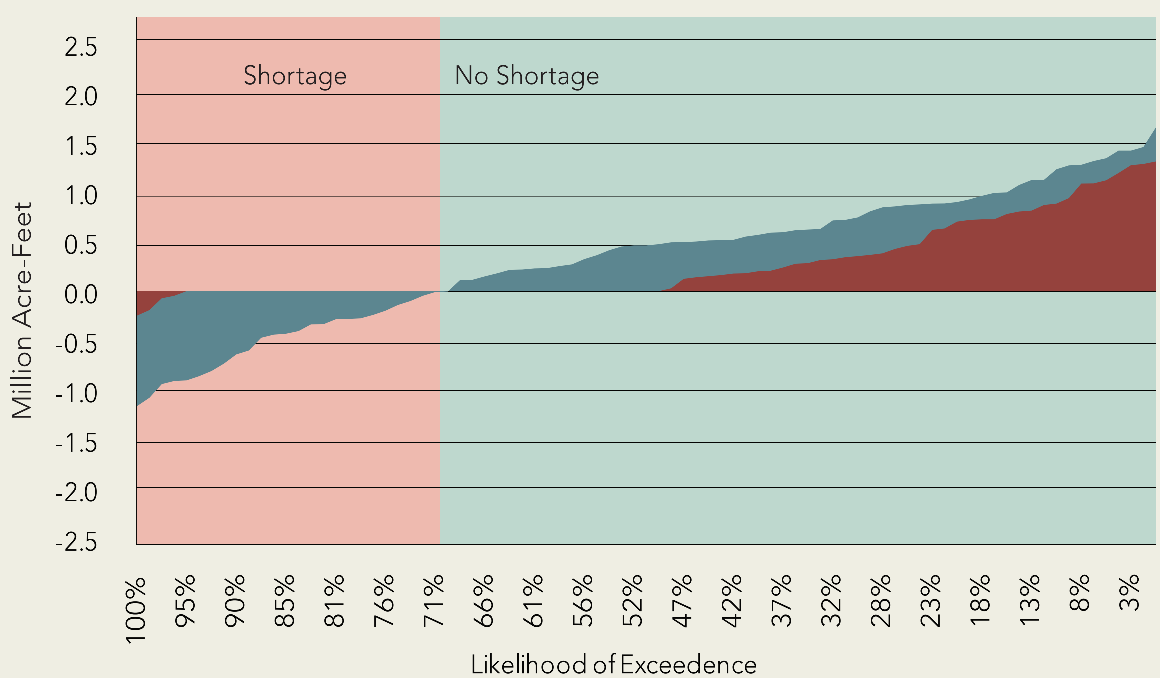
Imported Focus

Metropolitan would take a limited and reduced role in developing regional reliability. Metropolitan would focus on implementing an interim and a long-term Delta solution to improve the reliability of the SWP, while also improving the reliability of the CRA. Metropolitan would maintain its existing water management assets and storage but would not seek to develop new assets. While existing LRP contracts and incentives would be honored, the responsibility for developing new local resources and conservation would fall on member and local agencies, without any participation or financial incentives from Metropolitan. This approach assumes supplies are augmented only through implementation of a Delta fix in 2022, which improves the SWP yield to levels approximating those estimated prior to the court rulings and Biological Opinions to protect Delta smelt and Chinook salmon but it does not include additional Metropolitan-initiated local resource augmentation or participation.

The reliability under the Imported Focus is shown in **Figure 2.3**. The area shaded in dark blue shows supply reliability before storage is utilized, resulting in a regional supply shortage 30 percent of the time, up to a maximum of 1.2 MAF. The red area shows supply reliability after storage is utilized. With the use of storage, regional supply shortages are reduced to occurring four percent of the time with a maximum shortage of 250,000 AF. This is a mid-range shortage magnitude in 2035, but the Imported Focus has the highest magnitude of shortage in 2015 and 2025.

The Imported Focus shows the lowest costs in 2015, and the highest costs in 2025 and 2035. Compared to the Current Approach scenario,

FIGURE 2.3 DRY-YEAR WATER SUPPLY RELIABILITY UNDER THE IMPORTED FOCUS IN 2035



the Imported Focus scenario has lower demand management costs, despite the resulting higher water sales. To meet the additional demands, the Imported Focus scenario includes additional Northern California supply program costs. The net effect leads to a small decrease in the supply rate. These additional supply program purchases do, however, incur high SWP marginal power costs as the water is moved into the service area and this results in a higher system power rate. Overall, the rates are marginally lower than the Current Approach scenario as a result of the slightly higher water sales.

The 2035 costs under this approach are about 2 percent above inflation.

Enhanced Regional Focus

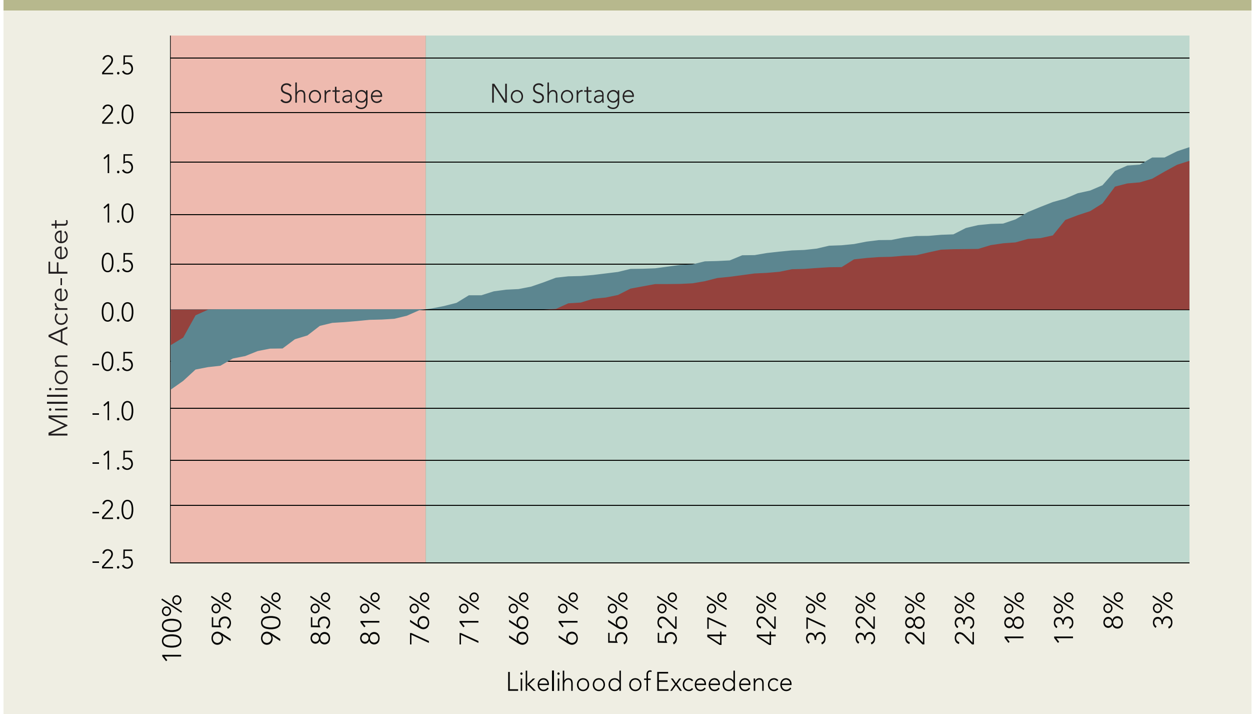
Metropolitan would take steps to increase its current role in developing regional reliability in anticipation of guarding against an indefinite delay in achieving a long-term Delta solution. Metropolitan would take the lead in developing projects and programs to improve the reliability of the SWP and the CRA while maintaining its existing water management assets and storage and developing new assets if needed. Metropolitan would take early steps to incur the cost to identify and develop large, scalable regional water recycling and seawater desalination projects until a long-term Delta solution becomes viable. These two alternatives offer a view of regional reliability and cost should Delta improvements be delayed.

Enhanced Regional Focus #1

This approach assumes that Delta improvements will not be completed by 2035 but regional-scale local projects are implemented at 30,000 AF in 2015, increasing to 351,000 AF by 2025, and 463,000 AF by 2035.

The reliability under the Enhanced Regional Focus #1 is shown in **Figure 2.4**. The blue area shows supply reliability before storage is utilized, resulting in a regional supply shortage 26 percent of the time, up to a maximum of 835,000 AF. The red area shows supply reliability after storage is utilized. With the use of storage, regional supply shortages are reduced to occurring 4 percent of the time with a maximum shortage of 370,000 AF. This is the highest shortage magnitude in 2035, but the lowest in 2015 and 2025.

FIGURE 2.4 WATER SUPPLY RELIABILITY UNDER ENHANCED REGIONAL FOCUS #1 IN 2035



The costs are the highest of the options in 2015 and in the middle for 2025 and 2035. Compared to the Current Approach scenario, the Enhanced Regional Focus #1 scenario has lower SWP and CRA deliveries resulting in a lower system power rate. Similar to the Imported Focus scenario, the Enhanced Regional Focus #1 scenario also has a lower LRP cost that creates some additional demand for water sales. The major impact is caused by the addition of $1.7 billion in enhanced regional project costs, which dramatically increases the rate.

The 2035 costs under this approach are 35 percent above inflation, although this represents little more than one percent annually above inflation.

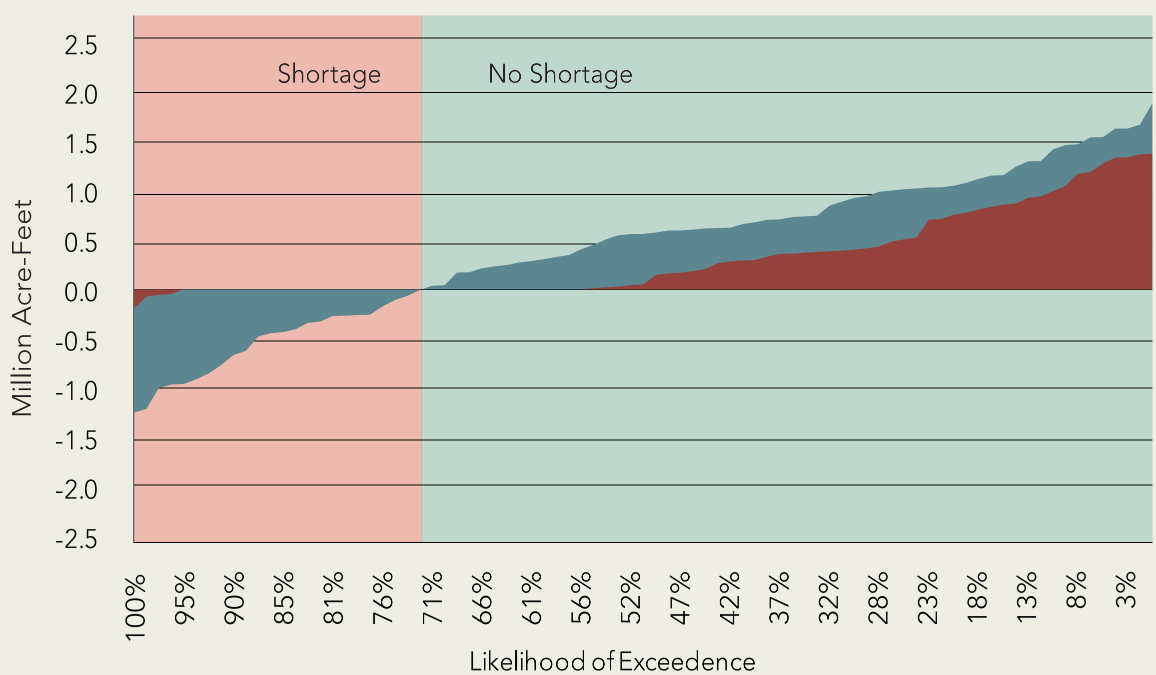
Enhanced Regional Focus #2

This approach assumes that the Delta improvements will be completed in 2022, improving the SWP to yields approximating those estimated prior to the court rulings and Biological Opinions to protect Delta smelt and Chinook salmon. Regional Scale local projects were initiated in the interim with a implementation of only 40,000 AF in regional project in 2015.

The reliability under the Enhanced Regional Focus #2 is shown in **Figure 2.5**. The blue area shows supply reliability before storage is utilized, resulting in a regional supply shortage 28 percent of the time, up to a maximum of 1.1 MAF. The red area shows supply reliability after storage is utilized. With the use of storage, regional supply shortages are reduced to occurring 4 percent of the time with a maximum shortage of 190,000 AF. This is the same magnitude of shortage in 2015 as Enhanced Regional Focus #1, and the same in 2035 as the Current Approach. The 2025 shortage is in the middle.

Costs under this approach fall in the mid-range of all the scenarios for all years. Compared to the Current Approach scenario, the Enhanced Regional Focus #2 scenario has lower LRP costs that create some additional demand for water sales. This additional demand is met by the development of some enhanced regional projects at a cost of $154 million. These projects, however, do not produce enough water to decrease Metropolitan's reliance on the SWP and

FIGURE 2.5 WATER SUPPLY RELIABILITY UNDER ENHANCED REGIONAL FOCUS #2 IN 2035



CRA and as a result, the SWP and CRA costs are similar to the Current Approach scenario. Like the Enhanced Regional Focus #1 scenario, the additional enhanced regional costs result in an increase in the supply rate. All other rate elements are slightly lower as a result of high sales and the shifting of administrative and general costs. Overall, the rates for the Enhanced Regional Focus #2 scenario are somewhat higher than the Current Approach scenario.

The 2035 costs under this approach are about one and a half percent above inflation.

Summary of Technical Findings

Analysis presented for the Strategic Policy Review showed that the different approaches for Metropolitan's role could result in similar water supply reliability outcomes in the 2025 and 2035 time frames. In terms of frequency of shortages, all four of the approaches in the Strategic Policy Review have virtually the same frequency. In all cases, water supply reliability that comes primarily from a combination of water conservation efforts resulting from the 20x2020 legislation and successful investments in either a Delta solution or in large regional-scale recycling and desalination results in shortages roughly averaging 5 to 7 percent of the time, as shown in **Table 2.8**.

In essence, this is because all four alternatives present different approaches for equivalent levels of resource development. The only difference occurs in the Enhanced Regional Approach #1 in 2025 where the frequency of shortages are slightly higher because the Delta improvements have not been completed and regional-scale local projects have not reached full production.

The alternatives do vary, sometimes significantly, in the magnitude of shortages occurring in a single forecast year. There are a number of reasons for this. Most importantly, the timing of the implementation of the resources within an alternative and the interaction of the resources with Metropolitan's existing storage portfolio are the main determinants of the magnitudes of shortages seen in the alternatives. The frequency and magnitude of shortages for each alternative are contained in **Table 2.8**.

Water rate impacts, graphed in **Figure 2.6**, in 2035 are also very similar for all of the approaches that included a long-term Delta solution. The notable exception would be the Enhanced Regional Focus #1. In this case, the inability to successfully implement a long-term Delta solution results in the need for large quantities of regional-scale recycling and desalination to achieve comparable levels of water supply reliability. Regional-scale recycling and desalination are among the highest cost options, but these options can produce enough water supply to offset losses of Delta supplies. Water rates in this case would be significantly higher than in any of the other cases.

In all cases, the average annual rate increase through 2035 would be between zero and 2 percent above inflation, shown shaded in brown.

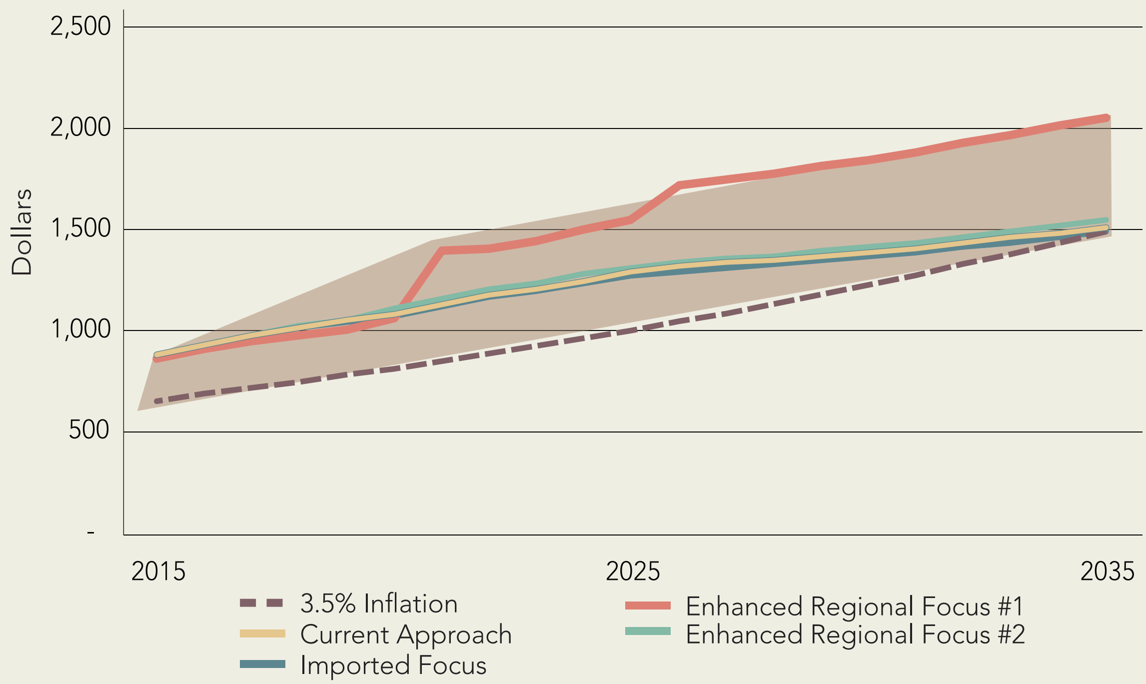
The water rates in **Table 2.8** were estimated by dividing the net costs by the anticipated water sales and range from 1 to 2 percent above inflation. The water sales for each scenario were estimated by taking the water demands and subtracting the average shortage calculated in the IRPSIM analysis. The water sales include only firm sales and wheeling/exchange; also, it was assumed that no replenishment sales would be available and that the Interim Agricultural Water Program will be phased out by 2013.

In 2035, the Imported Focus, Enhanced Regional Focus #1, and Enhanced Regional Focus #2 scenarios all generate roughly the same water

Table 2.8 Summary of Impacts by Approach

	Frequency of Shortages			*Magnitude of Shortages (AF)*			*Estimated Rates ($/AF)*		
	2015	*2025*	*2035*	*2015*	*2025*	*2035*	*2015*	*2025*	*2035*
Current Approach	12%	4%	5%	659,000	350,000	191,000	$867	$1,279	$1,501
Imported Focus	12%	4%	5%	665,000	367,000	191,000	$862	$1,261	$1,483
Enhanced Regional #1	12%	7%	5%	689,000	415,000	249,000	$856	$1,536	$2,048
Enhanced Regional #2	12%	4%	5%	659,000	325,000	369,000	$872	$1,303	$1,536

FIGURE 2.6 RANGE OF RATE IMPACTS OF STRATEGIC POLICY REVIEW APPROACHES OVER TIME



sales level of 2.29 MAF. The Current Approach scenario has 46,000 AF lower sales as a result of higher local resource production.

Policy Implications

This analysis revealed key results that can help to guide future water resource development and implementation. These key findings are:

- Conservation and water-use efficiency developed in response to the 20x2020 legislation are a key element to restoring water supply reliability, regardless of the future role of Metropolitan;
- Short-term challenges to water supply reliability will require a focused effort to address water supply reliability solutions and increase water-use efficiency;
- Options for addressing long-term challenges exist and can be implemented; and
- Future uncertainties, including climate change and environmental regulation, can be addressed in a prudent and cost-effective manner through scalable projects and other adaptive management aspects discussed in Section 3.

The Strategic Policy Review analysis supports various perspectives on Metropolitan's role in achieving these results and no one approach was chosen to define Metropolitan's future role. Each approach provided insight into the regional impact of different methods of resource development and the Strategic Policy Review identified the strengths of the various approaches as a guideline for a future role for Metropolitan.

First, improving the Delta by implementing an interim and long-term Delta solution provides the most reliability benefits at the lowest overall cost. To that end, Metropolitan should continue to place a strong emphasis on achieving success in the Delta. However, although the Imported Focus Approach seeks to attain that goal and also results in the lowest Metropolitan rate impact, this approach is not the most robust in terms of preparing the region for additional uncertainty and risk to water supply.

The other approaches increase Metropolitan's role and participation in the development of conservation and local resources, which lessens the impact of any future losses in water supply. The most robust approach is characterized by Enhanced Regional Approach #2. In this approach, prudent, innovative investments are made ahead of knowing the outcome to guard against future risk. These investments may result in the implementation of smaller quantities of more expensive water resources, but the largest share of the investments can be deferred and results in water rate impacts that are comparable to other approaches.

Further, the early investments would strategically position the region to be able to implement large-scale resource programs if needed. The identification of these early actions is the basis for Metropolitan's Foundational Actions, outlined in Section 3. Other approaches may be marginally less expensive, but could result in a severe loss of water supply reliability given future uncertainty. This approach is similar to the Enhanced Regional Approaches #1 and #2 and supports the principle that Metropolitan will take a leadership role, working in collaboration with its member agencies, to assure that Southern California has the water resources and necessary infrastructure required to meet its future needs.

Summary

Using a structured collaborative approach, Metropolitan, its board, and regional stakeholders together identified key areas of focus for future resource development and designed an approach for Metropolitan's role in that development.

Technical assessments and information gathered through this process have come together to form a preferred approach to confront the new trends and challenges identified. This includes development criteria, overall resource packages, and uncertainty planning approaches for a variety of regional resources, including conservation, groundwater, recycled water, seawater desalination, stormwater/urban runoff, and graywater.

This process also initiated a Strategic Policy Review examining the ramifications of alternative roles for Metropolitan, member agencies, and local retail agencies in future development of water resources. A study of water supply reliability and cost impacts associated with these approaches found that it is in the region's best interest for Metropolitan to continue to explore ways of increasing regional reliability and not limiting itself to singular areas like addressing Delta issues. Instead of picking one role for Metropolitan, the Strategic Policy Review identified the strengths of the various approaches to allow greater regional flexibility in resource development. The result of this process concluded that Metropolitan should:

- Adopt an adaptive management approach for the future;
- Continue to develop its core supplies;
- Diversify its role in developing regional water supply;
- Explore various options under which the region can pursue cooperative development of beneficial projects.

These findings formed the building blocks for a comprehensive adaptive management approach to address uncertainties and were used as the foundation for this IRP Update.

Furthermore, these principles are reflected in a growing body of policy statements, including the following:

- The 1952 Laguna Declaration that stated Metropolitan will "provide its service area with adequate supplies of water to meet expanding and increasing needs";
- The 1992 Metropolitan Mission Statement, reiterating that it will "provide its service area with adequate and reliable supplies of high-quality water to meet present and future needs"; and
- The 1996 IRP reliability goal that "Metropolitan and its member agencies will have the full capability to meet full-service demands at the retail level under all foreseeable hydrologic conditions."

Taken together, these policies indicate that Metropolitan has a long-standing history of leading regional efforts to secure overall water supply reliability for the region and the findings of the Strategic Policy Review confirm and support these efforts.

INTEGRATED WATER RESOURCES PLAN 2010 UPDATE

AN ADAPTIVE INTEGRATED RESOURCES STRATEGY

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

3 An Adaptive Integrated Resources Strategy

Metropolitan has traditionally implemented new water supply resources by looking to the future and anticipating the timing of a gap between supplies and demands. However, changing conditions, such as new environmental regulations, climate change and economic unknowns, can introduce additional uncertainty into the reliability equation. Without a plan to address these types of challenges, the region could be faced with costly shortages or expensive fast-track fixes.

This IRP Update specifically plans for this uncertainty in Metropolitan's future water supplies. To better handle future challenges, Metropolitan evaluated a range of adaptive management strategies in order to develop a robust plan that will both meet demands under observed hydrology and respond to future uncertainty. This type of plan provides solutions by developing diverse and flexible resources that perform adequately under a wide range of future conditions.

Metropolitan's adaptive approach will develop resources in this manner through its **Core Resource Strategy.** This strategy will meet "full-service demands at the retail level would be satisfied for all foreseeable hydrologic conditions," consistent with previous reliability goals. That commitment to reliability remains unchanged, as manifest in the addition of an **Uncertainty Buffer** to address the water supply challenges that are posed by uncertain weather patterns, regulatory and environmental restrictions, water quality impacts, and changes in the state and the region. Finally, this adaptive approach identifies low-cost, low-risk **Foundational Actions** to shorten development time for additional regional resources, should they be necessary.

Fundamentals of Adaptive Management

Identifying Uncertainty

The first step in the process of developing a management strategy was identifying areas in which uncertainty could impact water supply reliability. As discussed in Section 1: "Challenges & Changed Conditions," recent events, such as conveyance restrictions in the Delta, have exemplified new and changing trends in the region's water supply reliability. Changes in climate trends, the cost and use of energy, potential policy and permitting restrictions, endangered species protections, and demographic unknowns show the need for resources to respond to these uncertainties. These variations call for updated planning and suggest the need for hedging actions now and in the future. Moreover, the impact of these uncertainties on Metropolitan's ability to achieve reliability needs to be accounted for explicitly in the decision-making process and calls for an adaptive approach to future resource development.

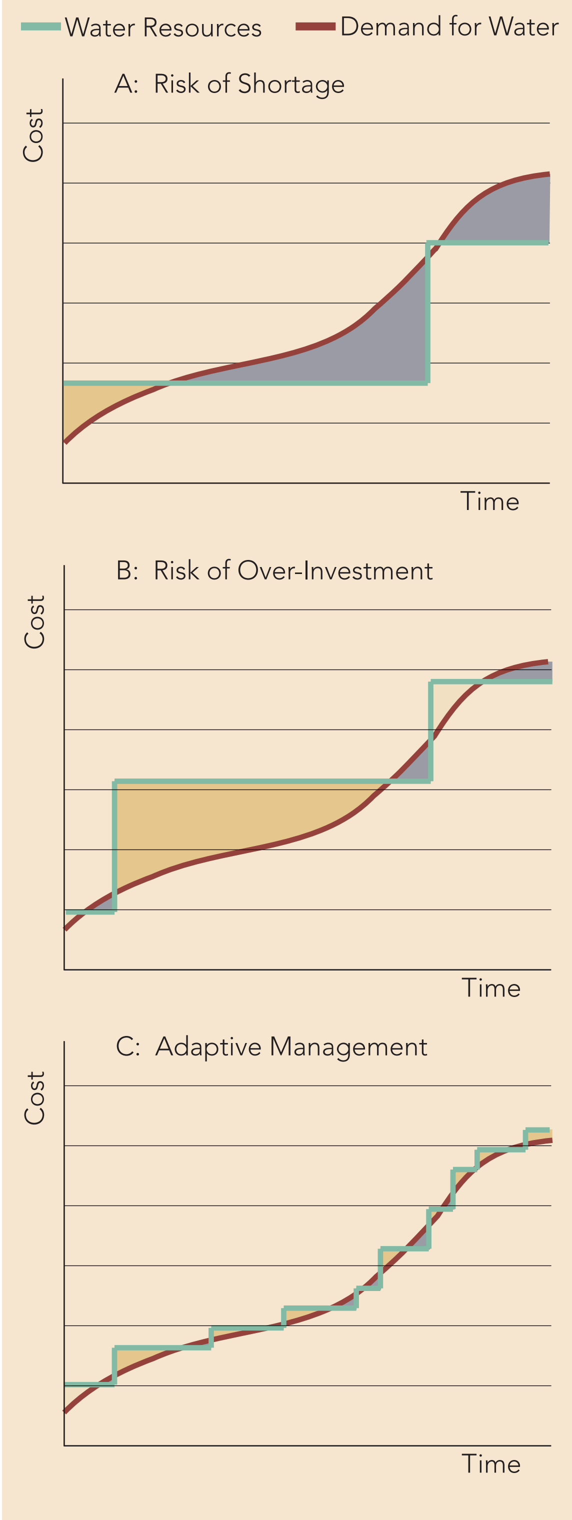
Incorporating Uncertainty into Management Strategy

In response to these uncertainties, Metropolitan has developed an adaptive management approach to mitigate uncertainty. This will ensure that resources can be brought online economically and in time to avoid shortages, without overspending on excess capacity.

The basis of an adaptive management approach is to pursue actions and resource programs

California recently experienced three consecutive years of drought, and the Colorado River basin is just emerging from an eight-year drought.

Figure 3.1 Relative Monetary & Shortage Risks



that can be implemented to meet observed[1] demands, as well as identify resources to be developed in the occurrence of an unforeseen event or development issue in a core supply. By adopting this approach, Metropolitan is signaling its willingness to invest in alternatives before an actual reduction in supply occurs. If no reduction occurs, then the money spent on the adaptive management components could be viewed as wasted. However, if a reduction in supply does occur, and the adaptive management components were not in place, then Metropolitan and its member agencies would likely face costly shortages.

As the regional water planner for an $800 billion economy, Metropolitan faces two polar opposite potential risks based on changing conditions. There is the risk of water supplies not developing as planned and reacting slowly to the changes because alternatives are not far enough along in the planning stages, creating economic hardships for the region. Conversely, there is the risk of developing more supplies to meet a demand that may react to rate increases, creating excess water costs and economic hardship as well. The adaptive management approach mitigates both potential risks by creating a buffer of additional supplies to be used as needed and taking low-cost foundational actions for supply augmentation, should they prove necessary.

Figure 3.1 illustrates how Metropolitan will implement a measured, adaptive approach to balance the financial and water supply risks of resource development.

In Graph A of **Figure 3.1**, if in planning to meet future demands (illustrated by the red curved line), the region waits to develop supplies (illustrated by the green line) until they are needed, the region is at high risk for shortages (shaded in purple). Graph B shows the opposite; the region has built supplies before they are needed and the brown shading shows the costs of developing those supplies. Graph C depicts the adaptive management approach which falls somewhere in the middle, seeking to achieve the

1. For the purpose of this IRP Update, "observed conditions" refers to those hydrologic and demand-related scenarios seen under the 80-year range of conditions experienced regionally from 1922-2004. This is the span of time used in IRPSIM because it offers the most complete data for all relevant geographical areas. For more information on IRPSIM, see Appendix A.1.

highest protection against future shortages at the lowest financial risk.

This graphic depiction, however, does not capture the dynamic ability of adaptive management to respond to changing conditions as necessary. The magnitude of the shortage and over-investment "steps" in Graph C vary with the regional value of supply development versus shortage avoidance. This adaptive management approach can provide a blueprint of how the region can quickly adapt and respond to disruptions in its planned water resources. This is achieved through identifying additional resource opportunities and establishing incremental development actions to implement supplies, if needed. This approach balances the need for a cost-effective strategy with the need to invest in actions that ensure water supply and facilities are in place at the time supplies are needed.

In order to achieve maximum supply reliability in a cost-effective and adaptive manner, three main management components have been identified to build on existing supplies. In order to determine the breadth of supplies needed, Metropolitan performed detailed analysis of regional demands and supplies, described below.

Determining Regional Water Need: Gap Analysis

Metropolitan's resource strategy for achieving regional water supply reliability has been to develop and implement water resources programs and activities through its IRP process. Since the 1996 IRP, and more recently the 2004 IRP Update, Metropolitan and its member agencies have continued to develop reliable water supplies for the region, based on the Preferred Resource Mix. Under this mix, new water supplies are developed based on a regional evaluation of reliability, diversification, cost, water quality, and other factors. The diversification of the regional supply portfolio that has resulted from these investments has been an important step in providing flexibility and adaptability.

However, in light of changing conditions, Metropolitan has systematically evaluated existing levels of resource development in terms of future reliability. This analysis looked at the resources available to meet demands, focused

The Core Resources Strategy looks at managing emerging trends by developing traditional sources on the State Water Project and Colorado River as well as planned conservation and local supply development.

Top Photo: Five pumping stations lift the water in the Colorado River Aqueduct a total of 1,617 feet along its 242 mile journey from its intake point at Lake Havasu on the California-Arizona border and its endpoint at Lake Mathews in Riverside County.

Bottom Photo: The State Water Project includes 34 storage facilities, reservoirs and lakes; 20 pumping plants; four generating plants; five hydroelectric power plants, and about 700 miles of canals and pipelines.

specifically on dry years - those years with deficits between supply and demand in the ten percent of the model's estimates by volume, i.e., the driest ten percent. A simple mass balance calculates any gap between supplies and storage available in dry years,[2] measured against projections of future demands, referred to as "dry-year gap analysis."

In order to perform a cohesive dry-year gap analysis, Metropolitan used IRPSIM, a detailed comprehensive model of Metropolitan's imported resource availability, system capabilities, operating rules, storage capacities, local supply assumptions based on member agency surveys, and demand assumptions based on regional forecasts tailored to Metropolitan's service area. A more detailed description of the assumptions and supplies in IRPSIM is included in **Appendix A.1**. A more detailed description of the demand calculations is included in **Appendix A.2**.

IRPSIM provides a plethora of data output with which Metropolitan staff can examine regional operations and resource options. For this IRP Update, staff examined the magnitude and frequency of shortages under the existing level of resource development and under the proposed IRP Update components. These indicators provide insight into regional reliability and use of storage supplies.

Under existing levels of resource development and projected future demands, IRPSIM shows a significant gap, illustrated in **Figure 3.2**. These existing supplies consist of local surface, groundwater, and LAA, recycling and groundwater recovery, SWP Table A supplies, CRA programs, and conservation.

Also included in **Figure 3.2** and **Table 3.1** is transfer and storage availability to demonstrate how these can further meet demand. It is important to note that the storage and transfer supplies have been a key component of the Preferred Resource Mix since the 1996 IRP.

The results of this analysis show that under the existing level of resource development a gap remains even after storage resources have been utilized. The capability of storage and transfers to fill that gap is limited with this level of resource development because of the inability to maintain or add to storage resources. **Figure 3.3** highlights the impact of depending on that storage to meet gaps between supply and demand in dry-years. Storage availability decreases with time as reserves are depleted to meet needs under the existing resource development conditions.

In **Figure 3.4**, the blue area displays supply reliability under the existing level of resource development before storage is utilized. In 2035, staying at the existing level of resource development would result in a regional supply shortage 91 percent of the time, up to a maximum of 1.7 MAF. The red area shows supply reliability after storage is utilized. With the use of storage, regional supply shortages are reduced to occurring 59 percent of the time with a maximum shortage of 1.3 MAF.

Advances in the development of water conservation, water-use efficiency, and in new supply development are needed to improve the overall balance of supply and demand and increase the effectiveness and availability of storage resources in dry-years. The following sections outline how Metropolitan will develop programs within its core resources to meet this gap and assure regional water supply reliability into the future under foreseeable hydrologic conditions.

Component 1: Core Resource Strategy

Through the dry-year gap analysis, findings from the IRP technical workgroups, and the Strategic Policy Review process, it was determined that the continuation of similar resource investments and targets identified in the Preferred Resource Mix, along with an increased emphasis in water-use efficiency, can be an effective "Core Resources Strategy" under which Metropolitan can eliminate the gap between future supply and demand.

Specifically, there are four resource areas where Metropolitan can pursue additional programs and activities as a Core Resources Strategy to meet projected levels of demand. These resource areas are as follows:

- CRA: Develop dry-year programs combined with the continued storage, transfers, and exchanges;

2. A "dry-year" is defined as those modeled scenarios with the top ten percent largest deficits between supply and demand.

FIGURE 3.2 EXISTING DRY-YEAR SUPPLY & DEMAND ANALYSIS RESULTS

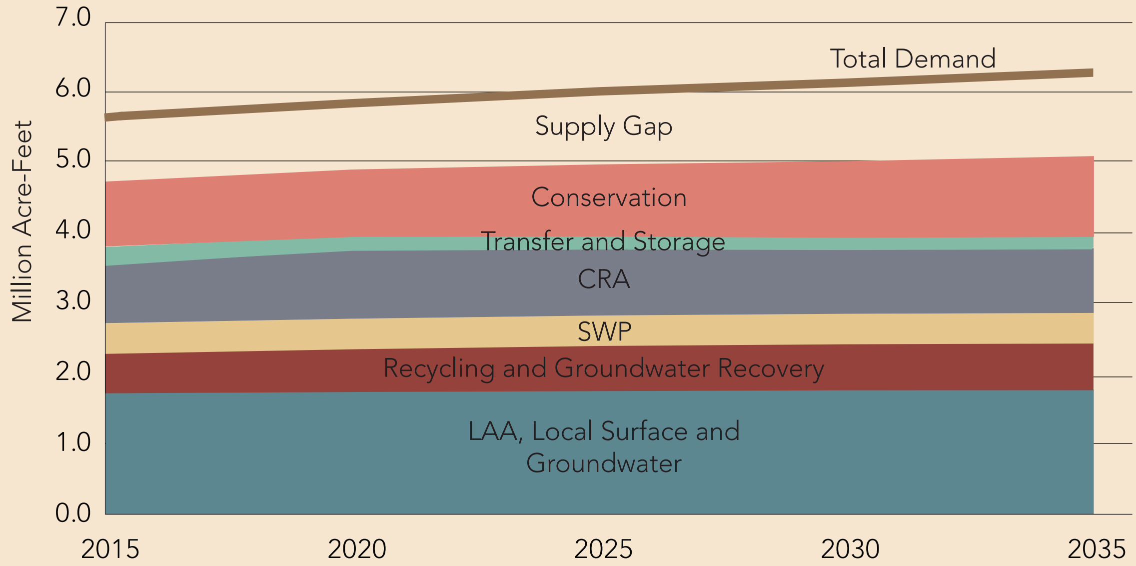


TABLE 3.1 EXISTING DRY-YEAR SUPPLIES WITH STORAGE PORTFOLIO

	2015	2020	2025	2030	2035
Dry-year Total Demand (Without Conservation)	5,597,000	5,804,000	5,951,000	6,094,000	6,229,000
Local Supplies					
Conservation	930,000	965,000	1,032,000	1,097,000	1,158,000
Recycling	353,000	387,000	413,000	422,000	430,000
Groundwater	1,485,000	1,503,000	1,515,000	1,526,000	1,527,000
Groundwater Recovery	122,000	136,000	144,000	148,000	150,000
Local Surface Water	100,000	99,000	99,000	99,000	99,000
LAA	147,000	147,000	147,000	147,000	147,000
Imported Supplies					
SWP	430,000	430,000	430,000	430,000	430,000
CRA	852,000	985,000	957,000	925,000	925,000
Total Supplies	**4,419,000**	**4,652,000**	**4,737,000**	**4,794,000**	**4,866,000**
Dry-year Need after Existing Supplies	1,178,000	1,152,000	1,214,000	1,300,000	1,363,000
Storage & Transfers*					
*In-Region Surface Storage***	256,000	283,000	321,000	320,000	309,000
In-Region Groundwater	151,000	255,000	255,000	255,000	255,000
SWP Surface Storage	43,000	66,000	171,000	207,000	205,000
SWP Groundwater	200,000	200,000	200,000	200,000	200,000
Yuba Accord Transfers	20,000	20,000	20,000	20,000	20,000
SBVMWD Transfers	2,000	2,000	2,000	2,000	2,000
Other Water Transfers	100,000	100,000	100,000	100,000	100,000
Total Storage & Transfers	772,000	926,000	1,069,000	1,104,000	1,091,000
Dry-year Need after Existing Supplies, Storage & Transfers	406,000	226,000	145,000	196,000	272,000

*Not including Emergency Storage.
**For planning purposes, annual In-Region Surface Storage withdrawals are limited to one-third of the total water available.

FIGURE 3.3 AVERAGE DRY-YEAR STORAGE BALANCES UNDER EXISTING RESOURCE DEVELOPMENT

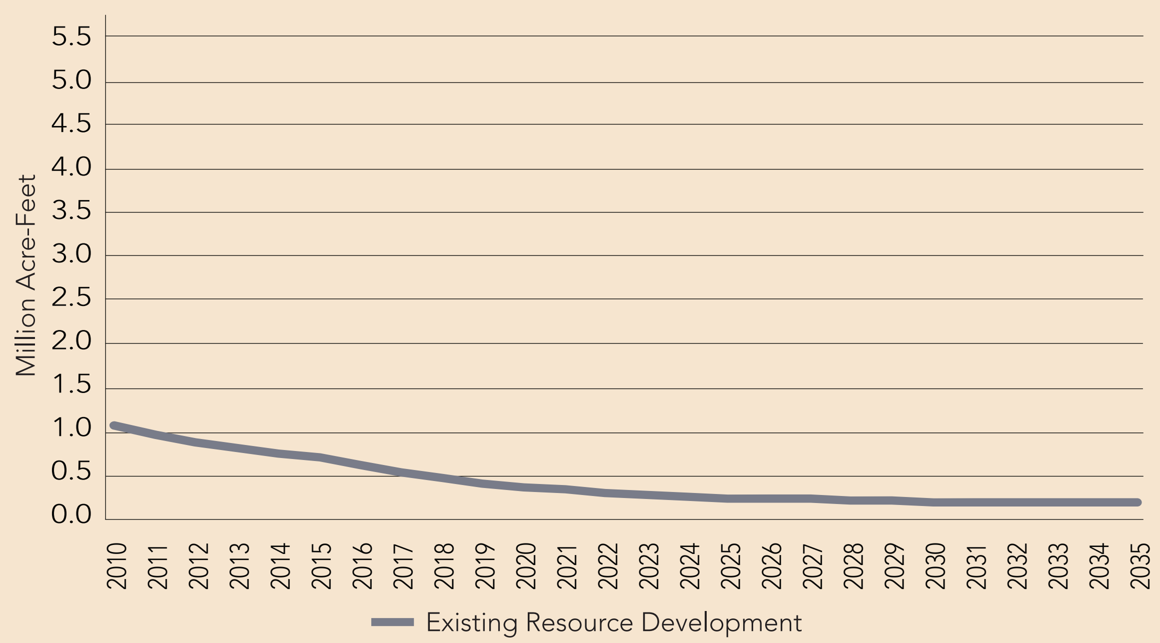
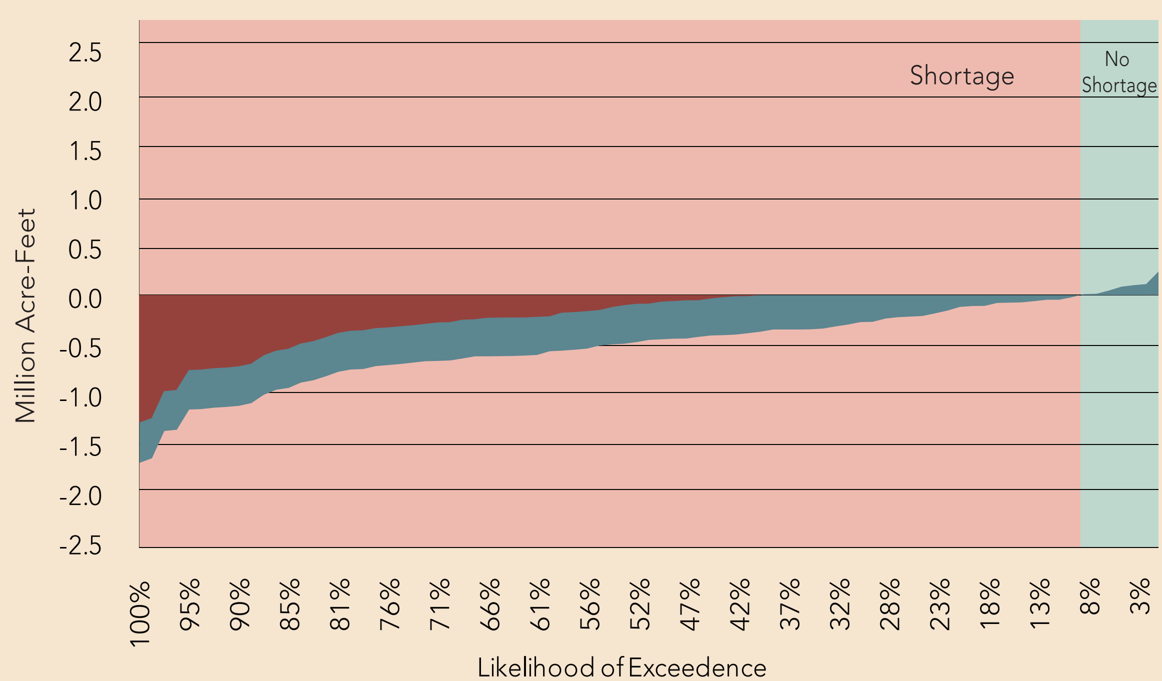


FIGURE 3.4 2035 DRY-YEAR SUPPLY RELIABILITY UNDER EXISTING RESOURCE DEVELOPMENT



Working with local agencies and communities, Metropolitan approaches its goal to maintain a full Colorado River Aqueduct during dry years with innovative projects and programs.

Left Photo: Lining of a leaky, earthen Coachella Canal conserves about 26,000 AF each year and is one of several projects designed to maintain a full Colorado River Aqueduct in dry years.

Right Photo: Metropolitan has a crop rotation and water supply program with the Palo Verde Irrigation District which provides up to 111,000 AF of water annually to Metropolitan's service area from farmland that is not irrigated.

- SWP: Improve reliability through mid- and long-term Delta improvements;
- Conservation & Water-Use Efficiency: Ensure and encourage retail-level compliance with 20x2020 water-use efficiency goals; and
- Local Projects: Enhance options to incentivize and partner in local supply augmentation.

CRA Dry-Year Supply Development

Metropolitan's goal is to develop programs that will maintain a full CRA during dry years. To achieve this level of program development, Metropolitan has explored a number of potential programs, including various water conservation programs with agencies that receive water from the Colorado River or are located in close proximity to the CRA.

It is expected that the ability to deliver a full CRA will also rely upon storage. For this reason, **Table 3.2** shows a range of possible combinations of existing programs and dry-year supplies, all totaling 1.25 MAF, the CRA capacity. The dry-year supplies include storage programs with water that can be withdrawn when needed.

Although not yet sufficient in the short-term to provide the full targeted CRA capacity, Metropolitan has been very successful in developing Colorado River programs to date. Critical to the success of these programs has been implementation of the Quantification Settlement

Table 3.2 CRA Existing & Dry-Year Supplies

		2015	2020	2025	2030	2035
Existing Programs	*CRA*	852,000	985,000	957,000	925,000	925,000
Core Strategies	*CRA Dry-year Supply*	398,000	265,000	293,000	325,000	325,000
Total		***1,250,000***	***1,250,000***	***1,250,000***	***1,250,000***	***1,250,000***

Agreement (QSA) to determine priority and quantity of rights for California parties holding rights to Colorado River water. This specifies how much must be made available to high-priority holders, while allocating any unused supplies to those with subsequent priority rights. On October 10, 2003, after lengthy negotiations, representatives from Metropolitan, IID, and CVWD executed the QSA and other related agreements. Parties involved also included the SDCWA, 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. One of those related agreements was the Colorado River Water Delivery Agreement: Federal Quantification Settlement Agreement, under which the Secretary of the Interior agreed to specified water deliveries to agencies under priorities 3a and 6a of the Seven-Party Agreement that are consistent on a federal level with provisions under the QSA.

In addition, Metropolitan also gained access to banking water in Lake Mead through the Intentionally Created Surplus program. It must be noted that the Lake Mead Intentionally Created Surplus Program, along with any other storage agreements that potentially augment Colorado River supplies, are storage programs not supplies.

With the adoption of the QSA and the opportunities to store conserved water in Lake Mead, a solid foundation has been laid for developing future programs that will help accomplish the long-term CRA target. The December 2007 federal guidelines concerning the operation of the Colorado River system reservoirs provide more certainty to Metropolitan with respect to the determination of a shortage, normal, or surplus condition for the operation of Lake Mead.

To augment these programs, Metropolitan is continuing to pursue agreements for exchanges and transfers on the CRA to help balance the overall water supply and demand picture for the service area, including:

- IID/Metropolitan 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.

Metropolitan is engaged in a number of projects to maximize Colorado River resources including the Drop 2 Storage Reservoir (pictured left) that captures Colorado River water released from Parker Dam which cannot be delivered to Southern California users for a variety of reasons. In exchange for funding Colorado River system efficiency projects, such as the pilot Yuma Desalting Plant (pictured right), Metropolitan can receive storage credits in Lake Mead which can be drawn on during future dry periods.

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 included 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, a total of 105,000 AF/year is conserved. Execution of the QSA and amendments to the 1988 and 1989 agreements extended the term to 2078 if the term of the QSA extends through 2077 and provides that up to 20,000 AF of the annual yield would be made available to CVWD upon CVWD's request, guaranteeing Metropolitan at least 85,000 AF/year.

- Palo Verde Land Management & 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 (PVID). Under the program, participating farmers in PVID are 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 are made available to Metropolitan.

  This program provides up to 133,000 AF of water to be available to Metropolitan in certain years, and a minimum of 33,000 AF/year. In 2005, 2006, 2007, 2008, and 2009 approximately 108,700 AF, 105,000 AF, 72,300 AF, 94,300 AF, and 120,200 AF of water, respectively, were saved and made available to Metropolitan. In March 2009, Metropolitan and PVID entered into a one-year supplemental fallowing program within PVID that provides for the fallowing of additional acreage, with savings projected to be as much as 61,000 AF. Of that total, about 24,000 AF of water was saved and made available to Metropolitan in 2009, with approximately 37,000 AF anticipated to be made available in 2010.

- Lower Colorado Water Supply Project: In March 2007, Metropolitan, the city of Needles, and the USBR executed a Lower Colorado Water Supply Project contract. Under the contract, Metropolitan annually receives Lower Colorado Water Supply Project water unused by Needles and other entities eligible to receive water from the project. A portion of the payments made by Metropolitan to Needles is placed in a trust fund for potentially acquiring a new water supply for Needles and other users of the Project should the groundwater pumped from the Project's wells become too saline for use. In 2009, Metropolitan received 2,300 AF from the Project.

- Hayfield Groundwater Storage Program: Metropolitan's board approved the Hayfield Groundwater Storage Program in June 2000. The program allows 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 over 70,000 AF in storage. At that time, construction of facilities for extracting the stored water began, but construction has been deferred because drought conditions in the Colorado River watershed resulted in a lack of surplus supplies for storage. A prototype well was completed in August 2009. Hydrogeologic investigations indicate that conversion of the prototype well into a production well could extract as much as 5,000 AF/year of stored water. When water supplies become more plentiful, Metropolitan will pursue this program and develop storage capacity of about 400,000 AF.

As with all storage and banking programs, CRA programs face major challenges and changing conditions and are influenced by the reduction of quantity and frequency of surplus water supplies available to Metropolitan from the SWP. Even though the reductions may be on the SWP, the inability for Metropolitan to store water on the SWP means that storage is more likely to be taken from CRA storage programs. If the conditions affecting the loss of surplus water continue, the storage programs that augment Colorado River supplies will not be able to contribute to filling the CRA when needed.

SWP Delta

Restoring Metropolitan's traditional supply from the SWP supply through short-, mid-, and long-term Delta improvements is a critical piece in achieving regional water supply reliability. Historically, deliveries from the SWP to Metropolitan have represented about 4 percent of the runoff in the Delta watershed in an average year. Metropolitan is committed to a comprehensive ecosystem/water system solution for the Delta, the site of the pumping facilities for the SWP.

Table 3.3 Summary of Delta Action Plan

Time frame	Actions
Short-term	• Secure ESA take authorization • Prepare for emergencies • Enhance Delta smelt habitat • Complete BDCP • Restore ecosystems • Two-gates project
Mid-term	• Implement BDCP • Implement flood control protection • Finalize site selection and environmental documents • Implement new governing structures
Long-term	• Restore ecosystems • Water supply conveyance • Protect against floods • Develop storage

It is likely that operational constraints will continue until a long-term solution to the problems in the Delta is identified and implemented, and various efforts are underway toward that end. For example, state and federal resource agencies and various environmental and water user entities are currently engaged in the development of the Bay Delta Conservation Plan (BDCP), aimed at addressing ecosystem needs and securing long-term operating permits for the SWP. Metropolitan has been an active participant in the BDCP, in addition to developing its own action plan, while remaining engaged in related legislation.

Bay Delta Conservation Plan

Metropolitan is actively participating in the BDCP process, a collaboration of state, federal, and local water agencies, state and federal fish agencies, environmental organizations, and other interested parties, that will identify a set of water flow and habitat restoration actions that contribute to the recovery of endangered and sensitive species and their habitats in the Delta.

The goal of the BDCP is to provide for both species/habitat protection and improved reliability of water supplies. Potential habitat restoration and water supply conveyance options included in the BDCP will be assessed through an EIR/Environmental Impact Statement (EIS). The BDCP planning process and the supporting EIR/EIS process are being funded by state and federal water contractors.

The BDCP process to restore habitat for Delta fisheries and improve the Delta water conveyance will help provide reliable water delivery operations to 25 million Californians.

Metropolitan's Delta Action Plan

In June 2007, Metropolitan's board approved a Delta Action Plan[3] that provides a framework for actions to build a sustainable Delta and reduce conflicts between water supply conveyance and the environment.

Building a sustainable Delta will require significant investment and take decades to implement. The Delta Action Plan aims to prioritize immediate short-term actions to stabilize the Delta while an ultimate solution is selected, then prioritize mid-term actions to maintain the Delta while the long-term solution is implemented. A summary of these actions is included in **Table 3.3**.

Short-Term Actions

While a course of action for the long-term restoration of the Delta ecosystem is being developed, actions must be taken in the short-term to stabilize the current situation. These actions include securing state and federal ESA take authorization, taking emergency preparedness steps to prepare for the possibility of catastrophic failure in the event of earthquake

3. Item 8-6 Metropolitan's Delta Action Plan from June 12, 2007 Board Meeting http://edmsidm.mwdh2o.com/idmweb/cache/MWD%20EDMS/003697545-1.pdf

The Delta has been considered "broken" for some time. It has been altered significantly from its natural form and it is not sustainable. Land subsidence in the Delta is a direct threat to the levees (pictured right). Subsidence in the Delta has been caused by the use of land for farming and the composition of the rich peat soil. Some island areas are currently 30 feet below sea level, and extremely vulnerable to flooding. Working towards sustainable solutions in the Delta is one of Metropolitan's Core Resources Strategies.

or flood,[4] pursuing actions to enhance habitat for Delta smelt and other pelagic species, completing the BDCP, and beginning work on ecosystem restoration projects that will help species regardless of which ultimate solution is selected (e.g., marsh restoration, island rebuilding).

Additionally, Metropolitan is continuing to pursue the Two-Gate flow and tidal regulation project as a near-term action in the Delta to provide fishery benefits and mitigate water supply impacts.

The proposed Two-Gate System would provide movable barriers on the Old and Middle Rivers to modify flows and prevent vulnerable fish from being drawn toward the SWP and Central Valley Project pumping plants. The Two-Gate System is anticipated to protect fish habitat while allowing up to an estimated additional 150,000 AF/year of SWP water supply in years when the allocation for SWP contractors exceeds 35 percent. Additional supplies from this interim fix are assumed to materialize by 2013. The proposed Two-Gate system is subject to operational studies, monitoring, environmental documentation and compliance, acquisition of right-of-way, and completion of design and construction.

4. For more information on Metropolitan's Delta Levee Emergency response, see Appendix A.14.

Mid-Term Action Plan

Upon selection and enactment of an ultimate Delta solution, it will likely take 10 years or more to complete environmental documentation and construct new facilities. During this period, it will be necessary to maintain the stabilization process of the Delta through continuing implementation of the BDCP projects with selected habitat and fishery improvements for Delta native species, beginning to implement flood control protections, including bypasses and levee improvements, finalizing site selection and environmental documentation for new storage projects, and implementing new governance structures for managing the Delta.

Long-term Action Plan

The long-term action plan must take a global, comprehensive approach in solving the fundamental issues and conflicts in the Delta, with true sustainability in mind. A piecemeal approach will not satisfy the many stakeholders

The Delta needs wide-scale restoration of the ecosystem and a water conveyance system that will reduce potential conflicts with this estuary. Projects being studied include plans to restore up to 80,000 acres of marsh and vegetated areas along the riverbanks of the Delta.

that have a vested interest in the Delta. Delta improvements require that three basic elements be addressed: (1) ecosystem restoration, (2) water supply conveyance, and (3) flood control protection and storage development.

Delta Legislation

Metropolitan was an active participant in the development of the 2009 Delta legislative package signed into law by Gov. Schwarzenegger. The Legislature developed this package beginning with recommendations received from Gov. Schwarzenegger's Delta Vision "Blue Ribbon" Task Force. The Task Force evaluated existing and proposed land and water uses, ecosystem functions and processes, and management practices in the Delta in order to identify management scenarios and implementation strategies to attain sustainability in the region. In addition to these recommendations, the Legislature held informational hearings with Delta experts, Task Force members, Schwarzenegger Administration officials, as well as the public at large, while engaging in vigorous water policy discussions. Metropolitan's management testified at some of these hearings and staff provided written comments to the Legislature on Southern California's viewpoints. Following the informational hearings, several legislators began work on developing a comprehensive legislative package, followed by further information hearings and public comment. This culminated in a Delta legislative package introduced in the 7th Extraordinary Session of the Legislature.

The suite of Delta/water management reforms enacted by this legislation included a key new policy for water management affecting the many communities throughout California that depend upon the Delta watershed.

The policy reads as follows:

"The policy of the state of California is to reduce reliance on the Delta in meeting California's future water supply needs through a statewide strategy of investing in improved regional supplies, conservation, and water-use efficiency. Each region that depends on water from the Delta watershed shall improve its regional self-reliance for water through investment in water-use efficiency, water recycling, advanced water technologies, local and regional water supply

projects, and improved regional coordination of local and regional water supply efforts."

The Delta Legislation, however, was not limited to water management strategies and included the following highlights:

- SB 1: Establishes a framework of coequal goals of a more reliable water supply for California and protecting, restoring and enhancing the Delta ecosystem; creates a new Delta Stewardship Council that will help coordinate the actions of more than 200 local, state, and federal agencies in the estuary; and creates a Delta Conservancy to coordinate restoration activities.
- SB 2: Places an $11.1 billion bond on the November 2010 ballot to help fund Delta restoration, the public benefits associated with new storage projects, groundwater cleanup, recycling, and regional water management efforts. A vote on this bond package was delayed by the Legislature until November 2012.
- SB 6: Provides a mandate for local monitoring of groundwater elevations.
- SB 7: Requires urban water agencies to lower per capita urban water use statewide by 20 percent by the year 2020 (20x2020), described further in the following section.
- SB 8: Improves accounting for Delta water diversions.

SWP Resource Development

Metropolitan's strategy for the SWP depends on the full use of the current State Water Contract provisions in order to restore traditional deliveries prior to recent environmental restrictions. These provisions include 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, transfers, exchanges, and programs. The supplies from Delta improvements represent the restoration of supplies lost in recent years due to pumping restrictions. Metropolitan is committed to working collaboratively with DWR, SWP contractors, and other stakeholders to ensure the success of these programs.

The quantitative impacts of these investments in a dry year are shown in **Table 3.4.** In addition to anticipated supplies available from Metropolitan's Delta improvements outlined above, **Table 3.4** assumes continued success of our existing programs, detailed below:

- Sacramento Valley Water Management Agreement (Phase 8 Settlement): Metropolitan is a signatory to the Sacramento Valley Water Management Agreement (Phase 8 Settlement) that 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.
- Monterey Amendment: Metropolitan was a signatory to the 1994 Monterey Amendment to resolve disputes between the urban and agricultural SWP contractors over how contract supplies are to be allocated in times of shortage by amending certain provisions of the long-term water supply contracts with DWR. The Monterey Amendment altered the water allocation procedures such that both shortages and surpluses would be shared in the same manner for all contractors, eliminating the prior "agriculture first" shortage provision. In turn, the agricultural contractors agreed to permanently transfer 130,000 AF to urban

Table 3.4 SWP Dry-Year Supplies & Delta Improvements

		2015	2020	2025	2030	2035
Existing Programs*	*SWP*	430,000	430,000	430,000	430,000	430,000
Core Strategy	*Delta Improvements*	151,000	151,000	283,000	283,000	283,000
Total		**581,000**	**581,000**	**713,000**	**713,000**	**713,000**

*The existing supplies assume that carryover storage in San Luis Reservoir would be available for use in a dry-year, but because of the environmental and regulatory challenges on the SWP, it is possible that this water would not be available in the quantities shown.

Today, those involved with solving Delta problems agree to the coequal priorities of improving water supply reliability and strengthening and restoring the valuable ecosystem. The Bay Delta Conservation Plan is being crafted with the oversight of state and federal wildlife agencies as well as water districts, environmental groups, local Delta interests and members of the public. Each year, 500 million tons of cargo are transported through the Delta, and its estuary is home to 750 species of plants and animals.

contractors and permanently retire 45,000 AF of their contracted supply. The Amendment facilitated several important water supply management practices including groundwater banking, voluntary water marketing, and flexible and more efficient use of SWP facilities including borrowing from Castaic Lake and Lake Perris and use of carryover storage in San Luis Reservoir to enhance dry-year supplies. It also provided for the transfer of DWR land to the Kern County Water Agency for development of the Kern Water Bank. The Monterey Amendment was challenged in court and the original EIR invalidated. Following a settlement, a new EIR was completed and the CEQA process concluded in May 2010. However, the project has been challenged again in a new round of lawsuits.

- 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.
- Yuba Dry-year Water Purchase Program: In December 2007, Metropolitan entered into an agreement with DWR providing for Metropolitan's participation in the Yuba Dry-year Water Purchase Program between Yuba County Water Agency and DWR through 2025.
- Desert Water Agency/Coachella Valley Water District SWP Table A Transfer: Under the transfer agreement, Metropolitan transferred 100,000 AF of its SWP Table A amount to DWCV effective January 1, 2005. Desert Water Agency/Coachella Valley Water District (DWCV) pays all SWP charges for this water, including capital costs associated with capacity in the SWP to transport this water to Perris Reservoir as well as the associated variable costs. The amount of water actually delivered in any given year depends on that year's SWP allocation. Water is delivered through the existing exchange agreements between Metropolitan and DWCV. While Metropolitan transferred 100,000 AF of its Table A amount, it retained other rights,

including interruptible water service, its full carryover amounts in San Luis Reservoir, its full use of flexible storage in Castaic and Perris Reservoirs, and any rate-management credits associated with the 100,000 AF. 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.

- DWCV Advance Delivery Program: Under this program, Metropolitan delivers Colorado River water to DWCV in advance of the exchange for their SWP Contract Table A allocations. By delivering enough water in advance to cover Metropolitan's exchange obligations, Metropolitan is able to receive DWCV's available SWP supplies in years in which Metropolitan's supplies are insufficient without having to deliver an equivalent amount of Colorado River water.
- DWCV Other SWP Deliveries: Since 2008, Metropolitan has provided DWCV's written consent to take delivery from the SWP facilities non-SWP supplies separately acquired by each agency. These deliveries include water acquired from the Yuba Dry-year Water Purchase Program and the 2009 Drought Water Bank.

The Delta remains a critical source of supply for Metropolitan for two fundamental reasons. It is of high quality compared to other sources such as the Colorado River, with high source quality key to emerging local initiatives such as recycling. Moreover, the Delta is uniquely capable of providing additional supplies in wet years, when diversions are far less sensitive on the ecosystem, enabling Metropolitan to replenish groundwater basins and its surface storage network.

Although water from the Delta remains a key component of Metropolitan's diverse water portfolio, the Delta will be a decreasing percentage of the resource "pie" as other resources are developed. Development of a diverse resource mix is the foundation of Metropolitan's resource planning and this strategy is supported by every element of the state's new reduced reliance policy for the Delta including emphasizing water-use efficiency, water recycling, advanced water technologies, local and regional water supply projects, and improved regional coordination of local and regional water supply efforts.

Water-Use Efficiency through Conservation & Recycling

Conservation continues to be an important part of Metropolitan's water supply planning. Continued investment in cost-effective conservation remains a key component of Metropolitan's resource goals.

This IRP sets conservation goals in terms of the 2009 20x2020 Water Conservation Act signed by Gov. Schwarzenegger. In order to be eligible for future state water grants and loans, this legislation requires urban retail water suppliers to develop urban water use targets to help meet the 20 percent goal by 2020, with interim targets for 2015. The legislation provides flexibility in how targets are established and achieved. Per capita reductions can be accomplished through any combination of increased water conservation, improved water-use efficiency, and increased use of recycled water to offset potable demand. Potable demand offsets can occur through direct reuse of recycled water, such as for irrigation, or indirect potable reuse through groundwater recharge and reservoir augmentation. Retail water suppliers receive partial credit for past efforts in conservation and recycled water; therefore, not all agencies need to reduce demand by 20 percent in order to comply with the new law.

The legislation provides additional flexibility by allowing compliance on an individual agency basis or through collaboration with other agencies in a region. Based on Metropolitan's analysis of population and demand and the methodologies for setting targets described in the legislation, compliance with 20x2020 on an individual retail agency basis throughout the region would result in reduced potable demand of 380,000 AF in 2020, shown in **Table 3.5**. Achieving regional consistency with the legislative goal – a 20 percent reduction for the region as a whole – would result in additional savings of 200,000 AF for a total of 580,000 AF. These additional 200,000 AF regional savings will be an important part of the Uncertainty Buffer described later in this section.

In terms of GPCD, the baseline regional water demand under this legislation was 177 in 2005. With no 20x2020 compliance, under existing levels of conservation and water recycling, the 2020 target would be 166 GPCD. Since the legislation allows for various calculations of this baseline on a retail-agency basis, if all retail agencies in the service area choose their optimal baseline, the resulting use in 2020 will be 150 GPCD. Regionally, however, this is only a 15 percent reduction from the 177 GPCD baseline. In order to reach a full 20 percent reduction on a regional level, average regional 2020 target would need to be 141 GPCD. **Figure 3.5** compares the impact on GPCD of these various levels of conservation.

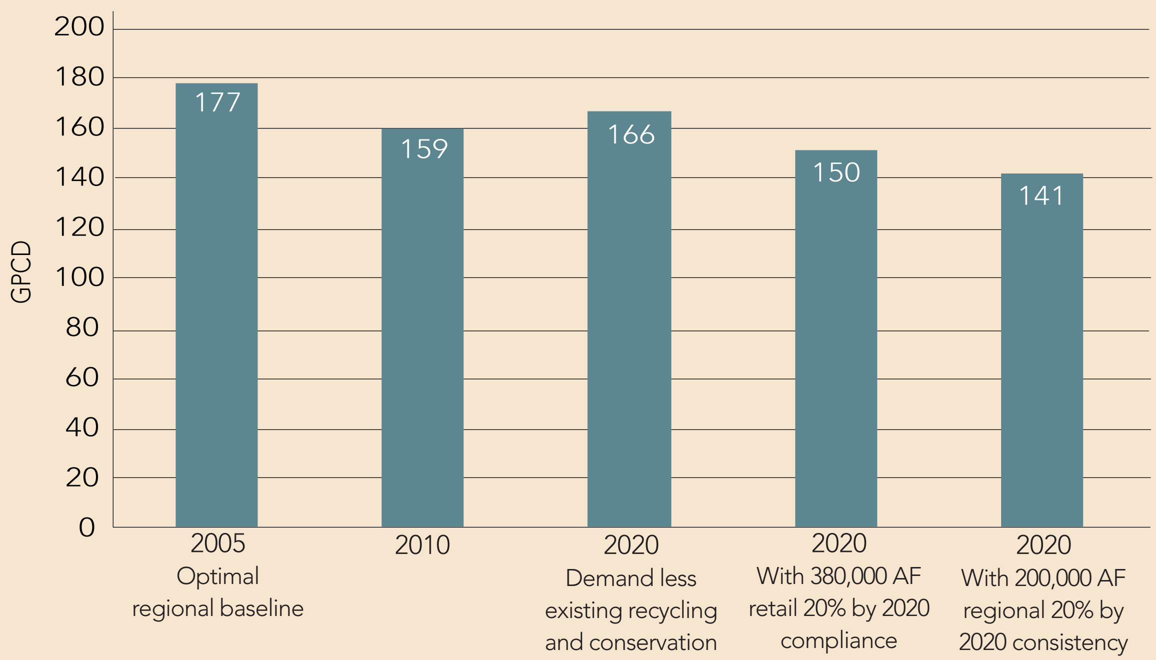
Augmentation of Local Resources through Incentives & Partnerships

Metropolitan continues to pursue local water recycling, groundwater recovery, and seawater desalination. Although recycling is used in meeting the 20x2020 goals, those recycling projects not being considered to meet 20x2020 could go toward meeting local resource augmentation goals. However, the primary supplies considered for augmentation are groundwater recovery and seawater desalination.

TABLE 3.5 ESTIMATED CONSERVATION SAVINGS INCLUDING 20X2020 RETAIL COMPLIANCE

		2015	2020	2025	2030	2035
Existing Program	*Conservation*	930,000	965,000	1,032,000	1,097,000	1,158,000
	Recycling Projects	353,000	387,000	413,000	422,000	430,000
Core Strategies	*20x2020 Retail Compliance (Conservation & Recycling)*	190,000	380,000	380,000	380,000	380,000
Total		**1,473,000**	**1,732,000**	**1,825,000**	**1,899,000**	**1,968,000**

FIGURE 3.5 GPCD COMPARISONS WITH VARYING LEVELS OF REGIONAL WATER EFFICIENCY*



*Per capita GPCD reductions can be acccomplished through any combination of increased water conservation, improved water use efficiency, and increased use of recycled water to offset potable demand.

Local agencies have implemented projects to recover contaminated or degraded groundwater for potable uses to enhance supply reliability of the region by maximizing local groundwater resources. Furthermore, several agencies are progressively pursuing development of seawater desalination projects.

Table 3.6 outlines targets for further development of these local resources, a goal that will require a continued commitment to building key partnerships throughout the region between Metropolitan, its member agencies, and other government entities across a multitude of disciplines and jurisdictions.

Supply Reliability & Storage Sustainability Under Core Resources

Thorough resource simulation analysis using IRPSIM shows that by implementing the Core Resources Strategy, described above and summarized in **Table 3.7**, Metropolitan can achieve its reliability goals under observed conditions.

The successful development of the resources identified in the Core Resources Strategy, and the use of storage and transfers, significantly improves the balance between demand and dry-year supply compared to the existing levels of resource development. The capability of storage and transfers to meet the gap is greatly improved with this level of resource development because

Table 3.6 Existing Dry-Year Local Resource Production & Augmentation

		2015	2020	2025	2030	2035
Existing Programs	*Groundwater*	1,485,000	1,503,000	1,515,000	1,526,000	1,527,000
	Groundwater Recovery	122,000	136,000	144,000	148,000	150,000
	Local Surface Water	100,000	99,000	99,000	99,000	99,000
	LAA	147,000	147,000	147,000	147,000	147,000
Core Strategies	*Local Resources Augmentation (Groundwater Recovery & Seawater Desalination)*	72,000	72,000	102,000	102,000	102,000
Total		**1,926,000**	**1,957,000**	**2,007,000**	**2,022,000**	**2,025,000**

Table 3.7 Dry-Year Demand & Supply Balances under Core Resources Strategy

	2015	2020	2025	2030	2035
Dry-year Need after Existing Supplies	1,178,000	1,152,000	1,214,000	1,300,000	1,363,000
Core Resources Strategy					
Delta Improvements	151,000	151,000	283,000	283,000	283,000
CRA Dry-year Supply	398,000	265,000	293,000	325,000	325,000
20x2020 Retail Compliance	190,000	380,000	380,000	380,000	380,000
Local Resources Augmentation	72,000	72,000	102,000	102,000	102,000
Total Core Resources	**811,000**	**868,000**	**1,058,000**	**1,090,000**	**1,090,000**
Dry-year Need after Core Resources	367,000	284,000	156,000	210,000	273,000
Storage & Transfers Available*					
*In-Region Surface Storage***	256,000	283,000	321,000	320,000	309,000
In-Region Groundwater	151,000	255,000	255,000	255,000	255,000
SWP Surface Storage	43,000	66,000	171,000	207,000	205,000
SWP Groundwater	200,000	200,000	200,000	200,000	200,000
Yuba Accord Transfers	17,000	17,000	17,000	17,000	17,000
SBVMWD Transfers	6,000	6,000	6,000	6,000	6,000
Other Water Transfers	100,000	100,000	100,000	100,000	100,000
Total Storage & Transfers	**773,000**	**927,000**	**1,070,000**	**1,105,000**	**1,092,000**

* Does not include Emergency Storage or CRA Storage, which is assumed to be used as part of Core Resources Strategy.
**For planning purposes, annual In-Region Surface Storage withdrawals are limited to one-third of the total water available.

of the improved ability to maintain or add to storage resources. **Figure 3.6** shows average storage availability through the planning horizon with the Core Resources Strategy as compared with average storage under existing development. No longer is there a declining amount of storage capacity over time, meaning that storage reliance is sustainable. This provides additional evidence that the Core Resources Strategy will be able to provide reliability out into the future. This improved reliability is illustrated in **Figure 3.7**.

Figure 3.7 provides a visual representation of supply reliability in the year 2035 with implementation of the Core Resources Strategy. The blue area shows that the region could experience a supply shortage of up to 870,000 AF about 18 percent of the time before storage is utilized. Storage use would be effective and sustainable under this strategy, allowing the region to achieve 100 percent reliability. When compared to **Figure 3.4** showing reliability under existing levels of resource development, one can see the drastic increase in reliability gained by implementing this Strategy.

Component 2: Developing an Uncertainty Buffer

Planning for water supply reliability is complicated by risk and uncertainty. Foreseeable water supply and demand conditions may differ from those observed in the past and affect regional reliability. Water supply reliability in the Metropolitan service area through 2035 and beyond depends on many factors including the successful implementation of local and imported water supply projects described in previous sections of this report. Inevitably, some projects envisioned for the region will be delayed or not completed. Uncertain regional growth and water demand projections are additional factors that must also be considered when planning future water supplies.

For example, the imposition of additional and unforeseen environmental and regulatory restrictions could cause significant impacts to water supplies. Under additional restrictions, Metropolitan would need to significantly adapt in order to meet anticipated water demands

Because of these uncertainties, the concept of developing a planning buffer was introduced during the 2004 IRP Update. This IRP Update proposes to expand the concept of a planning buffer and create an actual hedge against demand uncertainty, by pursuing an Uncertainty Buffer. However, this IRP Update simply sets the Uncertainty Buffer as a goal. Metropolitan will evaluate specific future projects to implement this goal based on then-existing and changed conditions consistent with the adaptive management strategy outlined in the IRP.

This Uncertainty Buffer would consist of two parts: collaboration between Metropolitan and its member agencies to achieve regional compliance with 20x2020 actions and local resource programs that can be implemented if the board determines the programs are needed. This allows Metropolitan to balance the rate impact of implementing the buffer against the risk of shortage.

The 20x2020 initiative directly addresses the role of demand in providing reliable water supplies and has the potential to provide 200,000 AF regionally in addition to the 380,000 AF reduction in potable demand achieved in the Core Resources Strategy through retail-level compliance. This additional water-use efficiency helps provide a regional buffer to respond to uncertain conditions.

Through the IRP Technical Workgroups, Metropolitan's member agencies have also identified various local supply projects that could be implemented and added to the regional supply portfolio if necessary. For the purposes of the rate discussion in Section 4, this additional local supply development is assumed to be up to 300,000 AF regionally. Combined with the 200,000 AF of regional water-use efficiency buffer, the total regional buffer could be as much as 500,000 AF. These local supply projects would be developed as needed, based on an evaluation of risk, cost and regional benefit. Ultimately the size of the buffer will be determined over time, to account for risk and project development schedules, which can be up to ten years.

As a point of reference, the regional 20x2020 consistency portion of the Uncertainty Buffer alone is roughly equivalent to four percent of

FIGURE 3.6 AVERAGE DRY-YEAR STORAGE BALANCES UNDER CORE RESOURCES STRATEGY

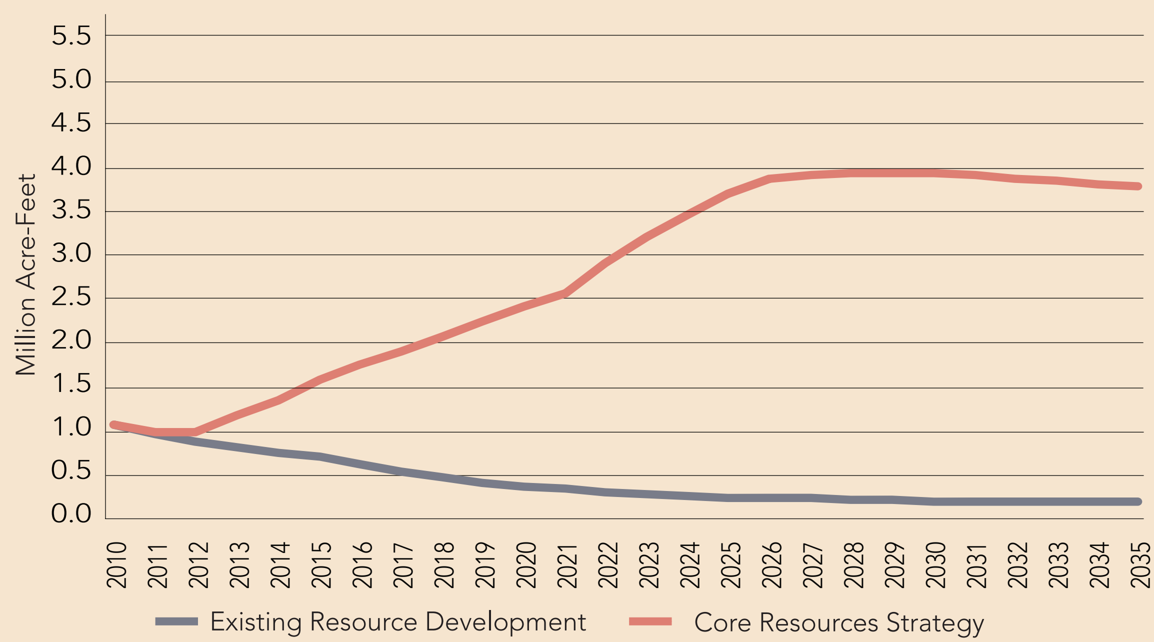
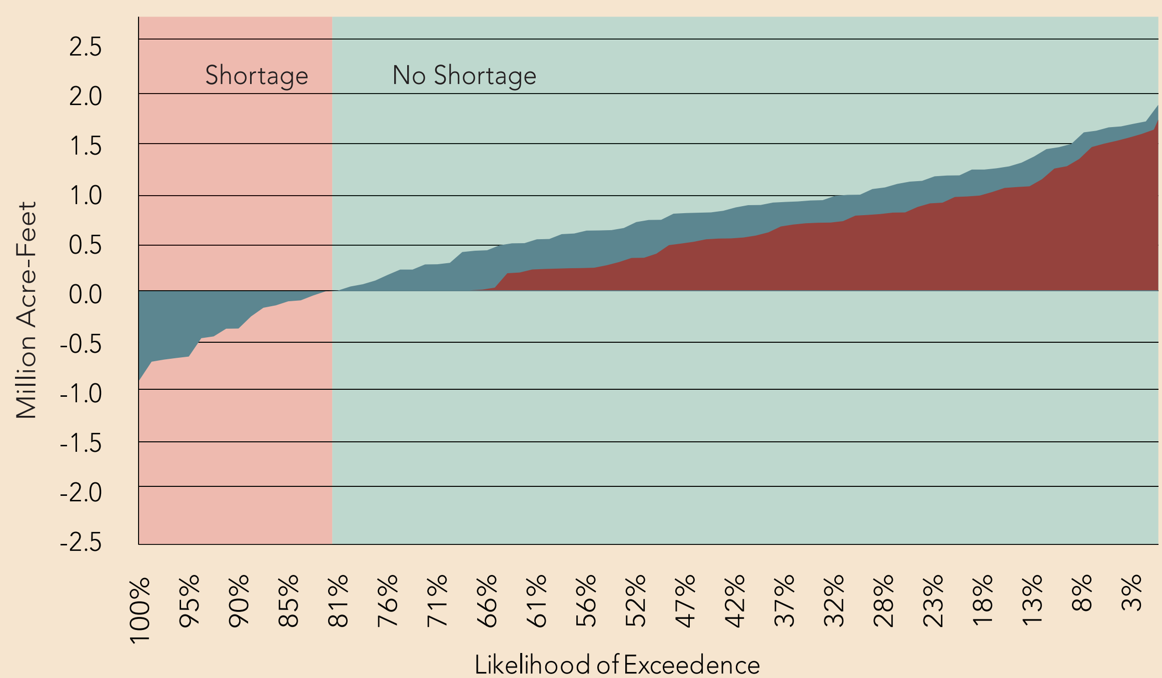


FIGURE 3.7 2035 DRY-YEAR SUPPLY RELIABILITY UNDER CORE RESOURCES STRATEGY



total regional demand, ten percent of regional demand on Metropolitan, or half the losses in recent years from pumping restrictions on the SWP.

Achieving Additional Supply Reliability & Storage Sustainability with Uncertainty Buffer

Pursuing a buffer provides insurance against foreseeable short-term uncertainties, augments storage, and provides reliability without increasing imported supplies. An analysis of the impacts of implementing an Uncertainty Buffer shows that reliability can be made to be robust to changes in the planning assumptions and improve the balance between demand and supply established by the Core Resources Strategy.

Because of this additional supply development and water-use efficiency, the capability of storage and transfers to meet any remaining gap is significantly larger than the projected demand need and even shows an excess of supply if the whole Uncertainty Buffer were implemented under projected supply and demand scenarios, as seen in **Table 3.8.** This is the direct result of the underlying theory of an Uncertainty Buffer: a buffer is purposefully overdeveloped relative to demands, because it is intended to hedge against unknown changes in the planning parameters used in the analysis. The region would hedge against over-development by taking a measured approach to implementation.

Figure 3.8 shows average storage through the planning horizon with the existing supplies, Core Resources Strategy, and the Uncertainty Buffer. Because there is an excess of supply if the entire Uncertainty Buffer is pursued, the need for storage is vastly reduced, and storage programs would conceivably near maximum capacity. However, since the purpose of the Uncertainty Buffer is to help the region deal with unforeseeable change and be implemented as needed, it is unlikely the entire Uncertainty Buffer would be developed under the projected demands and supplies. As noted above, when evaluating future projects to implement this Uncertainty Buffer, Metropolitan will evaluate then-existing and changed conditions adaptively. Should changes occur, the supply and storage that appears to be in surplus would be used to mitigate and meet those changes and provide added reliability as seen in **Figure 3.9**.

Figure 3.9 provides a visual representation of supply reliability in the year 2035 with implementation of the Core Resources Strategy and Uncertainty Buffer. The blue area shows that the region could experience a supply shortage of over 700,000 AF about 12 percent of the time

Table 3.8 Dry-Year Demand & Supply Balances under Core Resources Strategy & Uncertainty Buffer

	2015	2020	2025	2030	2035
Dry-year Need after Core Resources Strategy	367,000	284,000	156,000	210,000	273,000
Uncertainty Buffer					
20x2020 Regional Consistency Target	100,000	200,000	200,000	200,000	200,000
Dry-year Need after Buffer Implementation*	267,000	84,000	0	10,000	73,000
Storage & Transfers Availability**					
*In-Region Surface Storage****	275,000	309,000	330,000	323,000	313,000
In-Region Groundwater	178,000	255,000	255,000	255,000	255,000
SWP Carryover	53,000	93,000	208,000	230,000	233,000
SWP Groundwater	200,000	200,000	200,000	200,000	200,000
Yuba Accord Transfers	17,000	17,000	17,000	17,000	17,000
SBVMWD Transfers	6,000	6,000	6,000	6,000	6,000
Other Water Transfers	100,000	100,000	100,000	100,000	100,000
Total Storage & Transfers	829,000	980,000	1,116,000	1,131,000	1,124,000

* When Dry-year Need is zero or below (there is a surplus of water), a zero is shown.
** Does not include Emergency Storage or CRA Storage, which is assumed to be used as part of Core Resources Strategy.
*** For planning purposes, annual In-Region Surface Storage withdrawals are limited to one-third of the total water available.

Figure 3.8 Average Dry-Year Storage Balances Under Core Resources Strategy & Buffer

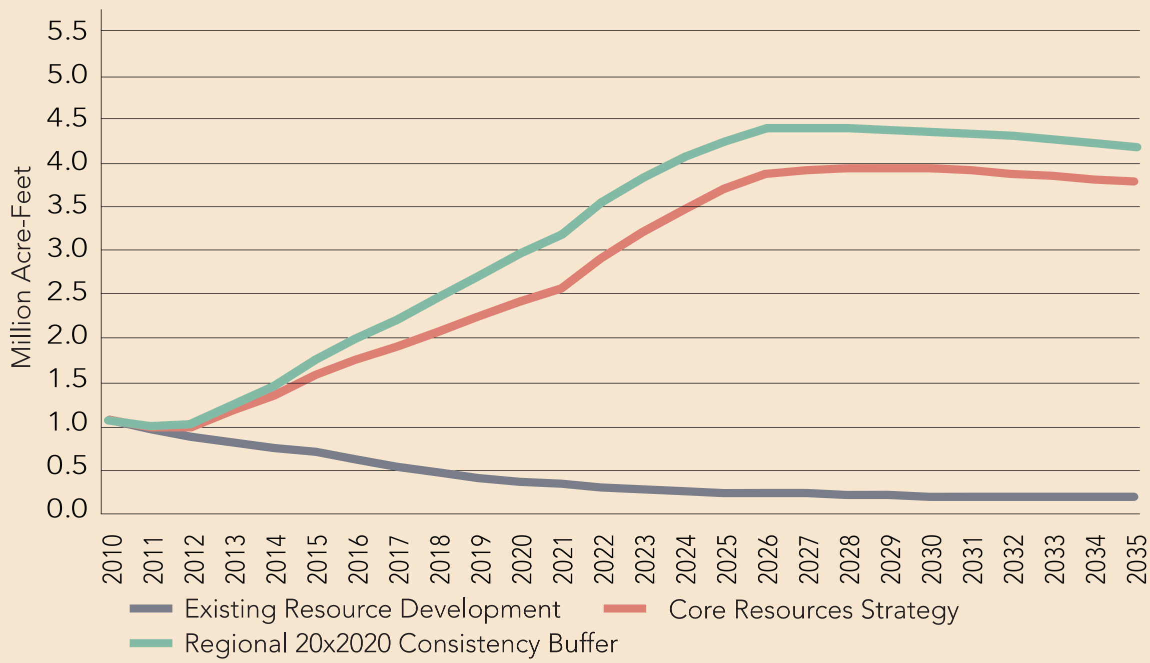
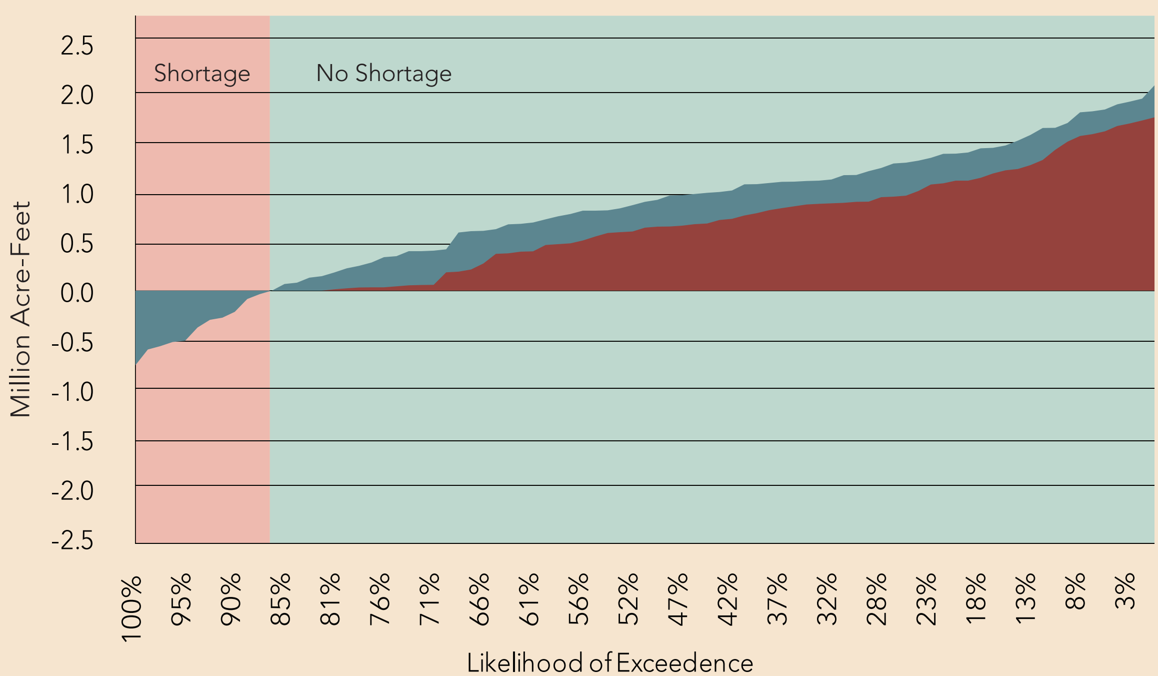


Figure 3.9 2035 Dry-Year Supply Reliability Under Core Resources Strategy & Uncertainty Buffer



before storage is utilized, reducing what was seen under the Core Resources Strategy alone.

Component 3: Foundational Actions

Metropolitan's policies on reliability have evolved in order to keep current with emerging regional and statewide conditions. Because our region faces escalating water supply uncertainties, it is appropriate at this juncture to take a look at different manners in which to ensure regional water supply reliability.

In order to sufficiently plan for unforeseen circumstance and provide replacements if the Core Resources Strategy or Uncertainty Buffer supplies are reduced, Metropolitan will employ Foundational Actions concurrent with the Core Resources Strategy and Uncertainty Buffer that will focus on further development or study of four local resources:

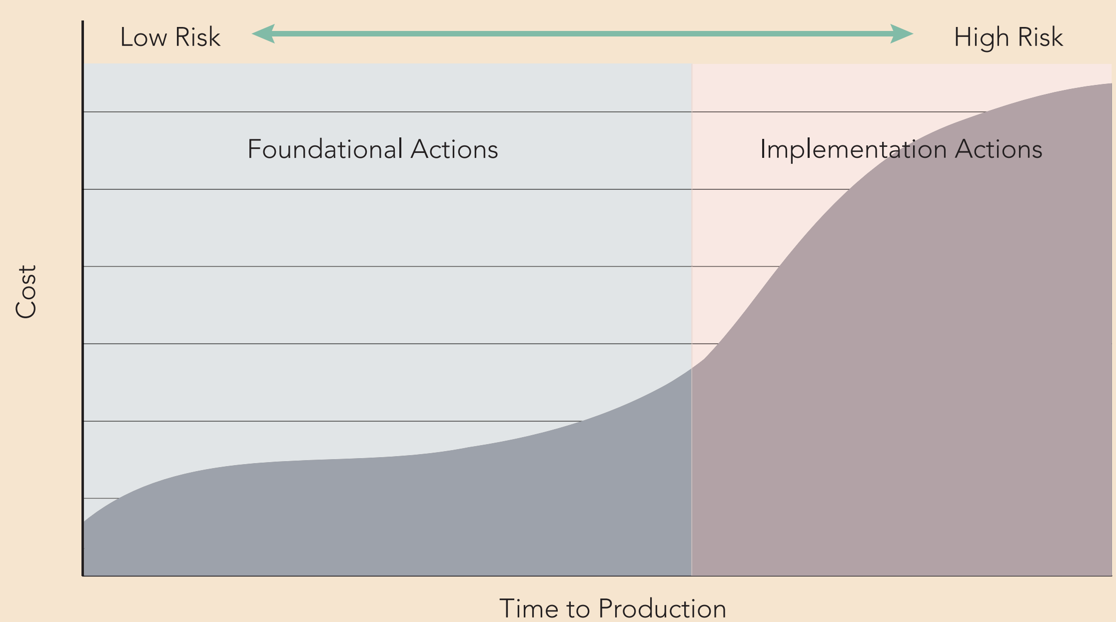
- Recycled water;
- Seawater desalination;
- Stormwater; and
- Graywater.

These Foundational Actions are low-regret, low-risk actions, essentially feasibility studies, legislative efforts, and research, undertaken with the aim of reducing the time it takes for a project to reach full production. These resources can then be used to replace or augment Core Resources or Uncertainty Buffer supplies if the Foundational Actions show that a particular resource is suitable for regional investment. These Actions would be comprised of planning and preparatory actions laying the foundation for full-scale investments. In response to emerging uncertainties, this approach provides a scalable response to varying degrees of shortage, the value of which is seen in **Figure 3.1,** Graph C.

For example, **Figure 3.10** shows a hypothetical progression of actions needed to implement a project. The dark shaded area under the curve represents actions needed to implement a project from start to production. These actions often take years and come with varying degrees of cost risk. Foundational Actions could drastically reduce this time frame, at low cost and risk.

Figure 3.10 shows a hypothetical delineation of those actions that might be considered low-

FIGURE 3.10 HYPOTHETICAL VARIABLE COST & RISK OF PROJECT IMPLEMENTATION



cost, low-risk Foundational Actions in blue and those implementation actions requiring greater risk and cost in pink. Each resource project will have different ratios of Foundational Actions to higher cost and risk actions. The most important aspect of pursuing Foundational Actions is the flexibility with which these supplies can be implemented based on need and urgency. By doing the preliminary feasibility studies and research, time for any future implementation is reduced and the region is better prepared should opportunities arise in the future.

Establishing a Suite of Actions

In order to reduce the lead time necessary to implement the four supplies, Metropolitan has identified specific actions to facilitate this development. By regionally collaborating to complete these Foundational Actions, key planning options are established and critical deterrents to development begin to ease. For example, if capital improvements would be needed to maximize water development of a certain project, the formation of a permitting and inspection work group would expedite this project's application and approval process. Greater synergy and efficiency can be attained by implementing a greater number of Foundational Actions.

Moreover, this approach allows the region to select supply projects from any of the four resources to create supply portfolios that could be used to mitigate future supply gaps. Once these Foundational Actions are established, projects can be implemented to meet specific needs within the region in a scalable manner to respond to varying degrees of shortage.

In order to methodically evaluate development of these resources, Metropolitan's Foundational Actions draw from the findings and recommendations from the IRP technical workgroups (**Section 2 and Appendices A.7-13**). From this data and staff expertise came seven categories of foundational and other resource development actions that can be pursued regionally to aid future implementation of these resources. An overview of these categories is found in **Table 3.9**. Each resource has been evaluated and a series of resource development actions identified for each category.

Inclusion of these Foundational Actions in an adaptive management approach provides the region with a flexible water supply planning and implementation tool that can quickly respond to unforeseen water supply shortages in the Core Resources Strategy or Uncertainty Buffer. Below are summaries and detailed tables (**Tables 3.10-13**) of those Foundational Actions, along with possible future implementation actions, identified for potential pursuit toward development of these four resources. These tables also delineate a Foundational Action versus higher risk actions and the estimated time to completion, mirroring project development concept illustrated in **Figure 3.10**. Like the shaded areas in **Figure 3.10**, the actions shown in blue are Foundational Actions, and those in pink are higher risk and cost implementation actions toward developing each water supply.

Recycled Water

As an existing resource, Foundational Actions for recycled water must take into account existing projects and conditions. These Actions are described below and detailed in **Table 3.10**, along with an estimated time line of 12 years to development, with eight of those years consisting of Foundational Actions.

Table 3.9 Categories of Resource Development Actions

Integrational	Integrates existing regional facilities or programming, establishes efficiency and cohesion mainly through collaborative planning processes
Public Perception	Eases or improves public perception on key issues through extensive public outreach
Legislative	Facilitates supply development through legislative or regulatory action
Fiscal	Identifies and establishes funding mechanisms to maximize regional participation
Procedural	Streamlines permitting and regulatory approval processes through collaboration and organizational efforts
Operational	Identifies and mitigates external challenges that impact facility and resource operations
Infrastructural	Pursues facilities and capital required to develop water supply

Integrational

The integration of future water treatment facilities with existing facilities is a key element in ensuring that regional efforts are optimized and assets are used efficiently and effectively. A Regional Recycled Water Facility Master Plan, in collaboration with recycled water stakeholders, would identify future demand; inventory recycled water projects within the region; identify regional facility needs, including specific capital projects; and look for opportunities to share existing and planned treatment, storage, and conveyance facilities. This approach emphasizes synergy and economies of scale in future implementation. Using this information, alternative methods of project implementation could be evaluated and regional treatment facility efficiency objectives created to maximize recycled water.

Public Perception

Public perception greatly influences the successful implementation of recycled water programs. Continued public education on recycled water will be essential, combined with marketing efforts to promote economical and reliable recycled water use. The target audience for the outreach campaign will be the general public, with special focus on students. The region can take advantage of and work in tandem with existing similar education and marketing campaigns by others. Partnerships can be formed between water and wastewater agencies to develop and implement such campaigns.

Legislative

In order to effectively monitor proposed legislation on recycled water and consider developing new recycled water legislation beneficial to the region, a Recycled Water Legislative Task Force would be created that would consist of agencies and organizations throughout the region. The Task Force would meet on a regular basis to seek regional consensus on current and developing legislative issues. Such a forum would provide a valuable opportunity for water agencies and wastewater agencies to seek a consensus on legislative positions for the benefit of the region. Specifically, the Task Force would quantify current and proposed legislation, and identify potential proponents and opponents of legislation and establish a consistent platform for promoting recycled water. From there the Task Force could coordinate support for regulations and work with a proposed financing committee (see below) to seek local, state, and federal funding for recycled water projects and programs through bonds and other measures.

Fiscal

In light of the scarcity of public funds for planning, design, and construction of infrastructure projects and serious competition for those available funds, a regional collaborative approach to securing funding for recycled water projects is not only critical but necessary for the region to successfully implement increased water recycling. Thus, a committee would be created that would prepare a regional finance plan. This Committee would seek to identify and establish funding mechanisms to finance the capital costs needed for treatment and distribution systems. The Finance Committee would also review the availability of existing incentives and bond funds (loans and/or grants) and would recommend proposals for new bond funding of facilities to the Legislative Task Force. With a guiding principle of efficient use of public funds, the Finance Committee would explore regional cost-sharing opportunities among the region's recycled water stakeholders to further enhance recycled water use, seeking partnerships to achieve economies of scale through the region's significant existing recycled water infrastructure.

Procedural

Critical to the successful implementation of recycled water projects is a streamlined application and permitting process. Therefore, a Task Force would be created to work with health departments, and permitting and regulatory agencies to expedite project approvals processes. In conjunction, a clearinghouse consisting of policies, codes, ordinances, and standards related to recycled water would be established to assist in developing consistency on the interpretation and application of rules and standards.

Operational

Effective operations of recycled water projects rely upon knowledge that such operations do

Table 3.10 Project Development Actions & Timeline for Recycled Water

	Actions		Years to Water Production											
			1	2	3	4	5	6	7	8	9	10	11	12
Integrational	Regional Facility Master Plan	• Project demands and recycled water supplies	■											
		• Identify regional recycled water facilities and purveyors, service boundaries and jurisdictions, and regional concentrate discharge lines		■	■									
		• Identify opportunities for sharing existing storage and conveyance facilities			■	■								
		• Establish regional recycled water facility efficiency objectives				■	■							
		• Create list of capital improvements needed to maximize regional recycled water use				■								
		• Prepare an analysis of alternatives for treatment, energy use, siting, scale, integration, etc.						■	■					
Public Perception	Outreach Campaign	• Address public questions about recycled water through multi-media campaign		■	■	■	■	■	■					
		• Sponsor career days, science fairs, and other educational events to promote recycled water				■	■	■	■					
Legislative	Legislative Task Force	• Quantify effects of existing and pending legislation	■											
		• Establish recycled water platform (benefits, current application, potential)		■	■	■								
		• Identify political proponents and opponents		■	■									
		• Advocate legislation that encourages and promotes recycled water use					■	■	■	■				
Fiscal	Regional Finance Committee	• Identify major recycled water facility and retrofit cost components					■							
		• Coordinate funding with business groups, municipalities, and financiers					■	■						
		• Identify incentive and grant opportunities and disseminate to partners					■							
		• Identify bond measures to fund recycled water and coordinate with Legislative Task Force						■	■	■				
		• Explore regional cost-sharing opportunities to encourage efficient use of public funds								■				
		• Establish funding mechanisms to finance capital costs									■	■	■	■
Procedural	Regional Policy & Permitting Task Force	• Establish regional clearinghouse for recycled water codes, regulations, ordinances, and standards	■	■										
		• Work with CDPH, county health department, etc. to identify barriers to implementation and health risks		■	■	■								
		• Assist in study to quantify and propose solutions to barriers identified by public health agencies					■							
		• Establish and promote a unified regional policy template			■	■	■	■	■					
		• Update and streamline application and permitting process					■	■	■					
Operational	Regional Salt Management Plan	• Collaborate with water supplies, wastewater agencies and watermaster/basin managers to establish regional objectives and strategies		■	■									
		• Quantify existing regional salt balances and standards				■								
	Regional Watershed Management Plan	• Quantify existing basin storage and water quality standards				■								
		• Collaborate with water suppliers, flood control districts, and water master/basin managers to establish regional objectives and strategies				■	■							
		• Establish monitoring protocol and consult with regulatory agencies to streamline process						■	■					
		• Coordinate regionally to schedule basin deliveries and extractions							■	■				
Infrastructural	Regional Project Development	• Acquire land and design facilities for potential project sites suited for regional coordination and existing infrastructure									■	■	■	■
		• Pursue necessary environmental compliance, and permitting									■	■	■	■

not negatively impact the receiving waters of the underlying groundwater basin – currently or into the future. As salt levels typically rise in recycled water and as emerging constituents of concern in recycled water are better understood and increasingly subject to regulation, it is proposed that the region pursue the following: 1) prepare and update a Regional Salt Management Plan in collaboration with regulatory agencies and regional stakeholders to quantify and manage regional salt balances, 2) prepare and update a Regional Watershed Management Plan in collaboration with regulatory agencies and regional stakeholders to establish regional recycled water objectives/strategies and quantify and manage impacts to local groundwater basin storage and quality. Additionally, regional water quality monitoring and standards would be created on salt and basin management, which would be readily available to stakeholders in planning for new recycled water facilities.

Infrastructural

The overarching approach to increasing recycled water use is a regional approach – not only to planning, marketing, education, legislation, financing, regulations, policies, and basin management, but to actual facility design and construction. While the efforts of wastewater and water agencies have created the significant existing recycled water infrastructure in the region, enhancing that infrastructure to its full capability necessitates a fully integrated approach. This is especially true when faced with construction of new treatment and distribution facilities within a developed environment already containing numerous other underground utilities. This may require retrofits to existing systems to increase capacity or coordination on land acquisition and construction to prepare for future demand. Additionally, by necessity, increasing recycled water use within the region will result in recycled water service crossing multiple political, watershed, and groundwater basin boundaries and land acquisition, environmental compliance, permitting, and construction will require regional project implementation.

Seawater Desalination

Foundational and other resource development actions for seawater desalination include completion of feasibility, policy, financial, legislative, and management studies and plans estimated to take eight years, with 11 years total for project implementation. Foundational actions and implementation timelines for desalinated seawater are described below and in **Table 3.11**.

Integrational

As a first step to integrate desalinated seawater as a potential resource for Southern California, a Regional Feasibility Study would be put together to document and guide further research and development. Key work elements of this effort include establishing a database of existing practices. Based on this data, the region could propose, implement, and report the findings on new pilot studies for desalinated seawater systems. Only with more complete data and information can the full potential be determined with enough certainty to inform decision makers on the extent to pursue desalinated seawater as a resource and the degree to pursue it.

Public Perception

How the public perceives and understands the costs and benefits of desalinated seawater will be crucial to its effectiveness as a resource. Any educational campaign should include a critical assessment of environmental benefits and risks associated with desalinated seawater while seeking to address public health concerns over water quality, the long-term effect on water rates, and the trade-off of providing locally produced water vs. imported water.

Legislative

Legislative support is imperative in creating funding, streamlining processes, and increasing opportunities in which seawater desalination can be utilized. Legislation can influence the implementation of ordinances and codes, directly affecting recycled water use in the region. The Foundational Actions needed include developing and supporting legislation that would consolidate or coordinate the permits from the various regulatory agencies.

TABLE 3.11 PROJECT DEVELOPMENT ACTIONS & TIMELINE FOR SEAWATER DESALINATION

	Actions		Years to Water Production										
			1	2	3	4	5	6	7	8	9	10	11
Integrational	Regional Feasibility Study	• Identify existing projects or projects near construction and create a centralized database of challenges, issues, practices, research and development, water quality data, and performance monitoring metrics											
		• Use the identified projects and GIS mapping to find areas of opportunity											
		• Model yield vs. cost of existing projects											
Public Perception	Outreach Campaign	• Address public questions about seawater desalination to promote desalination											
		• Sponsor career days, science fairs, and other educational events											
Legislative	Legislative Task Force	• Collaborate to establish a science-based, statewide policy or legislation in support of desalination											
		• Pursue legislation to consolidate or coordinate permitting requirements											
Fiscal	Funding Strategy Plan	• Utilize existing sub-regional efforts/plans to identify funding and cost-sharing opportunities and ongoing financing for O&M											
		• Explore partnerships with private investments, industry, federal, and state agencies to regionally coordinate pursuit of funding and grants											
		• Establish a funding mechanism to finance capital costs											
Procedural	Regional Synergy Task Force	• Work with regulatory agencies to address and revise existing regulatory and management structures that inhibit desalination production											
		• Assist in developing water quality monitoring and treatment guidelines											
		• Centralize the permitting in one agency, watermaster-like permitting coordinator											
		• Develop a SWRCB policy for the permitting process to relieve pressure on permitting agency staff											
Operational	Marine Life Protection Plan	• Encourage a science-based, statewide policy or legislation in support of desalination and best technologies											
	Steelhead Recovery Plan	• Evaluate impacts of Steelhead Recovery Plan											
	Energy Use & Emission Mitigation Plan	• Partner with the power and private industries to support technological research and to reduce energy needs and establish a regional mitigation bank for carbon and environmental impacts											
		• Pursue a policy that desalination energy use be treated comparable to other water resources with regards to required offsets											
Infrastructural	Land Acquisition	• Early strategic real estate planning to reserve prime coastal locations for potential project sites • Acquire land as needed											
	Regional Project Development	• Develop planning and design documents • Pursue environmental compliance and permitting • Inspection preparation											

Fiscal

Once a Regional Feasibility Study is complete, and the resource potential of desalinated seawater has been evaluated, a Regional Desalinated Seawater Funding Strategy Plan would assist in developing potential funding mechanisms to finance capital cost for construction of desalinated seawater projects. Opportunities for current and future bond funding for grants and loans would be identified. A regional approach to financing would be explored.

Procedural

The work of the Regional Synergy Task Force (which would include proposals for improved regulations and identifying necessary administrative and legislative approaches), would be focused on establishing regional permitting, inspection, and policies and coordinating between various agencies. Key elements would include establishing streamlined application and permitting processes for desalinated seawater projects. The Task Force would use data from the Feasibility Study to promote a unified regional desalinated seawater policy in conjunction with efforts of the Regional Desalinated Seawater Legislative Task Force.

Operational

Applying knowledge from the Feasibility Study, a cohesive regional approach to operations would be prepared to establish regional objectives and strategies. The plan would be developed in close collaboration with water suppliers, wastewater agencies, watermasters, basin managers, public health agencies, stormwater agencies, cities, counties, the state, and vendors. This includes understanding the impact of desalination on marine life and working with regulatory agencies to quantify these impacts and establish mitigation methods for wildlife protection. Additionally, working with energy providers and regulatory agencies to address efficiency and emissions mitigation actions is also necessary.

Infrastructural

The regional approach to construction would be facilitated by development of regional standards for planning, design, construction, operations, and maintenance. Regional Implementation would be done in conjunction with the creation of the operational elements and institution of the Regional Desalinated Seawater Outreach Campaign. As the unit costs of desalinated seawater systems decrease and as funding and financing sources become available, construction of desalinated seawater projects would be expected to increase.

Stormwater

To take full advantage of the opportunity to augment our local water supply utilizing stormwater, the region would need to first overcome the barriers to implementation as identified in the Stormwater/Urban Runoff Issue Paper. The following provides a framework of development actions to address these barriers and strategically maximize this local resource. Foundational actions make up about 8 of the estimated 12 years to production of a stormwater project, and are described below and detailed in **Table 3.12**.

Integrational

Data Management

A regional water supply project database would provide a regional picture of stormwater projects, which would assist in the selection of pilot projects, in the development of a regional Stormwater Management Plan, and in the integration of experiences and regulatory approval processes. Several existing stormwater management projects in the region have yielded challenges and lessons learned that can be used to improve future water supply augmentation efforts. A compilation of lessons learned could be established and continually updated through this database.

This regional database could build upon existing local project databases, such as those created for the IRWMPs.

Regional Feasibility Study

For locally captured stormwater to become a reliable water supply in Southern California, techniques for stormwater capture and use must become the norm and research must continue to advance knowledge. By progressing research in stormwater capture while concurrently planning, constructing, and operating new stormwater facilities, innovative and efficient techniques unique to Southern California can be institutionalized.

The goal of the Regional Feasibility Study Implementation Element is to provide the data, research, and studies needed to overcome technical obstacles, including the following:

- Lack of a quantified relationship between stormwater capture and reduction in imported water demand;
- Difficulty in determining the cost effectiveness of a project from a water supply perspective;
- Unknown water quality impacts;
- Limited safeguards against pollution transport; and
- Lack of information sharing regarding new technology and water quality.

The first critical step would be to identify and study pilot projects. Next, the data gained from the pilot projects could be used to develop water quality models and guidelines, direct use and surface water storage strategies, cost/benefit approaches, a centralized database of technical information, and a business case for regional and local incentives.

Public Perception

Public awareness is a key aspect of the success of enhancing stormwater use. A stormwater education program could be targeted to coordinate with other public awareness programs. Stormwater, recycled water, groundwater, and imported water are inter-related. Yet, the public message among the various interests is inconsistent and could be better coordinated to provide maximum impact. For example, a water supply education campaign at a school could also include information about stormwater, recycled water, and groundwater to educate the public on the entire water picture and on ways an individual can be part of the overall solution. The linkage between stormwater capture and water supply should be emphasized.

Legislative

New regulatory and legal requirements are pushing stormwater/urban runoff programs forward at a faster rate and are emphasizing low impact development principles and collective watershed management. This creates new opportunities to influence these programs and standards early in the development process, to work with local communities so that the programs are implemented as intended, and to ensure a maximum water supply benefit.

The Stormwater Legislative Task Force would work proactively to address legislation through a unified, regional approach and would work collaboratively with other existing regional efforts/groups.

Fiscal

A Funding Strategy Plan is essential to overcoming the funding barrier to implementing stormwater projects. Stormwater projects often provide multiple benefits, which attract multiple funding partners, but may also lead to a large total project cost. Working collaboratively as a region on the Funding Strategy Plan would provide the framework to most effectively utilize the limited funding available, to equitably share project costs, and to establish a comprehensive funding mechanism to finance capital and O&M costs. This effort could build upon existing regional and sub-regional plans and workgroups to increase efficiency and reduce redundant efforts.

Procedural

Upon completion of the Regional Stormwater Feasibility Study, efforts would focus on establishing a Stormwater Policy Task Force. This group would work with the Legislative Task Force and existing regional efforts to identify regulatory and legislative needs to enhance stormwater capture and use. In addition, these task forces would work together to streamline the permitting process for projects to move forward in a timely fashion.

The Stormwater Policy Task Force would further contribute to developing water quality monitoring and treatment guidelines, and to updating the regional water supply project database.

Operational

Upon completion of the Regional Stormwater Feasibility study and upon receipt of the recommendations of the Regional Stormwater

Table 3.12 Project Development Actions & Timeline for Stormwater

	Actions		Years to Water Production: 1 2 3 4 5 6 7 8 9 10 11
Integrational	Regional Project Database	• Identify and track projects, including project attributes, such as construction costs, schedules, production yield, readiness to proceed, etc.	
	Regional Feasibility Study	• Use Project Database to document and study existing projects or projects near construction	
		• Pursue pilot projects, if further data is needed, to study various geographical areas and types administration, including infiltration, direct use, and surface water storage	
		• Add to Regional Stormwater Project Database challenges, lessons learned, water quality data, and performance monitoring	
		• Model the effect, per basin, of stormwater recharge on production yield and basin water quality	
		• Develop surface water storage strategies	
		• Develop a detailed approach to determine the cost/benefit of each project	
		• Develop a stormwater capture direct use model to correlate the amount of stormwater capture to reduction in demand and measure BMP effectiveness	
		• Develop a set of monitoring and treatment guidelines	
		• Develop a business case for providing regional and local stormwater capture and use incentives	
Public Perception	Educational Campaign	• Coordinate with existing public awareness programs to target homeowners, renters, commercial, and industrial property owners, and schools to emphasize the link between stormwater and overall water supply	
Legislative	Legislative Task Force	• Determine the effects of existing and pending legislation and identify barriers to stormwater development	
		• Address and propose changes to legislation through a unified, regional approach	
Fiscal	Funding Strategy Plan	• Research and utilize existing sub-regional efforts/plans to identify funding and cost-sharing opportunities including ongoing financing for O&M	
		• If the Feasibility Study finds projects to be cost effective, establish a funding mechanism/incentive program to offset capital costs	
Procedural	Regional Policy Task Force	• Identify changes to codes, regulations, and standards needed to facilitate implementation of stormwater BMPs	
		• Address existing regulatory and management structures that inhibit increased stormwater yield and assist regulatory agencies in adjusting these and developing water quality monitoring and treatment guidelines	
Operational	Management Plan	• Integrate existing regional plans to establish regional objectives and strategies	
Infrastructural	Regional Project Development	• Develop planning, design, and environmental documents • Procure necessary permits • Acquire land for potential project sites (if necessary)	

Policy Task Force, a Stormwater Management Plan will be developed. This Plan will be prepared to establish regional objectives, strategies, and evaluate appropriate alternatives for enhancing stormwater capture and use in the Metropolitan service area. The plan will build upon existing regional efforts, such as IRWMPs, and will be developed in collaboration with water suppliers, stormwater agencies, wastewater agencies, watermasters, basin managers, and other local agencies and related stakeholders. A critical element to the Stormwater Management Plan will be to maintain and enhance the relationships with partners and stakeholders over the course of this process to ensure the continued success of stormwater as a viable water supply resource for the region.

Infrastructural

Based upon the results of the Regional Feasibility Study and the Stormwater Management Plan, facility implementation needs will be identified. Depending on the type of project, this could include advanced planning, design, permitting, regulatory compliance, financing plans, land acquisition (as needed), and construction.

Based on the knowledge gained from the construction projects, maintenance manuals can be updated to improve long-term maintenance responsibilities for facilities. Identifying metrics to monitor performance will also be included. This process would also include inputting the performance monitoring data into feasibility study updates.

Graywater

The Graywater Technical Workgroup and Metropolitan staff concluded that graywater is not a significant, viable supply for the foreseeable future. In addition to issues with cost and existing regulations, there is the added issue of graywater projects negatively impacting wastewater and recycled water infrastructure. For these reasons, the IRP Update does not recommend actions to further develop graywater until an Impact Study can collect data to better understand these issues.

Unlike the other three resources with Foundational Actions, due to the detrimental effect graywater has on existing water infrastructure, no further Foundational Actions nor estimated timeline for development of graywater can be formed until the Impact Study has been completed.

Graywater Impact Study

The Graywater Impact Study would include summarizing existing practices and issues, examining various administration options, and determining regional potential. Specifically, the following topics were identified for further research:

- The negative effects of graywater on other resource investments, like wastewater and recycled water;
- Water quality, including pathogen removal for indoor use;
- Market potential;
- Impact on existing plumbing infrastructure;
- Indoor vs. outdoor use; and
- Cost-effectiveness for future incentives.

Only with more complete data and information can the full potential of graywater be determined with enough certainty to inform decision makers on whether to pursue graywater as a resource and the degree to pursue it. This would include resolving the issues of reduced flows to existing wastewater and recycled water plants.

Contingent on the findings of this Graywater Impact Study, other Foundational Actions such as policy, financial, legislative, and management studies and plans could be pursued to decrease project development time.

Summary

Metropolitan's approach to reliability is based on an analysis of projected supplies and demands. The high number of variables inherent in this type of analysis makes this a complex undertaking. In an effort to ensure future water supply reliability for Southern California, Metropolitan has adopted the following adaptive goals:

- Core Resources Strategy: Develop programs within the four core resources (SWP, CRA, local resources, and conservation) to meet projected demands under observed conditions;

- Uncertainty Buffer: Regionally collaborate to hedge against uncertainty in projected conditions, through regional consistency with 20x2020 legislation and identification of local projects to be developed if necessary; and
- Foundational Actions: Guard against unknown risks to the Core Resources and Uncertainty Buffer, by pursing low-risk, low-cost actions to shorten implementation time for further resources (recycled water, seawater desalination, stormwater, and graywater), if needed.

INTEGRATED WATER RESOURCES PLAN 2010 UPDATE

FINDINGS & CONCLUSIONS

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

4 Findings & Conclusions

This portion of the report recaps the main steps toward developing an adaptive management approach for this IRP Update, provides a summary of key findings and goals, and the potential cost impact of these efforts.

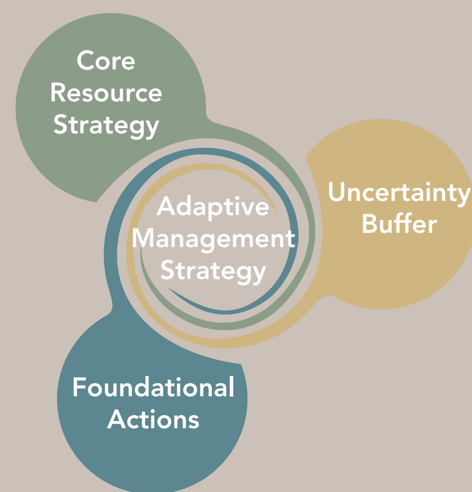
First, Metropolitan recognized the need for more explicit handling of uncertainty. Future variability in climate, demographics, and regulations could have a large impact on Southern California's water resources and a comprehensive plan is needed to effectively respond. Metropolitan has developed an adaptive management approach to these challenges in this IRP Update. This approach allows flexibility in resource development and scalable response to needs in order to balance risk of overproduction against risk of shortage. **Step 1** below summarizes these concepts as the first step in ensuring regional reliability through this IRP Update.

Step 1	Acknowledge future uncertainty and need for adaptive approach in a resource plan to handle these challenges.

With this goal in mind, Metropolitan staff performed **Step 2**, a comprehensive analysis of projected yield of existing resources and anticipated demand through 2035. This revealed a "gap" between demand and supply that existing storage and transfers would be unable to fully bridge.

Step 2	Determine need under existing supplies and demand projections.

Figure 4.1 Three-Component Adaptive Management Strategy



From here, Metropolitan developed a three-part strategy to fill that gap and meet demands through 2035 in a cost-effective, scalable manner that handles future uncertainty. **Figure 4.1** illustrates the three concurrent components of this adaptive management approach: a Core Resources Strategy, Uncertainty Buffer, and Foundational Actions. The first component, the Core Resources Strategy, identifies additional supply development goals to build upon existing programs and meet needs under observed conditions. **Step 3** highlights this below.

This Core Resources Strategy consists of meeting future demands through traditional core resources on the SWP and the CRA, as well as planned conservation and local supply development. Metropolitan and its member

The Sacramento-San Joaquin Delta is the hub of California's water delivery system. It spans approximately 1,200 square miles and overlays parts of five major cities and 14 unincorporated towns and villages in Northern California. Working towards a healthier environment and more reliable water system are the coequal priorities for a Delta "fix."

Step 3	Identify additional supply development goals to meet demands under observed conditions - Core Resources Strategy.

agencies have a long history of investing in these key resources, which have provided the region with reliable water supply over the course of Metropolitan's history. In order to build on these investments, areas within these resources have been identified for future development, as summarized in **Table 4.1**.

The Core Resources Strategy sets out goals under observed conditions, but Metropolitan has acknowledged the need for addressing future uncertainty, whether from an unforeseen climate or regulatory circumstances impacting the core supplies or from demand-side increases due to changes in population, density patterns, behavior, economic outlooks, etc. To this end, Metropolitan proposes an Uncertainty Buffer (**Step 4**) in two parts: pursuit of greater water efficiency through regional consistency with 20x2020 legislation and future identification of specific local projects ready for implementation that can be developed if needed.

Step 4	Regionally develop Uncertainty Buffer goals for foreseeable uncertainty, implementing adaptively as necessary.

This protects the region against future shortages while not over-investing in unnecessary resources. **Table 4.2** summarizes the supply yields expected from the Core Resources Strategy and fully implemented Uncertainty Buffer. Note that supplies are available to meet demands and replenish storage accounts. Although the storage capacity available to balance demands and supplies decreases over time as more water is set aside for emergencies (see detailed description of emergency storage in **Appendix A.15**), the volume of water in storage increases. However, the total volume of water in storage cannot be used at one time due to system constraints, but under the goals set out in this IRP Update, the available storage is more than adequate to meet demand needs after resource development

With core supplies developed and a buffer in place, Metropolitan is well positioned to meet future demands and uncertainty. However, supply vulnerabilities and uncertainties require further contingency planning. The third component of this IRP Update, highlighted in **Step 5**, is regional pursuit of actions in recycling, seawater desalination, stormwater, and graywater that lay a foundation for further

Step 5	Identify Foundational Actions to be pursued regionally and concurrently with the Core Resource Strategy and Uncertainty Buffer, in order to reduce implementation time for other potential resources, to be developed if needed.

Table 4.1 Summary of Actions Under Core Resources Strategy

Core Resource	*Development Area*
CRA	• Continued of existing programs and partnerships • Pursuit of further innovations in Colorado River-related storage, conservation, transfers, exchanges, and agreements
SWP	• Delta ecosystem enhancement and species protection • Continued of existing programs and pursuit of new sustainable storage and transfer agreements • Infrastructure improvements and flood control emergency preparation • Conveyance solutions • Continued collaboration with federal, state, and local stakeholders • Legislation supporting the goals above
Water-Use Efficiency	• Support retail-level 20x2020 compliance, consisting of conservation and water recycling
Local Resource Augmentation	• Regionally pursue groundwater recovery, seawater desalination, and further recycling

Table 4.2 Dry-Year Resource Goals

	2015	2020	2025	2030	2035
Dry-Year Total Demand (Without Conservation)	5,597,000	5,804,000	5,951,000	6,094,000	6,229,000
Water-Use Efficiency					
Conservation	930,000	965,000	1,032,000	1,097,000	1,158,000
Recycling	353,000	387,000	413,000	422,000	430,000
20x2020 Retail Compliance	190,000	380,000	380,000	380,000	380,000
20x2020 Regional Consistency Target	100,000	200,000	200,000	200,000	200,000
Sub-Total Water-Use Efficiency	1,573,000	1,932,000	2,025,000	2,099,000	2,168,000
Local Resources					
Groundwater	1,485,000	1,503,000	1,515,000	1,526,000	1,527,000
Local Surface Water	100,000	99,000	99,000	99,000	99,000
Groundwater Recovery	122,000	136,000	144,000	148,000	150,000
LAA	147,000	147,000	147,000	147,000	147,000
Local Resources Augmentation	72,000	72,000	102,000	102,000	102,000
Sub-Total Local Resources	1,926,000	1,957,000	2,007,000	2,022,000	2,025,000
State Water Project					
SWP	430,000	430,000	430,000	430,000	430,000
Delta Improvements	151,000	151,000	283,000	283,000	283,000
Sub-total SWP	581,000	581,000	713,000	713,000	713,000
Colorado River Aqueduct					
CRA	852,000	985,000	957,000	925,000	925,000
CRA Dry-year Supply	398,000	265,000	293,000	325,000	325,000
Sub-Total CRA	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000
Total Resource Development	**5,330,000**	**5,720,000**	**5,995,000**	**6,084,000**	**6,156,000**
Dry-year Need after Resource Development*	267,000	84,000	0	10,000	73,000
Storage & Transfers Available**	829,000	980,000	1,116,000	1,131,000	1,124,000
Average Storage Levels**	1,913,000	3,122,000	4,410,000	4,521,000	4,338,000
Total Storage Capacity***	5,438,000	5,410,000	5,417,000	5,400,000	5,378,000

* When Dry-year Need is zero or below (there is a surplus of water), a zero is shown.
** Does not include Emergency Storage or CRA Storage, which is assumed to be used as part of Core Resources Strategy.
***Total Storage Capacity changes as emergency storage requirements increase over time.

development of these resources if needed to meet future demands. These actions are identified as Foundational Actions.

These resources take years to develop from concept to water production, but a portion of this development can be pursued concurrently with the Core Resources Strategy and Uncertainty Buffer at low-cost and low-risk. This will reduce the total development time so that these resources can be implemented in time to add to the water resource portfolio if a core resource should fail to develop as projected. The Foundational Actions are comprised of mainly planning and mitigation actions short of full-scale facility investments.

Regional collaboration will be necessary to pursue these Foundational Actions summarized in **Table 4.3,** and since the entire 2010 IRP Update is meant to be implemented on a regional scale, it will take continued coordination between Metropolitan and its member agencies.

A summary of all of the regional resources considered for potential development in this IRP in order to maximize regional utility are summarized in **Table 4.4**. Allowing resources to be developed in a variety of ways adds to the flexibility of this plan and better serves the region. This approach will allow Metropolitan to adopt alternative roles as best benefits the region and enhances existing collaboration, like those roles examined in the Strategic Policy Review discussed in Section 2: A Process of Regional Collaboration. In addition to pursuing imported supplies, Metropolitan's role in local supply development could include a range of roles, which will allow Metropolitan to respond to changing regional conditions. A brief description of these possible levels of involvement is provided below:

- Incentivizing: This level of involvement for Metropolitan entails incentivizing local supply development. Metropolitan's existing LRP program is an example of this type of arrangement, wherein Metropolitan provides an incentive for supply yield produced by its member agencies. Facilities would be owned and operated by the local agency;
- Alternative Financing: Metropolitan could offer a wider range of financing options that might include up-front funding of capital projects. This option would increase Metropolitan's level of commitment and risk, but it would also provide greater flexibility for developing projects that require large start-up costs. Facilities would be owned and operated by the local agency;

Table 4.3 Foundational Actions by Category

Category	*Recycled Water*	*Seawater Desalination*	*Stormwater*	*Graywater*
Integrational	• Regional Facility Master Plan	• Regional Feasibility Study	• Regional Project Database • Regional Feasibility Study	• Regional Feasibility Study
Public Perception	• Outreach Campaign	• Outreach Campaign	• Educational Campaign	• Educational Campaign
Legislative	• Legislative Task Force	• Legislative Task Force	• Legislative Task Force	• Legislative Task Force
Fiscal	• Regional Finance Committee	• Funding Strategy Plan	• Funding Strategy Plan	• Regional Finance Committee
Procedural	• Regional Policy & Permitting Task Force	• Regional Synergy Task Force	• Regional Policy Task Force	• Regional Policy & Permitting Task Force
Operational	• Regional Salt Management Plan • Regional Watershed Management Plan	• Marine Life Protection Plan • Steelhead Recovery Plan • Energy Use & Emission Mitigation Plan	• Regional Management Plan	• Regional Management Plan
Infrastructural	• Regional Project Development	• Land Acquisition • Regional Project Development	• Regional Project Development	• Regional Project Development

Table 4.4 Resources Included for Potential Development to Achieve Supply Yields

	Core Resources Strategy	*Buffer*	*Foundational Actions*
CRA	√		
Conservation	√	√	
Groundwater Recovery	√	√	
Recycling	√	√	√
Seawater Desalination	√	√	√
Stormwater			√
SWP	√		
Graywater			√

- Equity Partnership: In an equity partnership, Metropolitan would be part owner of a local facility. An example of this type of arrangement could be a partnership in a desalination facility in which the ownership, funding, and performance of the project is mutually shared among the partners; and
- Full Ownership: In a full ownership type of arrangement, Metropolitan would own the facility. Ownership, funding and yield of the project would fall on the responsibility of Metropolitan.

It is important to note that these roles apply to Metropolitan's role in developing a single project and are not mutually exclusive; the region may find it benefits most from a mixture of them tailored for specific projects. Metropolitan will consider specific future projects under then-existing conditions, deciding if implementation is necessary and appropriate. The process of addressing these regional supply concerns may lead to new and improved forms of Metropolitan participation and collaboration.

Through the process detailed in this IRP Update, Metropolitan and its stakeholders have defined a role and a process for Metropolitan that will ensure water supply reliability for the region into the foreseeable future. Under the auspices of the 2010 IRP Update, Metropolitan will:

- Adopt an adaptive management approach to address future uncertainty;
- Continue to develop its core supplies to meet projected demands up to 2035;
- Initiate Uncertainty Buffer goals to mitigate future uncertainties;
- Pursue Foundational Actions at low-cost and low-risk to minimize time to development of additional resources if core resources fail to develop as planned;
- Explore various options under which the region can pursue partnerships and cooperative development of beneficial projects; and
- Diversify its role in developing regional water supply.

Over its more than 75-year history Metropolitan has faced many challenges in fulfilling its mission

Metropolitan assumes regional responsibilities for water supply but also for providing leadership in addressing challenges and planning for the future.

Top Photo: In 2010, Metropolitan launched a Global Water and Technology Forum to provide pathways for innovators, water suppliers and investors to connect and forward technology advances in the industry.

Bottom Photo: The planning process for the Integrated Resource Plan was interactive and involved nearly a dozen public briefings with input solicited to craft the report.

of providing a reliable, high-quality water supply to Southern California. This IRP Update provides the framework to continue on this mission with greater assertiveness. The Core Resources Strategy, Uncertainty Buffer, and Foundational Actions bring together the adaptive strategy that Metropolitan will use to address uncertainty and vulnerability. Through continued collaboration with its member agencies, and newly formed partnerships throughout the region, Metropolitan and all stakeholders will forge ahead together on the road to reliability.

Water Rate Impact of IRP Strategy

Although this IRP Update simply sets goals for regional development, cost-effectiveness is an important factor in evaluating future resource development options and so Metropolitan staff built on the findings and analysis of the Strategic Policy Review to estimate the rate impact of the Core Resources Strategy and Uncertainty Buffer; the Foundational Actions were not included in the rate impacts because these actions do not incur significant costs until the supplies are implemented.

Historically, Metropolitan has incentivized local resource development by providing funding for actual production, with the risk and burden of financing, constructing, and operating the supplies falling on the local agency. Expanding Metropolitan's participation to include up-front funding, shared equity partnership, or regional ownership based on the individual needs and consent of local agencies may be considered to increase effectiveness in implementing projects within the service area. The impacts of these alternative roles were considered in terms of any potential implementation of the local resource portion of the Uncertainty Buffer in the future.

Core Resources Strategy

All of the Uncertainty Buffer scenarios build off of the Core Resources Strategy. The Core Resources Strategy assumes the following:

- Delta fix costs of $2.3 billion, representing Metropolitan's share of Delta habitat conservation and conveyance program costs;
- Continued funding of LRP contracts plus an additional 102,000 AF of local supplies at up to $250/AF;
- CRA programs costing $300/AF; and
- Continued conservation funding at $20 million/year.

These costs are escalated at the same percentages as those in the Strategic Policy Review described in Section 2.

In addition to funding these programs, Metropolitan sales decrease by the volume of water conserved, which is assumed to be 380,000 AF due to retail-level 20x2020 compliance. The costs of pursuing the Core Resources Strategy are in line with the base rate of inflation.

Water-Use Efficiency Buffer

Building on the Core Resources Strategy costs, there are three cost options examined to implement the Uncertainty Buffer based on implementation style and cost of resources. The first is implementation of the 20x2020 regional compliance of 200,000 AF only. This would decrease Metropolitan's annual sales by an additional 200,000 AF, and impact rates accordingly.

Metropolitan-Incentivized Buffer

Next, there are two alternative methods for potentially implementing the local resource portion of the Uncertainty Buffer, mirroring the Current Approach and Enhanced Regional Approach #1 from the Strategic Policy Review in Section 2. The first option proposes that 300,000 AF of local resources be implemented by member agencies with Metropolitan incentives, as in the Current Approach. This would result in $250/AF for the development of these supplies, as well as decreased Metropolitan sales by the same volume.

Metropolitan-Developed Buffer

An alternative implementation for this 300,000 AF of additional buffer supplies is for Metropolitan to develop these supplies. This scenario assumes that Metropolitan develops these resources at a cost of $1,500/AF, which is an estimate of local supply development based on Metropolitan's experience in the LRP program.

Table 4.5 Estimated Rate Impacts of the Adaptive IRP Strategy

	2015	2025	2035
Core Resources	$853	$1,233	$1,484
Buffer - Water-Use Efficiency	$892	$1,350	$1,608
Buffer - Metropolitan-incentivized local resource augmentation	$919	$1,510	$1,844
Buffer - Metropolitan-developed local resource augmentation	$953	$1,601	$2,021

Although Metropolitan would pay the full cost of developing these supplies, Metropolitan would also sell the water, so the true cost per AF is the net of cost less sales rate.

Table 4.5 shows the costs of these various options and **Figure 4.2** illustrates how the two alternate options for implementation of the local resources part of the Uncertainty Buffer add to the 20x2020 part of the Uncertainty Buffer, all of which are built on the cost of the Core Resources Strategy.

These costs are graphed in **Figure 4.3** over the planning period and overlaid with the range of costs between the Strategic Policy Review options in yellow. Like the Strategic Policy Review, the costs of this IRP strategy range from one to two percent annually above inflation. This was intentional, as Metropolitan wanted to show the costs for the most expensive Uncertainty Buffer implementation, according to the findings of the Strategic Policy Review findings, in order to provide a high-end estimate of Uncertainty Buffer implementation. It is likely that the cost of a fully implemented Uncertainty Buffer would likely fall somewhere in between the highest and lowest cost options studied here; however, actual future costs will be tied to Metropolitan's future decisions of specific project implementation.

Conclusion

This IRP Update expands Metropolitan's planning into a broader water vision and sets goals for the next 25 years on Metropolitan's traditional resources. It also defines a more adaptive role for Metropolitan on a longer timeline. Resource development uncertainties make setting targets more than 25 years in the future difficult. As such, Metropolitan is initiating an adaptive management approach. Major components of this IRP Update are to: (1) explicitly reflect uncertainty in Metropolitan's future water management environment, (2) evaluate a wider range of water management strategies, and (3) seek a robust and adaptive plan that responds to uncertain conditions that may evolve over time. A key evolution from the 2004 IRP Update is the identification of uncertainties and contingency actions that will extend the concept of a planning buffer into an operational approach.

Just as policy has evolved, so too have the technological and programmatic means by which Metropolitan can accomplished the regional reliability goal. From the completion of the CRA in 1941 to the present, Metropolitan has added programs and facilities to accomplish the broad goal of reliable water supply, including:

- Region's largest water treatment facilities and water transmission lines;
- Largest single contract with the SWP;
- Surface storage facilities and new groundwater storage programs to store less predictable deliveries from the SWP;
- Regional conservation programs and leadership in demand management;
- Innovative local resources program to provide support and incentives for the implementation of new and innovative water supply improvements within the service areas of its member agencies; and
- Overall leadership in forecasting, analyzing, and providing for Southern California's current and future water needs.

Today, the challenges posed by continued population growth, environmental constraints on the reliability of imported supplies, and the new uncertainties imposed by climate change require increased vision and leadership. New solutions are available in the form of dramatically improved water-use efficiency, indirect potable use of recycled water, and large-scale application of ocean desalination.

However, big challenges raise equally big questions regarding the most desirable means of

Figure 4.2 Summary of Rate Impacts

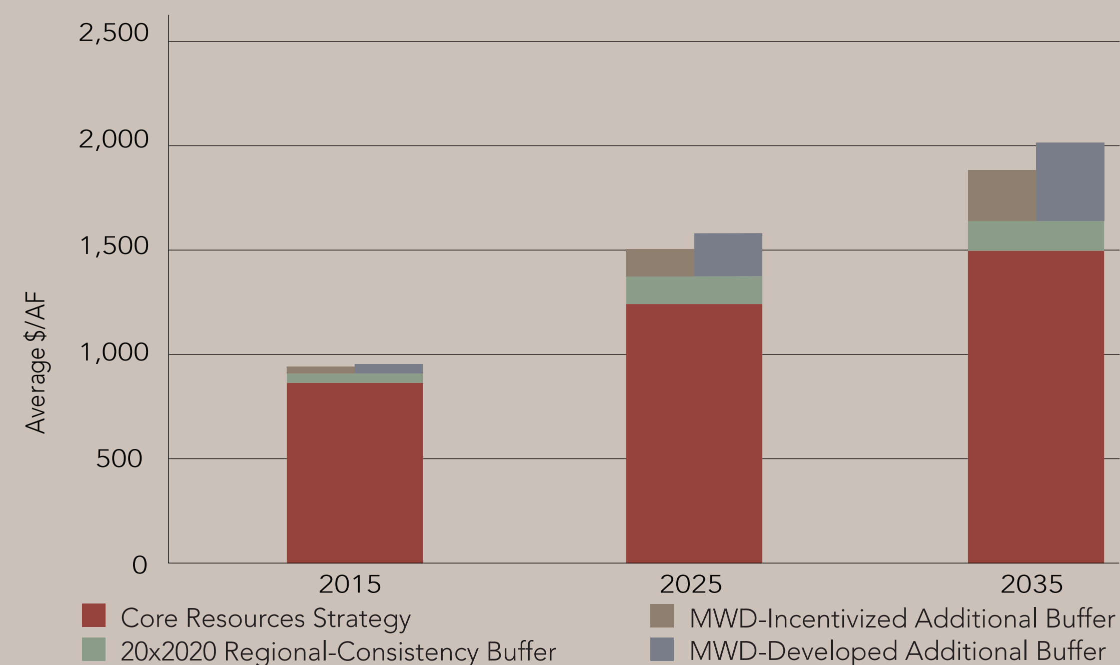
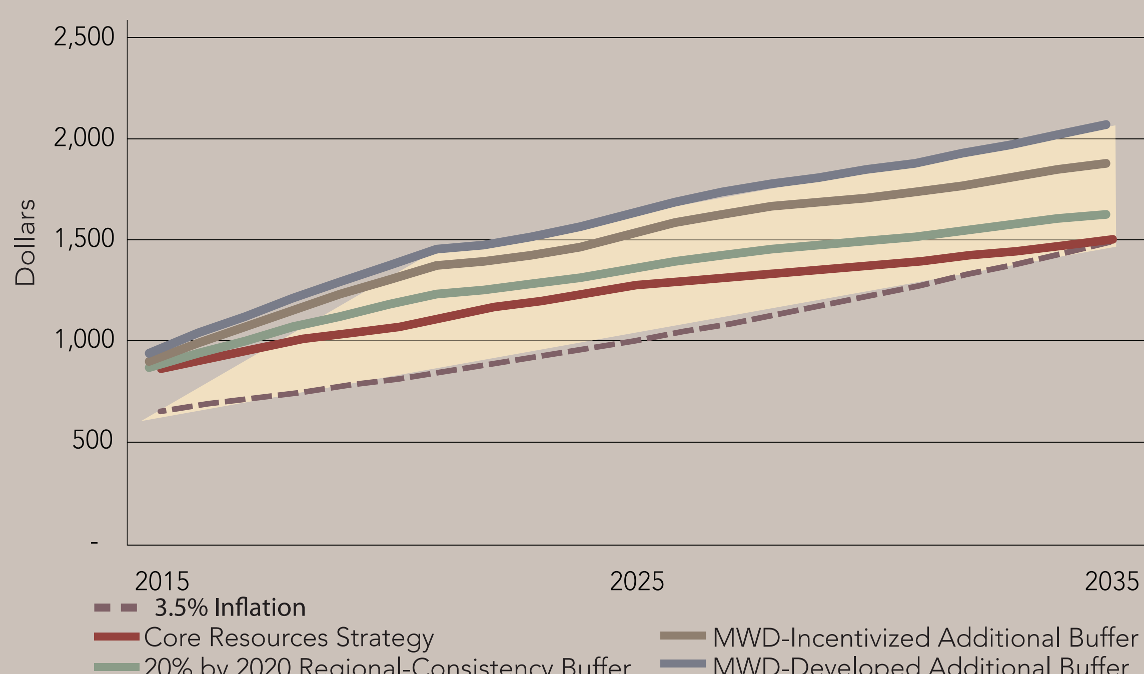


Figure 4.3 Rate Impacts Compared to the Range of Strategic Policy Review Rate Impacts



achieving new solutions and outcomes. What is the most reliable, affordable and feasible means of achieving the common goal of adequate and safe water supplies?

As mentioned at the outset, Metropolitan has been employing an integrated planning process that addresses the complexity of this issue. Metropolitan has long focused on both the development of needed facilities and the implementation of conservation-based solutions, balancing both technologies and responsibilities among its member agencies as well as within its own capital program. Metropolitan established targets for a diversified portfolio of investments, both structural and programmatic, that have provided the foundation for continued water supply reliability during a period of prolonged drought and severe regulatory limitations. The accomplishments achieved by both member agencies and Metropolitan have demonstrated the effectiveness of establishing clear responsibilities and a common road map to the future. The diversified portfolio developed in the 1996 IRP has served the region well.

This IRP Update will continue to serve the region by adapting to the challenges and uncertainties of the future. Through a decade of difficult but productive collaboration in the Delta, large and bold solutions have emerged which carry the promise of "fixing" the plumbing in one of the most environmentally sensitive and ecologically complex water sources in the West. There is a clear path forward in the Delta. At the same time, there are opportunities within the Metropolitan service area to develop large-scale regional water recycling and seawater desalination facilities. These projects are also subject to equally complex institutional constraints on implementation and carry significant cost. Overall, solutions are available to address the growing demands for safe and reliable water in Southern California; however, the timing and cost of implementation are hard to predict.

Together, the options presented in this IRP Update are projected to meet the future water supply needs of Southern California, and identify the "low-regret" actions that Metropolitan can take in order to swiftly respond to the uncertainties that exist with all water resource programs.

THE METROPOLITAN WATER DISTRICT
OF SOUTHERN CALIFORNIA
www.mwdh2o.com

La Entrada Water Supply Assessment

Appendix B
2009 City of Coachella and Coachella Valley Water District Memorandum of Understanding

APPENDIX B

2009 City of Coachella and Coachella Valley Water District Memorandum of Understanding

MEMORANDUM OF UNDERSTANDING

This Memorandum of Understanding ("MOU") is entered into this 9 day of September 2009 ("Effective Date"), by and between the City of Coachella, a general law city in California ("City") and Coachella Valley Water District, a public agency of the State of California ("CVWD"). Each party hereto may be hereafter referred to individually as a "Party" or collectively as the "Parties."

RECITALS

A. Whereas CVWD and City recognize that the Whitewater River Groundwater Basin is in a state of overdraft, and that Coachella Valley water purveyors must act together to ensure that the Coachella Valley has sufficient water supplies to meet its current and future demands;

B. Whereas, Coachella Valley Water Management Plan ("CVWMP") was adopted to provide for management of the water supplies to meet the water needs of the Coachella Valley and correct the overdraft of the groundwater basin, and

C. Whereas, the CVWMP planning period is thirty-five years in the future, and is updated each five years, and

D. Whereas the District is currently conducting the first five-year update to the CVWMP,

E. Whereas, the CVWMP relies on water conservation, source water substitution and supplemental water supplies to meet the areas water needs, and

F. Whereas the City is a municipal water supplier which pumps water from the Whitewater River Groundwater Basin, and

G. Whereas the City through its General Plan recognized and supports the CVWMP including water conservation, source water substitution and supplemental water supplies water to meet the areas water needs, and

H. Whereas, the City desires to insure a reliable water supply within its Sphere of Influence through actions consistent with the CVWMP, and

I. Whereas the City desires to provide for its fair share of supplemental water for developments approved by the City or served by the City's water system, and

J. Whereas the City desires to provide water service to future developments with water needs that were not included in the current CVWMP, and

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K. The Parties desire to enter certain understandings with respect to insuring reliable long-term water supplies.

NOW, THEREFORE, for good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the Parties agree as follows:

1. The City agrees to:

   (a) Undertake measures effective to satisfy the water conservation goals of the CVWMP.

   (b) Cooperate with source substitution projects identified in the CVWMP.

   (c) Provide for supply of supplemental water for developments approved by the City and/or supplied by the City's water system after January 1, 2010, by any combination of the following, in a manner consistent with, and not in excess of, any requirements imposed by CVWD within its service territory:

      (1) Water Conservation criteria in excess of the goals of the CVWMP. For example, by adopting low water use landscaping requirements which reduce water use in excess of the current CVWMP water conservation goals.

      (2) Source Substitution not identified in the current CVWMP. For example, using recycled wastewater effluent of the City's Wastewater Treatment Plant for landscape irrigation instead of using groundwater.

      (3) Acquire supplemental water supplies sufficient to offset the impacts of new water demands within the City or supplied by the City's water system.

      (4) Participate in funding CVWD's acquisition of supplemental water supplies sufficient to offset the impacts of new water demands approved by the City or supplied by the City's water system. The amount paid for supplemental water supplies shall not exceed CVWD's Supplemental Water Supply Charge for similar development types and water requirements in effect at the time paid.

   (d) Provide water system demand data and projected water demand data for proposed projects to be utilized for planning and water accounting purposes.

2. CVWD agrees to:

   (a) Include water demands projections for areas within the City's Water Service Area and/or City's Sphere of Influence in the current and successive updates of the CVWMP.

(b) Involve the City to extent reasonably possible in the CVMWP update process and consider in good faith any input the City may offer.

(c) If the City funds acquisition of supplemental supplies in paragraph 1 (c) (4), to use its powers to purchase and hold title to and deliver supplemental water supplies for the benefit of the City.

3. The City and CVWD agrees to:

(a) Work cooperatively to complete studies, and adopt regulations and MOUs necessary to formalize the understandings herein.

(b) Work cooperatively to each amend their Urban Water Management Plans to address water supplies for areas within the City's sphere of influence.

4. The Parties hereto agree to cooperate with each other in furthering the purposes of this MOU. The Parties hereby agree to take such other actions and execute such other reasonable documents as are consistent with this MOU and as are reasonably necessary to effectuate this MOU; provided, however, that the foregoing shall not require Parties to take any legislative action or exercise its discretion in any particular manner.

5. This MOU contains the final and complete agreement between the Parties with respect to the matters herein discussed and supersedes all previous communications and agreements between them with respect to the subject matter hereof, whether oral or written, to the extent such prior communications and agreements are not consistent with this MOU.

6. In the event that any action or proceeding is commenced between the Parties hereto to enforce or interpret any term of this MOU, each party shall bear its own costs and fees. The costs and fees shall include, without limitation, attorneys' costs and fees incurred on appeal and those incurred in enforcing any judgment rendered in any such action or proceeding.

7. All notices shall be in writing and shall be considered given and received: (i) when delivered in person to the recipient named below; or (ii) three days after deposit in the United States mail, postage prepaid, addressed to the recipient named below; or (iii) on the date of delivery shown in the records of an express courier such as Federal Express or DHL; or (iv) on the date of delivery by facsimile transmission to the recipient named below. All notices shall be addressed as followed:

If to District:

General Manager/Chief Engineer
Coachella Valley Water District
P.O. Box 1058
Coachella, Ca 92236-1058

If to City:

City Manager
City of Coachella
1515 Sixth Street
Coachella, CA 92236

Any Party may, by notice given at any time, require subsequent notices to be given to another person or entity, whether a Party or an officer or representative of a Party, or to a different address, or both. Notices given before actual receipt of notice of change shall not be invalidated by the change.

8. This MOU and all its provisions shall in all respects be interpreted, construed, enforced, and governed by and under the laws of the State of California, without regard to its conflict of laws principles.

9. Any action or proceeding brought respecting this MOU shall be instituted and maintained in the appropriate court in the County of Riverside, California.

10. This MOU may be modified only by another written instrument duly authorized, executed, acknowledged by both Parties. The MOU may be terminated by either party after 6 months notice and only after a good faith effort to resolve any dispute that may arise hereunder.

11. The provisions of this MOU are specifically made severable. If any clause, provision, right, or remedy provided for herein is determined to be unlawful or unenforceable, the remainder of this MOU shall remain in effect and shall be enforced as if such clause, provision, right, or remedy were not contained herein.

12. The language in all parts of this MOU shall in all respects be construed as a whole according to its fair meaning, and not strictly for or against any other Party. This MOU is the product of mutual negotiation and drafting efforts. Accordingly, the judicial rule of construction that ambiguities in a document are to be construed against the drafter of that document shall have no application to the interpretation or enforcement of this MOU.

13. This MOU may be executed in one or more counterparts, each of which shall be an original and all such counterparts together shall constitute the entire agreement of the Parties hereto.

14. Each individual executing this MOU hereby represents and warrants that he or she has the full power and authority to execute this MOU on behalf of the named Parties.

IN WITNESS WHEREOF, the Parties have demonstrated their intent to implement the terms of the MOU by signing this MOU, effective as of the date above written.

DISTRICT:

COACHELLA VALLEY WATER DISTRICT, a public agency of the State of California

By: ______________________

Its: GENERAL MANAGER

CITY:

CITY OF COACHELLA, a general law city of the State of California

By: ______________________

Its: Interim City Manager

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RESOLUTION OF THE BOARD OF DIRECTORS OF COACHELLA VALLEY WATER DISTRICT

RESOLUTION NO. 2009-167

BE IT RESOLVED by the Board of Directors of the Coachella Valley Water District assembled in adjourned regular meeting this 18th day of August, 2009, that the appropriate officers are hereby authorized to execute on behalf of this District, a Memorandum of Understanding with the City of Coachella.

* * * * * * * * * * *

STATE OF CALIFORNIA)
COACHELLA VALLEY WATER DISTRICT) ss.
OFFICE OF THE SECRETARY)

I, JULIA FERNANDEZ, Secretary of the Board of Directors of the Coachella Valley Water District, DO HEREBY CERTIFY that the foregoing is a full, true and correct copy of Resolution No. 2009-167 adopted by the Board of Directors of said District at a adjourned regular meeting thereof duly held and convened on the 18th day of August, 2009, at which meeting a quorum of said Board was present and acting throughout. The Resolution was adopted by the following vote:

AYES: Five

NOES: None

ABSTAIN: None

Dated this 18th day of August, 2009.

(SEAL)

Julia Fernandez
Board Secretary

La Entrada Water Supply Assessment

Appendix C
2013 City of Coachella and Coachella Valley Water District Memorandum of Understanding

APPENDIX C

2013 City of Coachella and Coachella Valley Water District Memorandum of Understanding

MEMORANDUM OF UNDERSTANDING

REGARDING IMPLEMENTATION OF

PRIOR MEMORANDUM OF UNDERSTANDING

REGARDING COACHELLA VALLEY WATER MANAGEMENT PLAN

This Memorandum of Understanding ("Implementation MOU") is entered into effective this 27th day of Feb 2013 ("Effective Date"), by and between the City of Coachella, a general law city in California ("City") and Coachella Valley Water District, a public agency of the State of California ("CVWD"). Each party hereto may be hereafter referred to individually as a "Party" and both may be referred to collectively as the "Parties".

RECITALS

A. In 2009, City and CVWD entered into a Memorandum of Understanding ("Water Plan MOU") committing themselves to cooperate in implementing the goals and objectives of the Coachella Valley Water Management Plan ("CVWMP"), as the CVWMP may be amended or updated from time to time. The Water Plan MOU provides, in part, that the City may participate in funding CVWD's acquisition of Supplemental Water Supplies ("SWS") to offset, in whole or in part, water demands of new projects approved by the City or supplied by the City's domestic water system, provided that the City complies with the Water Plan MOU, including the payment to CVWD of CVWD's Supplemental Water Supply Charge ("SWSC").

B. This Implementation MOU is intended to implement the Water Plan MOU with respect to the acquisition of SWS and the processing of Water Supply Assessments required by SB 610, Water Code section 10910 et seq. ("WSAs") and Written Verifications required by SB 221, Government Code section 66473.7 ("Written Verifications") for new projects entitled by the City to the extent that such projects rely, in whole or in part, on the acquisition of SWS pursuant to section 1(c)(4) of the Water Plan MOU.

C. The goal of both the Water Plan MOU and this Implementation MOU is to ensure that the Coachella Valley has sufficient water supplies to meet its current and future demands and to allow the City to access SWS for new developments within the City in a manner that is consistent with the CVWMP.

D. This Implementation MOU is intended to supplement and further implement, but not modify, the Water Plan MOU. In the event of an inconsistency or ambiguity between the terms of the Water Plan MOU and this Implementation MOU, the terms of the Water Plan MOU shall control.

AGREEMENT

1. Supplemental Water Supply Charge ("SWSC")

(a) City will take reasonable steps to adopt and update its own SWSC based on CVWD's SWSC within 120 days of CVWD's action to update the current SWSC fee and any future updates. CVWD shall provide City with at least 60 days notice of any future update to CVWD's SWSC in order that City has an opportunity to review and comment on the updated fee study. City may impose a SWSC in excess of CVWD's SWSC to recoup City's costs in administering the SWS program. Subject to project-specific calculations pursuant to Section 2(b) below, the City's SWSC will be based on annual consumption factors with return flows and supplemental water costs that result in SWSC unit costs per acre by development type that are approximately equal to the SWSC unit costs per acre as published in CVWD's most recent Water System Backup Facility Charge Study.

(b) CVWD will cooperate with, and provide such information within CVWD's possession or control to, City to facilitate City's adoption of a SWSC and subsequent updates thereto in accordance with section 1(a) above.

(c) For new development projects under consideration by the City that will rely on SWS pursuant to section 1(c)(4) of the Water Plan MOU, City will impose on the project, as a condition of recordation of a final subdivision map or parcel map, or prior to the first water meter connection, whichever comes first, the City's then current SWSC The City will be allowed to condition projects to collect the SWSC through an approved phasing plan that is comparable to CVWD fee-collection policies in effect at that time. Within 30 days of receiving a SWSC payment from developer, City will remit CVWD's portion of the SWSC to CVWD.

(d) Any SWSC funds remitted by the City to CVWD shall be deemed used for the acquisition of SWS needed to supply the demands of the development project for which the SWSC is paid. CVWD will hold entitlement and deliver such SWS for the benefit of the City as the retail water provider for the project.

2. Water Supply Assessments and Written Verifications

(a) For new development projects under consideration by the City that will rely on SWS pursuant to section 1(c)(4) of the Water Plan MOU, City will use its best efforts to submit a draft WSA or draft Written Verification to CVWD for review at least 30 days prior to approval by the City. CVWD will use its best efforts to provide City with any comments on a draft WSA or draft Written Verification within 15 days of receiving the document for review.

(b) If City's calculation of SWS required for a project is different than CVWD's calculation using its "Supplemental Water Supply Charge by Development Type" chart, City and CVWD agree to meet and confer in good faith to develop a mutually agreed upon amount of SWS needed for the project and to resolve related issues. The object of meet and confer will be to determine the amount of SWS needed for the project in a manner that is consistent with best engineering estimates and accounts for factors including but not limited to comparable projects and specific project design features.

(c) Upon CVWD's review and City's finalization of a draft WSA or Written Verification in accordance with section 2(a) above, CVWD will issue a letter to the City confirming that CVWD has reviewed and concurs with the WSA or Written Verification, and that, subject to appropriate conditions, CVWD has the ability to provide sufficient SWS to meet project demands as set forth by the WSA or Written Verification.

3. Additional Terms

(a) Paragraphs 1 through 14 of the Water Plan MOU are incorporated herein by this reference, and the Water Plan MOU remains in full force and effect.

(b) Notwithstanding the provisions of this Implementation MOU, the Parties hereto continue to recognize and support the City's agreements as set forth in the Water Plan MOU, such that nothing herein shall be construed to limit City efforts to develop projects and provide for SWS for developments in accordance with section 1(c) of the Water Plan MOU.

(c) As of the Effective Date hereof, the Parties recognize that an application for development has been submitted to the City for the proposed La Entrada Specific Plan, and that the Water Plan MOU and this Implementation MOU are intended to apply to the use of SWS for said project.

IN WITNESS WHEREOF, the Parties have demonstrated their intent to supplement and further implement the Water Plan MOU by signing this Implementation MOU as of the Effective Date above written.

CVWD:	CITY:
COACHELLA VALLEY WATER DISTRICT, a public agency of the State of California	CITY OF COACHELLA, a general law city of the State of California
By: 02.27.13 J. M. Barrett	By: 02-27-2013 David Garcia
Its: Acting General Manager	Its: City Manager

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La Entrada Water Supply Assessment

Appendix D
Additional Factors Potentially Affecting SWP Deliveries

APPENDIX D

Additional Factors Potentially Affecting SWP Deliveries

SUMMARY OF FACTORS HAVING THE POTENTIAL TO AFFECT SWP DELIVERIES

Updated May 1, 2013

TOPIC	CASE NAME & ISSUE	FILING DATE	RECENT DEVELOPMENTS
OCAP BIOLOGICAL OPINIONS	**2008 Delta Smelt Biological Opinion** *San Luis Delta Mendota Water Authority v. Salazar* *E.D. Cal. (1:09-CV-00407)* *9th Circuit Court of Appeals (11-15871, 11-16617, 11-16621, 11-16623, 11-16624, 11-16660, 11-16662, 11-17143)* Water agencies challenge 2008 Delta smelt Biological Opinion, which imposes flow restrictions on the State Water Project and Central Valley Project to protect Delta smelt.	 *3-3-2009* *2011*	In March 2011, the Court (Wanger) issued a final judgment after finding that the Bureau of Reclamation unlawfully failed to prepare an adequate NEPA analysis before adopting the 2008 Biological Opinion ("BO"), and that the BO was unlawful on several grounds. The matter is now on appeal related to the court's final judgment. ***Appeal.*** Oral argument was presented to the Ninth Circuit Court of Appeals on September 10, 2012. It is anticipated that a written decision will take several months to issue. ***Remanded Biological Opinion.*** On March 15, 2013, the California Department of Water Resources ("DWR") and the Federal Defendants filed a joint motion to extend the schedule for the Fish and Wildlife Service to complete a new delta smelt BO by an additional 3 years to facilitate a Collaborative Science and Adaptive Management Process (CSAMP). On April 9, 2013, the district court issued an order extending remand in annual increments, whereby the parties must submit a status report on February 15, 2014, detailing progress made and why remand should be extended for the subsequent years.
	2009 Salmon Biological Opinion *San Luis Delta-Mendota Water Authority v. Locke* *E.D. Cal. (1:09-CV-01053)* *9th Circuit Court of Appeals (12-15144, 12-15289, 12-15290, 12-15291, 12-15293, 12-15296)* Water agencies challenge 2009 salmon Biological Opinion ("BO"), which imposes flow restrictions to protect salmon.	 *6-15-2009* *2012*	In September 2011, the court ruled that the Salmon BO was inadequate and ordered that a new BO be prepared. This ruling is now on appeal and cross-appeal by both Plaintiffs and Defendants. ***Appeal.*** On August 1, 2012, the Federal Defendants and the intervening environmental groups submitted their first briefs. The water contractors filed their responding briefs on November 7, 2012. On March 21, 2013, Federal Defendants and the intervening environmental groups submitted their reply briefs. Briefing is scheduled to continue through May 2013. ***Remanded Biological Opinion.*** On March 15, 2013, DWR and the Federal Defendants filed a joint motion to extend the schedule for the National Marine Fisheries Service to complete a new salmon BO by an additional 3 years to facilitate a Collaborative Science and Adaptive Management Process (CSAMP). On April 9, 2013, the district court issued an order extending remand in annual increments, whereby the parties must

TOPIC	CASE NAME & ISSUE	FILING DATE	RECENT DEVELOPMENTS
			submit a status report on February 15, 2014, detailing progress made and why remand should be extended for the subsequent years.
LONGFIN SMELT	**Longfin Smelt Protection under CESA** *State Water Contractors v. Dept. Fish & Wildlife* *Sacramento County Superior Court (34-2009-80000203)* State Water Contractors ("SWC") challenges DFW's recommendation of permanent CESA protection of Longfin smelt and the CESA "take" permit for Longfin smelt issued to DWR.	*12-8-2008*	The parties' stipulation to continue the stay was approved by the court on October 15, 2012, and provided that any party may give notice to terminate the stay. A case management conference will be held on May 10, 2013. The parties have filed a stipulation with the court requesting a stay of the case management conference until August 8, 2013, to allow further settlement discussions. (Under the federal Endangered Species Act, Fish and Wildlife Service's ("FWS") 12 month study was released in early April 2012, finding that range-wide, the Longfin is not threatened or endangered, but that the Bay-Delta population is a distinct population segment that is threatened or endangered. The Longfin has been given a priority classification of 3, which signifies that it may not be until 2013 or later that FWS begins work on a BO for Longfin smelt.)
BAY-DELTA LITIGATION (OTHER THAN ENDANGERED SPECIES)	**Public Trust Challenge to Delta Exports** *California Water Impact Network ("CWIN") v. SWRCB* *Sacramento County Superior Court (34-2010-80000653)* Environmental and fisheries advocates allege Delta exports violate the public trust doctrine and are unconstitutional, and seek to compel SWRCB to adopt and enforce flow, salinity, and temperature standards in the Bay-Delta. DWR is also a respondent, and State Water Contractors have intervened.	*9-3-2010*	DWR and the SWC's defense is that these issues have already been determined by related litigation that is now final. The administrative record has not yet been lodged, and on June 14, 2011, the court entered an updated order that confirmed that each responding party has until 30 days after lodging of the administrative record to file its answer to the petition. On July 1, 2011, the U.S. Bureau of Reclamation, which was named by Petitioners as a real party in interest, filed a statement that it will not waive sovereign immunity. No new activity.
	Challenge to SWP Impacts on Delta Channels *Cortopassi Partners, et al. v. State of California* *San Joaquin County Superior Court (CV034843)* Delta landowner alleges SWP operations, specifically Bureau of Reclamation's operation of the Delta Cross Channel, cause sedimentation that increases Delta	*2-25-2008*	Trial began on January 28, 2013 and is ongoing.

TOPIC	CASE NAME & ISSUE FILING DATE	RECENT DEVELOPMENTS
	water levels and increases flood risk to Delta property, and seeks to compel DWR to remove sedimentation in Delta channels.	
MONTEREY PLUS LITIGATION	**Monterey Plus CEQA & Validation Action (“Central Delta I”)** *6-3-2010* *Central Delta Water Agency (“CDWA”), et al. v. DWR* *Sacramento County Superior Court (34-2010-80000561)* Delta water agencies and environmental and fisheries advocates seek a ruling that the Monterey Amendments are invalid, decertification of the Monterey Plus EIR, and reversal of DWR’s approval of Monterey Plus.	Central Delta and other challengers seek to invalidate the Monterey Plus EIR and the Monterey Plus Project. On April 25, 2012, the court entered a written order bifurcating the issues for a series of trials. Phase One, dealing with affirmative defenses based upon statute of limitations, laches, and mootness, but not including defenses to the first cause of action, was tried by the court on November 2, 2012. On January 31, 2013, the court issued its Final Statement of Decision, in which the court found that plaintiffs’ second and third causes of action (for reverse validation and mandamus) were untimely, the statute of limitations for the former having run years ago, and the latter being a cause of action available only where validation is inapplicable, and as the Monterey Amendment and DWR-to-KCWA Kern Water Bank agreements were “matters” subject to validation, the third cause of action could not be maintained. The court expressly agreed with the defendants and real parties that plaintiffs had attempted to conflate the concepts of a “project” for CEQA purposes, and a “matter” for validation purposes. Additionally, the court found that challenges to the DWR-KWBA transfer were barred by the Annual Validating Act and that the defense of laches also applied to plaintiffs’ challenge to that transaction. The remaining cause of action, a CEQA challenge to the sufficiency of the 2010 EIR, has not yet been scheduled for hearing. The Central Delta I and Rosedale CEQA challenges have been consolidated. DWR has lodged the CEQA administrative record with the court. Given the large size of the record and the court’s busy docket, we anticipate a hearing date will be set in December 2013 or January 2014.
MONTEREY PLUS LITIGATION	**Kern Water Bank Transfer (“Central Delta II”)** *7-2-2010* *CDWA, et al. v. Kern County Water Agency* *Sacramento County Superior Court (34-2010-80000719)* Delta water agencies and environmental and fisheries	The case continues to be stayed by the court until resolution of the Central Delta I case. Central Delta II challenges the second leg of the Kern Water Bank transfer, i.e., the transfer from KCWA to KWBA, and should be subject to the same time-bar defenses against the reverse validation and mandamus causes of action. There is no CEQA cause of action in

TOPIC	CASE NAME & ISSUE FILING DATE	RECENT DEVELOPMENTS
	advocates seek to restore the Kern Water Bank to public ownership contrary to the Monterey Plus Project.	Central Delta II.
	Kern Water Bank Transfer ("Rosedale Litigation") *6-3-2010* *Rosedale–Rio Bravo Water Storage Dist., et al. v. DWR* *Sacramento County Superior Court (34-2010-80000703)* Rosedale-Rio Bravo and Buena Vista Water Storage Districts seek to overturn DWR's approval of the Kern Water Bank transfer, and to compel DWR to consider the transfer's impacts on groundwater levels in the Kern River aquifer.	See "Central Delta I," above. Certain State Water Contractors are no longer parties in the case as the result of a previous demurrer to issues involving State Water Project contractors. Rosedale has been consolidated with Central Delta I for resolution of the CEQA challenges. DWR and the Rosedale petitioners are currently discussing the cost for the CEQA administrative record. Once the disputes over the administrative record are resolved, we anticipate the court will set a hearing date on the CEQA causes of action in the Fall of 2013. On April 19, 2013, Rosedale filed a statement of issues that it intends to raise. A trial date has yet to be set.
POWER	**Hyatt Thermalito Power Sale Credits** *Alameda County Flood Control & Water Conservation District Zone 7 v. DWR* *Sacramento Cty. Sup. Ct. (05AS01775 & 07AS04901)* *3rd District Court of Appeal (C065522)* North of Tehachapi State Water Project contractors challenge manner in which DWR allocates the credit from sale of power from the Hyatt Thermalito Power Plant among state water contractors.	The court of appeal issued its opinion on February 15, 2013 affirming the trial court's ruling in favor of DWR and defendants, but on different grounds. The court held that the State Water Contract was not ambiguous on the subject of market rates, because its language when read in light of governing law, is not reasonably susceptible of a reading that requires application of current market rates. The petitioners did not seek review by the California Supreme Court and the time to do so has now passed. Accordingly, the court of appeal decision is now final.
POWER	**FERC Relicensing CEQA Challenge** *8-21-2008* *County of Butte, et al., v. DWR* *Yolo County Superior Court (CV-09-1258)* *3rd District Court of Appeal (C071785)* Plumas and Butte Counties seek to decertify DWR's EIR for the FERC relicensing project, and reverse DWR's approval the FERC relicensing application.	The FERC relicensing CEQA challenge was heard by the trial court on January 17, 2012. On June 8, 2012, the trial court entered judgment in favor of DWR. Plumas and Butte Counties have appealed. On January 14, 2013, the administrative record was lodged with the court of appeal. On February 28, 2013, the court granted the Counties' request to file an oversized opening brief. The Counties filed their opening brief on March 29, 2013. On April 3, 2013, the Counties filed a certificate of interested entities.
SHORTAGE CUTBACKS and AREA OF ORIGIN	**Area of Origin Challenge to SWP Exports** *7-17-2008* *Solano County Water Agency v. DWR* *Sacramento County Superior Court (34-2008-00016338)*	The parties have negotiated sets of "Agreement in Principle" for settlement, to be approved by DWR and all intervening contractors prior to DWR preparing final settlement documents and any necessary CEQA

TOPIC	CASE NAME & ISSUE FILING DATE	RECENT DEVELOPMENTS
	Four northern State Water Project contractors seek to enjoin DWR from imposing Article 18 shortage provisions against them, citing "area of origin" and "county of origin" rights.	documents. Many State Water Contractors have approved the Agreement in Principle. On January 7, 2013, the court entered a stipulated order extending a stay of court proceedings to January 30, 2013, and extending the statute of limitations for the underlying claims to October 31, 2015. On February 11, 2013, the court entered a further stipulated order extending the stay imposed on January 7, 2013, through the earlier of April 30, 2013 or when the court approves a Settlement Agreement. There are no pending hearings.
WATER QUALITY	**Delta Mercury TMDL Litigation** *7-21-2011* *State Water Contractors v. SWRCB, et al.* *Sacramento County Superior Court (34-2011-00107299)* SWC seeks to overturn the open water allocation assigned to the Department of Water Resources under the Mercury and Total Mercury TMDL, adopted by the SWRCB and Regional.	The SWC claim that DWR cannot be assigned the open water allocation because State Water Project operations do not constitute a discharge under the Clean Water Act. The lawsuit has been stayed since filing and the SWC are working with DWR to participate in the Phase I studies. The SWC board authorized counsel to enter into a long term tolling agreement for the Phase 1 time period. A long term tolling agreement has been signed and the case will be dismissed without prejudice. SWC will continue to participate in the Phase 1 studies and can re-file the lawsuit if necessary at a later date.

Memorandum of Understanding 2009

COACHELLA CITY COUNCIL
AGENDA REPORT

TO: **Honorable Mayor and Council Members of the Coachella City Council**

FROM: **Paul Toor, Public Works Director**

DATE: **September 9, 2009**

SUBJECT: **CONSIDERATION OF THE CITY COUNCIL TO APPROVE A MEMORANDUM OF UNDERSTANDING (MOU) WITH THE COACHELLA VALLEY WATER DISTRICT**

STAFF RECOMMENDATION

It is recommended that the City Council adopt the Memorandum of Understanding (MOU) between the City and the Coachella Valley Water District enclosed herewith as Exhibit "A" and authorize the City Manager to execute the said Memorandum of Understanding (MOU).

BACKGROUND

The City of Coachella and the Coachella Water Authority provides potable water to all residents and businesses within its service boundaries. California Water Code Section10631 requires each water supplier to identify and quantify the existing and planned sources of water available to the supplier. Additionally, Senate Bill SB221 and SB 610 require local agencies approving new developments to prepare Water Supply Verification (WSV) and Water Supply Assessment (WSA) for the projects prior to approval. The purpose of this MOU is to ensure long term reliable water supply to all the existing and future customers within the City's service boundaries. As set forth in the MOU the Coachella Valley Water District will include City service boundaries in the Coachella Valley l Water Management Plan (CVWMP). In return the City agrees to acquire and pay for the supplemental water supplies to offset the impacts of new water demands.

FISCAL IMPACT

Approval of the proposed MOU does not have any impact on City's general fund or the existing rate payers. City will propose an impact fee for the future supplemental waters supplies to be collected from the new developments. The fees collected from the new developments shall be exclusively used to mitigate the impacts of the new water demand.

Concur:

Reviewed by:

John Gerardi, Finance Director/
Interim City Manager

Steve Brown, Interim City Manager

Recommended by:

Paul Fitor, Public Works Director

MEMORANDUM OF UNDERSTANDING

This Memorandum of Understanding ("MOU") is entered into this __ day of ______, 2009 ("Effective Date"), by and between the City of Coachella, a general law city in California ("City") and Coachella Valley Water District, a public agency of the State of California ("CVWD"). Each party hereto may be hereafter referred to individually as a "Party" or collectively as the "Parties."

RECITALS

A. Whereas CVWD and City recognize that the Whitewater River Groundwater Basin is in a state of overdraft, and that Coachella Valley water purveyors must act together to ensure that the Coachella Valley has sufficient water supplies to meet its current and future demands;

B. Whereas, Coachella Valley Water Management Plan ("CVWMP") was adopted to provide for management of the water supplies to meet the water needs of the Coachella Valley and correct the overdraft of the groundwater basin, and

C. Whereas, the CVWMP planning period is thirty-five years in the future, and is updated each five years, and

D. Whereas the District is currently conducting the first five-year update to the CVWMP,

E. Whereas, the CVWMP relies on water conservation, source water substitution and supplemental water supplies to meet the areas water needs, and

F. Whereas the City is a municipal water supplier which pumps water from the Whitewater River Groundwater Basin, and

G. Whereas the City through its General Plan recognized and supports the CVWMP including water conservation, source water substitution and supplemental water supplies water to meet the areas water needs, and

H. Whereas, the City desires to insure a reliable water supply within its Sphere of Influence through actions consistent with the CVWMP, and

I. Whereas the City desires to provide for its fair share of supplemental water for developments approved by the City or served by the City's water system, and

J. Whereas the City desires to provide water service to future developments with water needs that were not included in the current CVWMP, and

K. The Parties desire to enter certain understandings with respect to insuring reliable long-term water supplies.

NOW, THEREFORE, for good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the Parties agree as follows:

1. The City agrees to:

   (a) Undertake measures effective to satisfy the water conservation goals of the CVWMP.

   (b) Cooperate with source substitution projects identified in the CVWMP.

   (c) Provide for supply of supplemental water for developments approved by the City and/or supplied by the City's water system after January 1, 2010, by any combination of the following, in a manner consistent with, and not in excess of, any requirements imposed by CVWD within its service territory:

      (1) Water Conservation criteria in excess of the goals of the CVWMP. For example, by adopting low water use landscaping requirements which reduce water use in excess of the current CVWMP water conservation goals.

      (2) Source Substitution not identified in the current CVWMP. For example, using recycled wastewater effluent of the City's Wastewater Treatment Plant for landscape irrigation instead of using groundwater.

      (3) Acquire supplemental water supplies sufficient to offset the impacts of new water demands within the City or supplied by the City's water system.

      (4) Participate in funding CVWD's acquisition of supplemental water supplies sufficient to offset the impacts of new water demands approved by the City or supplied by the City's water system. The amount paid for supplemental water supplies shall not exceed CVWD's Supplemental Water Supply Charge for similar development types and water requirements in effect at the time paid.

   (d) Provide water system demand data and projected water demand data for proposed projects to be utilized for planning and water accounting purposes.

2. CVWD agrees to:

   (a) Include water demands projections for areas within the City's Water Service Area and/or City's Sphere of Influence in the current and successive updates of the CVWMP.

   (b) Involve the City to extent reasonably possible in the CVMWP update process and consider in good faith any input the City may offer.

(c) If the City funds acquisition of supplemental supplies in paragraph 1 (c) (4), to use its powers to purchase and hold title to and deliver supplemental water supplies for the benefit of the City.

3. The City and CVWD agrees to:

(a) Work cooperatively to complete studies, and adopt regulations and MOUs necessary to formalize the understandings herein.

(b) Work cooperatively to each amend their Urban Water Management Plans to address water supplies for areas within the City's sphere of influence.

4. The Parties hereto agree to cooperate with each other in furthering the purposes of this MOU. The Parties hereby agree to take such other actions and execute such other reasonable documents as are consistent with this MOU and as are reasonably necessary to effectuate this MOU; provided, however, that the foregoing shall not require Parties to take any legislative action or exercise its discretion in any particular manner.

5. This MOU contains the final and complete agreement between the Parties with respect to the matters herein discussed and supersedes all previous communications and agreements between them with respect to the subject matter hereof, whether oral or written, to the extent such prior communications and agreements are not consistent with this MOU.

6. In the event that any action or proceeding is commenced between the Parties hereto to enforce or interpret any term of this MOU, each party shall bear its own costs and fees. The costs and fees shall include, without limitation, attorneys' costs and fees incurred on appeal and those incurred in enforcing any judgment rendered in any such action or proceeding.

7. All notices shall be in writing and shall be considered given and received: (i) when delivered in person to the recipient named below; or (ii) three days after deposit in the United States mail, postage prepaid, addressed to the recipient named below; or (iii) on the date of delivery shown in the records of an express courier such as Federal Express or DHL; or (iv) on the date of delivery by facsimile transmission to the recipient named below. All notices shall be addressed as followed:

If to District:

General Manager/Chief Engineer
Coachella Valley Water District
P.O. Box 1058
Coachella, Ca 92236-1058

If to City:

City Manager
City of Coachella
1515 Sixth Street
Coachella, CA 92236

Any Party may, by notice given at any time, require subsequent notices to be given to another person or entity, whether a Party or an officer or representative of a Party, or to a different address, or both. Notices given before actual receipt of notice of change shall not be invalidated by the change.

8. This MOU and all its provisions shall in all respects be interpreted, construed, enforced, and governed by and under the laws of the State of California, without regard to its conflict of laws principles.

9. Any action or proceeding brought respecting this MOU shall be instituted and maintained in the appropriate court in the County of Riverside, California.

10. This MOU may be modified only by another written instrument duly authorized, executed, acknowledged by both Parties. The MOU may be terminated by either party after 6 months notice and only after a good faith effort to resolve any dispute that may arise hereunder.

11. The provisions of this MOU are specifically made severable. If any clause, provision, right, or remedy provided for herein is determined to be unlawful or unenforceable, the remainder of this MOU shall remain in effect and shall be enforced as if such clause, provision, right, or remedy were not contained herein.

12. The language in all parts of this MOU shall in all respects be construed as a whole according to its fair meaning, and not strictly for or against any other Party. This MOU is the product of mutual negotiation and drafting efforts. Accordingly, the judicial rule of construction that ambiguities in a document are to be construed against the drafter of that document shall have no application to the interpretation or enforcement of this MOU.

13. This MOU may be executed in one or more counterparts, each of which shall be an original and all such counterparts together shall constitute the entire agreement of the Parties hereto.

14. Each individual executing this MOU hereby represents and warrants that he or she has the full power and authority to execute this MOU on behalf of the named Parties.

IN WITNESS WHEREOF, the Parties have demonstrated their intent to implement the terms of the MOU by signing this MOU, effective as of the date above written.

DISTRICT:

COACHELLA VALLEY WATER DISTRICT, a public agency of the State of California

By: ____________________

Its: ____________________

CITY:

CITY OF COACHELLA, a general law city of the State of California

By: ____________________

Its: ____________________

Memorandum of Understanding 2013

MEMORANDUM OF UNDERSTANDING

REGARDING IMPLEMENTATION OF

PRIOR MEMORANDUM OF UNDERSTANDING

REGARDING COACHELLA VALLEY WATER MANAGEMENT PLAN

This Memorandum of Understanding ("Implementation MOU") is entered into effective this 27th day of Feb 2013 ("Effective Date"), by and between the City of Coachella, a general law city in California ("City") and Coachella Valley Water District, a public agency of the State of California ("CVWD"). Each party hereto may be hereafter referred to individually as a "Party" and both may be referred to collectively as the "Parties".

RECITALS

A. In 2009, City and CVWD entered into a Memorandum of Understanding ("Water Plan MOU") committing themselves to cooperate in implementing the goals and objectives of the Coachella Valley Water Management Plan ("CVWMP"), as the CVWMP may be amended or updated from time to time. The Water Plan MOU provides, in part, that the City may participate in funding CVWD's acquisition of Supplemental Water Supplies ("SWS") to offset, in whole or in part, water demands of new projects approved by the City or supplied by the City's domestic water system, provided that the City complies with the Water Plan MOU, including the payment to CVWD of CVWD's Supplemental Water Supply Charge ("SWSC").

B. This Implementation MOU is intended to implement the Water Plan MOU with respect to the acquisition of SWS and the processing of Water Supply Assessments required by SB 610, Water Code section 10910 et seq. ("WSAs") and Written Verifications required by SB 221, Government Code section 66473.7 ("Written Verifications") for new projects entitled by the City to the extent that such projects rely, in whole or in part, on the acquisition of SWS pursuant to section 1(c)(4) of the Water Plan MOU.

C. The goal of both the Water Plan MOU and this Implementation MOU is to ensure that the Coachella Valley has sufficient water supplies to meet its current and future demands and to allow the City to access SWS for new developments within the City in a manner that is consistent with the CVWMP.

D. This Implementation MOU is intended to supplement and further implement, but not modify, the Water Plan MOU. In the event of an inconsistency or ambiguity between the terms of the Water Plan MOU and this Implementation MOU, the terms of the Water Plan MOU shall control.

AGREEMENT

1. Supplemental Water Supply Charge ("SWSC")

(a) City will take reasonable steps to adopt and update its own SWSC based on CVWD's SWSC within 120 days of CVWD's action to update the current SWSC fee and any future updates. CVWD shall provide City with at least 60 days notice of any future update to CVWD's SWSC in order that City has an opportunity to review and comment on the updated fee study. City may impose a SWSC in excess of CVWD's SWSC to recoup City's costs in administering the SWS program. Subject to project-specific calculations pursuant to Section 2(b) below, the City's SWSC will be based on annual consumption factors with return flows and supplemental water costs that result in SWSC unit costs per acre by development type that are approximately equal to the SWSC unit costs per acre as published in CVWD's most recent Water System Backup Facility Charge Study.

(b) CVWD will cooperate with, and provide such information within CVWD's possession or control to, City to facilitate City's adoption of a SWSC and subsequent updates thereto in accordance with section 1(a) above.

(c) For new development projects under consideration by the City that will rely on SWS pursuant to section 1(c)(4) of the Water Plan MOU, City will impose on the project, as a condition of recordation of a final subdivision map or parcel map, or prior to the first water meter connection, whichever comes first, the City's then current SWSC The City will be allowed to condition projects to collect the SWSC through an approved phasing plan that is comparable to CVWD fee-collection policies in effect at that time. Within 30 days of receiving a SWSC payment from developer, City will remit CVWD's portion of the SWSC to CVWD.

(d) Any SWSC funds remitted by the City to CVWD shall be deemed used for the acquisition of SWS needed to supply the demands of the development project for which the SWSC is paid. CVWD will hold entitlement and deliver such SWS for the benefit of the City as the retail water provider for the project.

2. Water Supply Assessments and Written Verifications

(a) For new development projects under consideration by the City that will rely on SWS pursuant to section 1(c)(4) of the Water Plan MOU, City will use its best efforts to submit a draft WSA or draft Written Verification to CVWD for review at least 30 days prior to approval by the City. CVWD will use its best efforts to provide City with any comments on a draft WSA or draft Written Verification within 15 days of receiving the document for review.

(b) If City's calculation of SWS required for a project is different than CVWD's calculation using its "Supplemental Water Supply Charge by Development Type" chart, City and CVWD agree to meet and confer in good faith to develop a mutually agreed upon amount of SWS needed for the project and to resolve related issues. The object of meet and confer will be to determine the amount of SWS needed for the project in a manner that is consistent with best engineering estimates and accounts for factors including but not limited to comparable projects and specific project design features.

(c) Upon CVWD's review and City's finalization of a draft WSA or Written Verification in accordance with section 2(a) above, CVWD will issue a letter to the City confirming that CVWD has reviewed and concurs with the WSA or Written Verification, and that, subject to appropriate conditions, CVWD has the ability to provide sufficient SWS to meet project demands as set forth by the WSA or Written Verification.

3. Additional Terms

(a) Paragraphs 1 through 14 of the Water Plan MOU are incorporated herein by this reference, and the Water Plan MOU remains in full force and effect.

(b) Notwithstanding the provisions of this Implementation MOU, the Parties hereto continue to recognize and support the City's agreements as set forth in the Water Plan MOU, such that nothing herein shall be construed to limit City efforts to develop projects and provide for SWS for developments in accordance with section 1(c) of the Water Plan MOU.

(c) As of the Effective Date hereof, the Parties recognize that an application for development has been submitted to the City for the proposed La Entrada Specific Plan, and that the Water Plan MOU and this Implementation MOU are intended to apply to the use of SWS for said project.

IN WITNESS WHEREOF, the Parties have demonstrated their intent to supplement and further implement the Water Plan MOU by signing this Implementation MOU as of the Effective Date above written.

CVWD:	CITY:
COACHELLA VALLEY WATER DISTRICT, a public agency of the State of California	CITY OF COACHELLA, a general law city of the State of California
By: 02.27.13 J. M. Barrett	By: 02-27-2013 David Garcia
Its: Acting General Manager	Its: City Manager

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RESOLUTION OF THE BOARD OF DIRECTORS OF
COACHELLA VALLEY WATER DISTRICT

RESOLUTION NO. 2013-25

BE IT RESOLVED by the Board of Directors of the Coachella Valley Water District assembled in regular meeting this 12th day of February, 2013, that the Acting General Manager is hereby authorized to execute on behalf of this District, a Memorandum of Understanding Regarding Implementation of Prior Memorandum of Understanding Regarding Coachella Valley Water Management Plan between the Coachella Valley Water District and the City of Coachella.

* * * * * * * * *

STATE OF CALIFORNIA)
COACHELLA VALLEY WATER DISTRICT) ss.
OFFICE OF THE SECRETARY)

I, JULIA FERNANDEZ, Secretary of the Board of Directors of the Coachella Valley Water District, DO HEREBY CERTIFY that the foregoing is a full, true and correct copy of Resolution No. 2013-25 adopted by the Board of Directors of said District at a regular meeting thereof duly held and convened on the 12th day of February, 2013, at which meeting a quorum of said Board was present and acting throughout. The Resolution was adopted by the following vote:

Ayes:	Five
Directors:	Nelson, Powell, Pack, De Klotz, Livesay
Noes:	None

Dated this 12th day of February, 2013.

(SEAL)

Julia Fernandez
Board Secretary

Excerpt from

MINUTES

OF A REGULAR MEETING
OF THE
CITY COUNCIL OF THE CITY OF COACHELLA,

February 13, 2013

9.b. Approve the Implementation Memorandum of Understanding (MOU) between the City of Coachella/Coachella Water Authority (City) and the Coachella Valley Water District (CVWD) as it pertains to the 2009 Water Plan MOU, and authorize the City Manager to execute the said MOU.

Motion:	To approve per staff recommendation.
Made by:	Mayor Garcia
Seconded by:	Councilmember Zepeda
Approved:	4-0-1, by the following roll call vote:
AYES:	Councilmember Aviles, Councilmember Zepeda, Mayor Pro Tem Martinez and Mayor Garcia.
NOES:	None.
ABSTAIN:	Councilmember Hernandez.
ABSENT:	None.

STATE OF CALIFORNIA)
COUNTY OF RIVERSIDE) ss
CITY OF COACHELLA)

I, Andrea Carranza, Deputy City Clerk of the City of Coachella, do hereby certify that the above mentioned item was passed and adopted at a regular meeting of the City Council held on the 13th day of February, 2013.

Andrea Carranza

Andrea Carranza, Deputy City Clerk

AGREEMENT

THIS AGREEMENT ("Agreement") is made and entered into on this 9 day of Jan., 2008 ("Effective Date") by and between COACHELLA VALLEY WATER DISTRICT, a public agency of the State of California, ("District"), and CITY OF COACHELLA, a general law city in California ("City"). District and City are sometimes referred to individually as "Party" or collectively as "Parties."

RECITALS

A. District is a public agency organized, operating and existing under Sections 30000 et seq. of the California Water Code. Pursuant to such authority, the District is authorized to provide water and sanitation service in the Counties of Riverside, San Diego and Imperial.

B. City is a general law city located in the County of Riverside, State of California. Pursuant to such authority, City provides water and sanitation service to customers within the City of Coachella boundaries, as depicted on Exhibit "A" attached hereto and by this reference incorporated herein.

C. City provides water service within the boundaries of the City of Coachella through the City of Coachella Water Department.

D. City provides sewer service within the boundaries of the City of Coachella through the City of Coachella Sanitary District.

E. Each Party is authorized pursuant to California law to provide water and sewer service which could otherwise result in inefficient systems and duplication of services.

F. District and City are desirous of reaching an agreement which establishes permanent boundaries for water and sewer service to be currently provided by each.

NOW, THEREFORE, THE PARTIES AGREE AS FOLLOWS:

1. All of the above Recitals are hereby incorporated by reference to the same extent as though herein again set forth in full.

2. From and after the Effective Date, this Agreement establishes the boundaries for water and sewer service between District and City

3. Except as provided in Paragraph 4, City will provide, and CVWD will not provide, water and sewer service to the area lying north of the centerline of Avenue 56 and within the City boundary and Sphere of Influence existing on the Effective Date and the Proposed Sphere of Influence east of Jackson Street, as depicted on Exhibit "A."

4. Any Customer being served by District or City as of Effective Date and any property subject to a "Will Serve" letter issued by the District or City thirty (30) days prior to the Effective Date shall continue to be served by such Party, whether inside or outside the boundaries of District and City established under this Agreement. On request of either party ("Territory Party") new customers ("Temporary Customers") within its service area may be served by the other party ("Servicing Party"), if service is infeasible at that time by the Territory Party. The terms of Temporary Service shall be as agreed upon by the parties. Upon later request of the Territory Party, the Servicing Party will transfer to the Territory Party the Temporary Customer accounts, as well as any infrastructure, capacity fees, or supplemental import water rights, purchased by or on behalf of the Temporary Customers which are not otherwise retained by the Servicing Party by prior agreement.

5. All other areas within the City boundary and City's Sphere of Influence will be a service area of the District, as depicted on Exhibit "A."

6. City may provide water and / or sewer service to the area in the Northern Un-annexed Area as shown on Exhibit "A" if City is the first city to annex that area. The Northern Un-annexed Area is described as that area bounded by the existing northern Coachella City Boundary (south), Dillon/Tyler Road (west), Avenue 37 (north) and Johnson Avenue (east).

7. Neither Party can extend its service area into the service area of the other Party without prior written consent of the encroached upon Party. The consent requested shall be at the sole and absolute discretion of the encroached-upon Party.

8. Either Party may install pipelines through service area of the other provided that they are necessary and convenient to providing service in the installing Party's service area.

9. Water service by either Party to tribal property is subject to tribal consent.

10. This Agreement does not apply in any way to water service supplied by the District from the Coachella Canal or its distribution system to non-potable uses.

11. CVWD will provide two twelve-inch water connections and meters at the north side of Avenue 56, one at Fillmore Street and the other at Pierce for future connection by the City of Coachella, on such terms as may be agreed upon by the parties. Costs for these two connections and meters will be bourn by the City.

12. The Parties hereto agree to cooperate with each other in furthering the purposes of this Agreement. The Parties hereby agree to take such other actions and execute such other reasonable documents as are consistent with this Agreement and as are reasonably necessary to effectuate this Agreement; provided, however, that the foregoing shall not require District to take any legislative action or exercise its discretion in any particular manner.

13. This Agreement contains the final and complete agreement between the Parties with respect to the matters herein discussed and supersedes all previous communications and agreements between them with respect to the subject matter hereof, whether oral or written, to the extent such prior communications and agreement are not consistent with this Agreement.

14. In the event that any action or proceeding is commenced between the Parties hereto to enforce or interpret any term of this Agreement, each party shall bear its own attorneys' costs and fees. The attorneys' costs and fees shall include, without limitation, attorneys' costs and fees incurred on appeal and those incurred in enforcing any judgment rendered in any such action or proceeding.

15. All notices shall be in writing and shall be considered given and received: (i) when delivered in person to the recipient named below; or (ii) three days after deposit in the United States mail, postage prepaid, addressed to the recipient named below; or (iii) on the date of delivery shown in the records of an express courier such as Federal Express or DHL; or (iv) on the date of delivery by facsimile transmission to the recipient named below. All notices shall be addressed as followed:

If to District:

General Manager/Chief Engineer
Coachella Valley Water District
P.O. Box 1058
Coachella, Ca 92236-1058

If to City:

City Manager
City of Coachella
1515 Sixth Street
Coachella, CA 92236

Any Party may, by notice given at any time, require subsequent notices to be given to another person or entity, whether a Party or an officer or representative of a Party, or to a different address, or both. Notices given before actual receipt of notice of change shall not be invalidated by the change.

16. This Agreement and all its provisions shall in all respects be interpreted, construed, enforced, and governed by and under the laws of the State of California, without regard to its conflict of laws principles.

17. Any action or proceeding brought respecting this Agreement shall be instituted and maintained in the appropriate court in the County of Riverside, California.

18. This Agreement may be modified only by another written instrument duly authorized, executed, acknowledged by both Parties.

19. The provisions of this Agreement are specifically made severable. If any clause, provision, right, or remedy provided for herein is determined to be unlawful or unenforceable, the remainder of this Agreement shall remain in effect and shall be enforced as if such clause, provision, right, or remedy were not contained herein.

20. The language in all parts of this Agreement shall in all respects be construed as a whole according to its fair meaning, and not strictly for or against any other Party. This Agreement is the product of mutual negotiation and drafting efforts. Accordingly, the judicial rule of construction that ambiguities in a document are to be construed against the drafter of that document shall have no application to the interpretation or enforcement of this Agreement.

21. This Agreement may be executed in one or more counterparts, each of which shall be an original and all such counterparts together shall constitute the entire Agreement of the Parties hereto.

22. Each individual executing this Agreement hereby represents and warrants that he or she has the full power and authority to execute this Agreement on behalf of the named Parties.

23. This Agreement shall not be extinguished or altered in any way, by any Party without the prior written consent of the District.

IN WITNESS WHEREOF, the Parties hereto have caused this Agreement to be executed by their duly authorized representatives as of the date first above written.

DISTRICT:

COACHELLA VALLEY WATER DISTRICT, a public agency of the State of California

By: ______________________

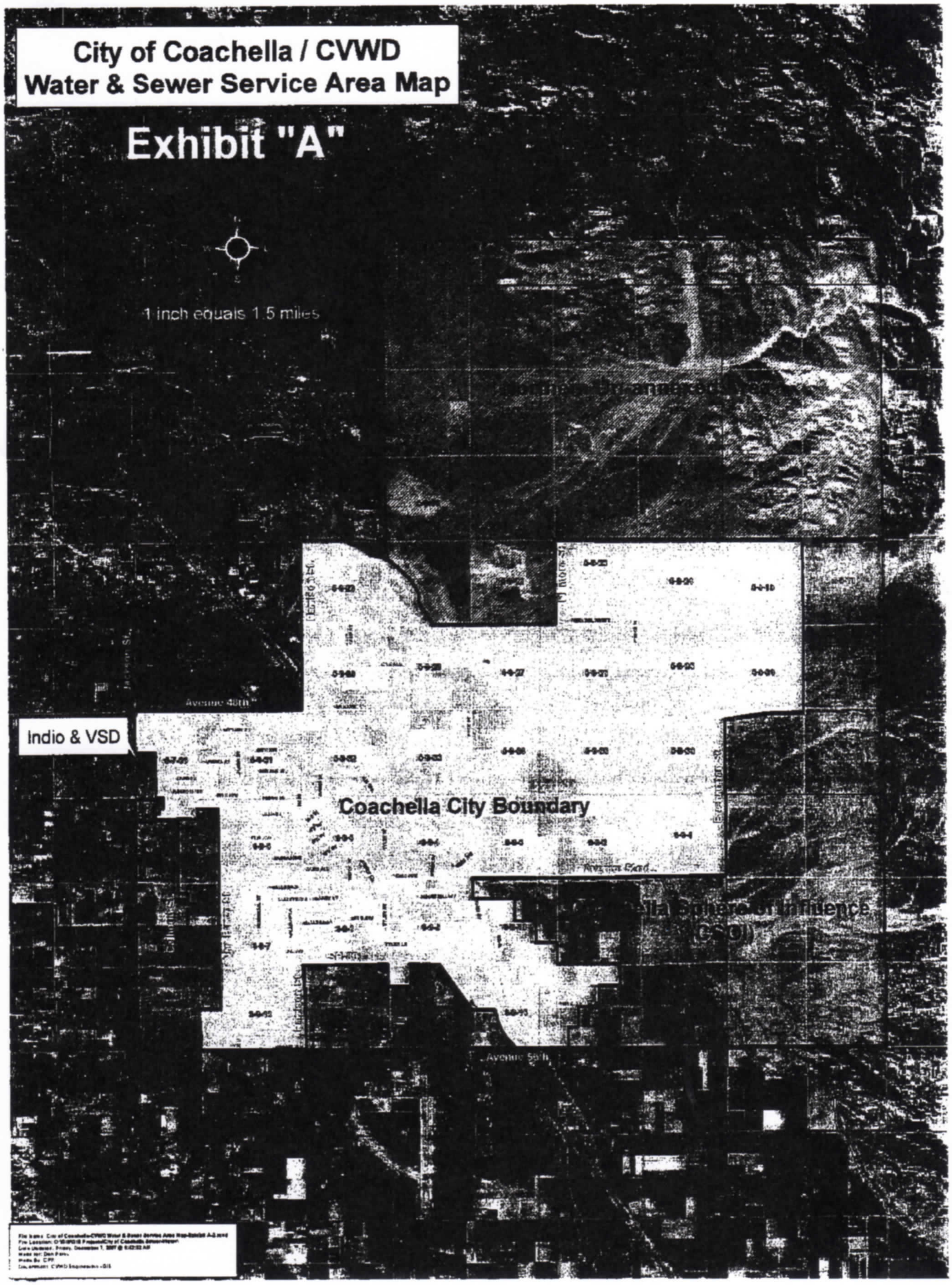
Its: ______________________

CITY:

CITY OF COACHELLA, a general law city of the State of California

By: ______________________

Its: Mayor


City of Coachella / CVWD
Water & Sewer Service Area Map
Exhibit "A"
1 inch equals 1.5 miles
Avenue 48th
Indio & VSD
Coachella City Boundary
Avenue 58th