# Coachella Valley Water District

# 2010 Urban Water Management Plan

## Final Report

July 2011

# TABLE OF CONTENTS

**Page Number**

# Table of Contents

# Table of Contents



# List of Figures

## List of Tables

# Table of Contents

## List of Tables

# 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 7$^{th}$ 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.*

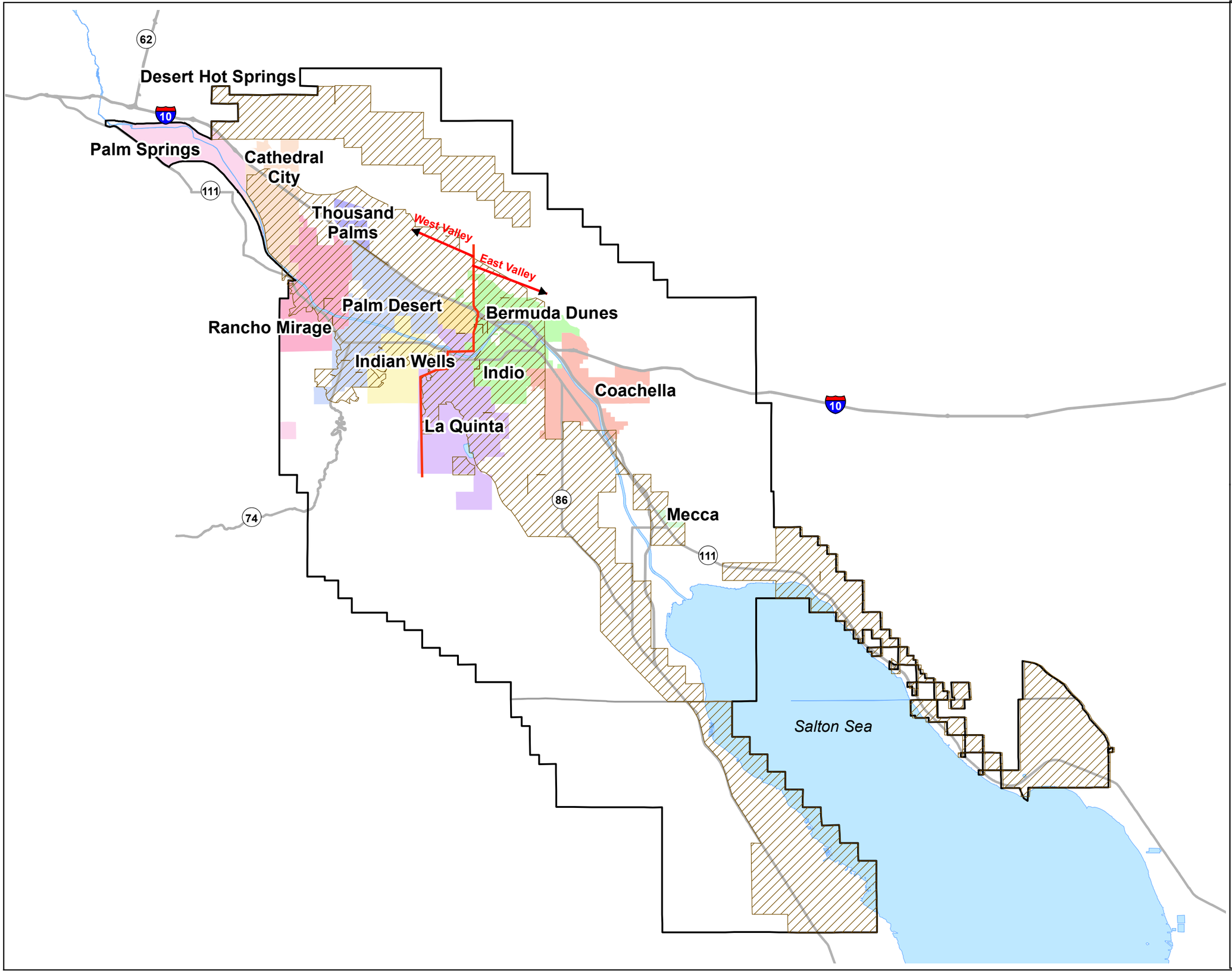
## 2.2 Service Area Physical Description

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.

# Section 2
# System Description

THIS PAGE IS INTENTIONALLY LEFT BLANK




**Legend**

- CVWD Boundary
- County Border
- Waterbodies
- Highways
- Urban Water Service Area

N

0 2.5 5 7.5 Miles

**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:

$$Distribution\ Service\ Population\ for\ each\ Baseline\ Year$$
$$= \left(No.\ of\ SFR\ Connections \times Census\ 2000\ SFR\ \frac{Persons}{Connection}\right)$$
$$+ \left(No.\ of\ MFR\ Connections \times Census\ 2000\ MFR\ \frac{Persons}{Connection}\right)$$

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.

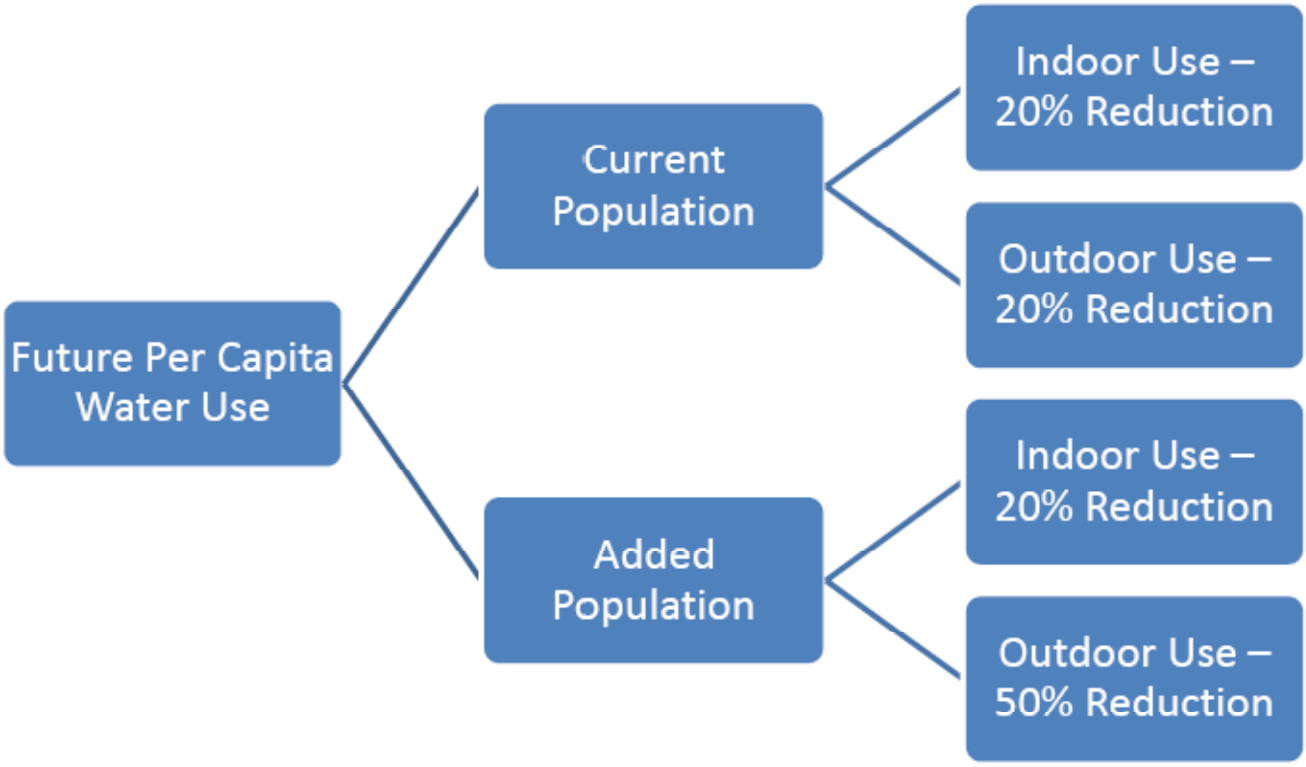



*Figure 3-1*
*Future Per Capita Water Use*

*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 |

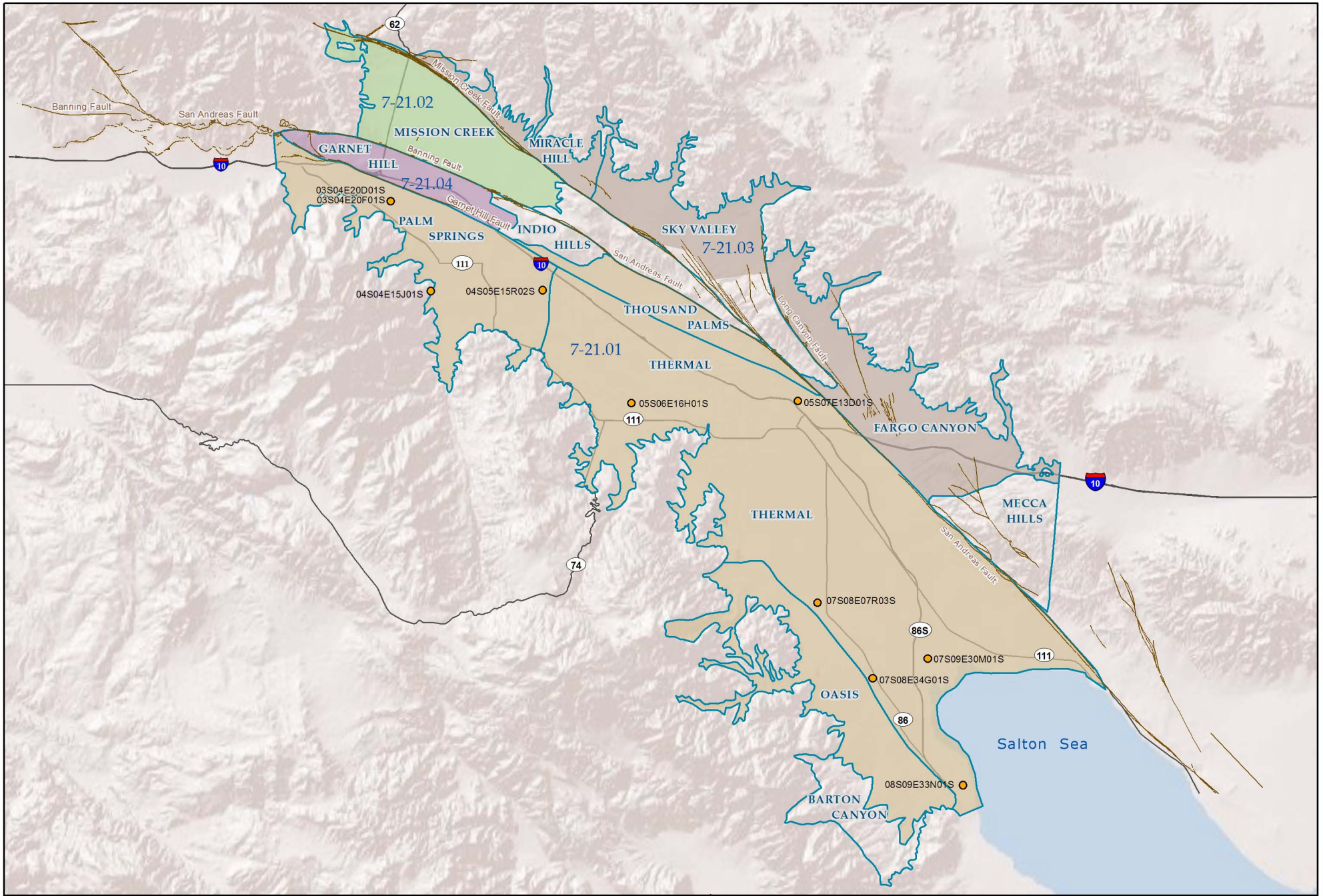
Source: CVWD Engineer's Report on Water Supply and Replenishment Assessment 2010-2011 (CVWD, 2010a)

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.


62
Banning Fault
San Andreas Fault
Mission Creek Fault
7-21.02
MISSION CREEK
MIRACLE HILL
GARNET HILL
Banning Fault
7-21.04
Garnet Hill Fault
03S04E20D01S
03S04E20F01S
PALM SPRINGS
INDIO HILLS
SKY VALLEY
7-21.03
San Andreas Fault
10
111
04S04E15J01S
04S05E15R02S
THOUSAND PALMS
Long Canyon Fault
7-21.01
THERMAL
05S06E16H01S
05S07E13D01S
FARGO CANYON
MECCA HILLS
74
THERMAL
San Andreas Fault
07S08E07R03S
86S
07S09E30M01S
07S08E34G01S
OASIS
86
Salton Sea
08S09E33N01S
BARTON CANYON
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.
N
0 2 4 8 Miles
Document: \Coachella Valley WD\WMP Update\14 Electronic Files - Modeling\GIS\Projects\CVWDSubbasins.mxd
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.

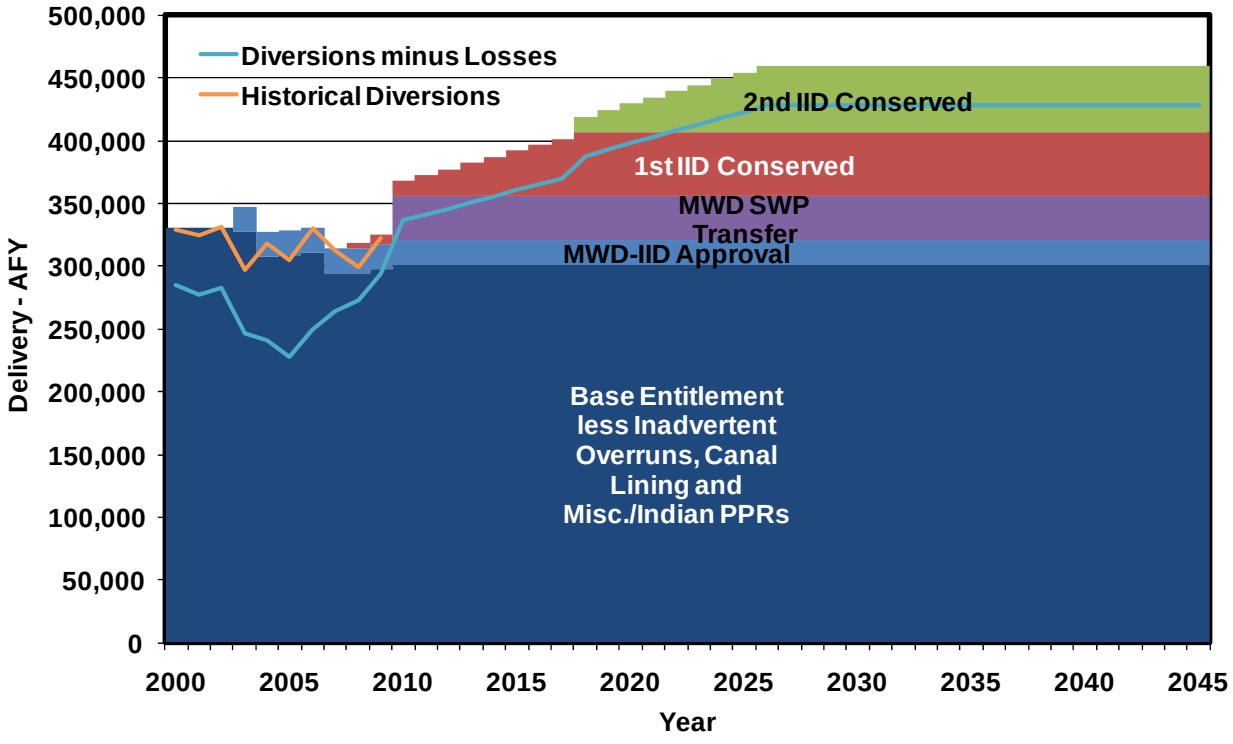



*Figure 4-2*
*CVWD Colorado River Water Allocation Chart*

### 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)

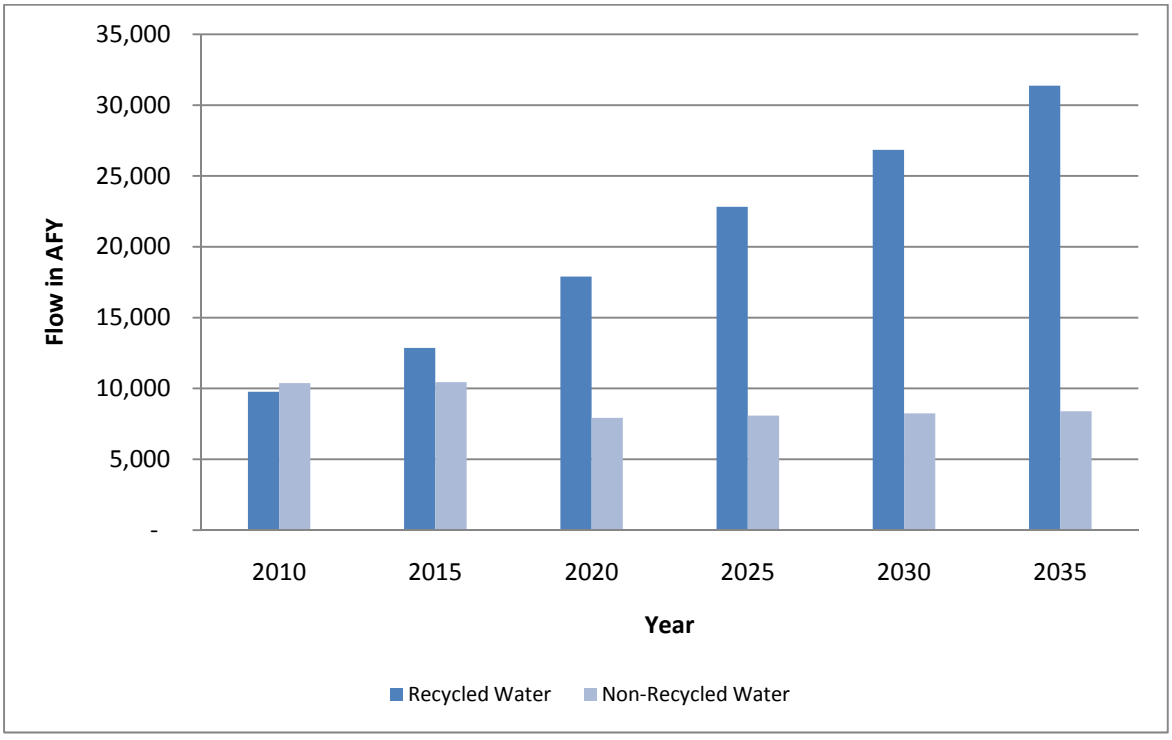



*Figure 4-3*
*Recycled Water Production*

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.

# Section 5
# Water Supply Reliability and Water Shortage Contingency Planning

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.<br>• No runoff from irrigation<br>• 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<br>• Irrigation only three times per week | Stage 2 |
| • No water served in restaurants unless requested<br>• Irrigation only twice a week<br>• Commercial car washing using recycled water only<br>• No filling swimming pools | Stage 3 |
| • No golf course watering, except greens, unless reclaimed water is used<br>• Irrigation only once a week<br>• Water rationing by customer class<br>• 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<br>• In normal years, CVWD would receive more money than required for normal operations<br>• Water customers resistance |
| Use of Accumulated Reserves | • Increased savings to General Fund during non-events<br>• Decreased availability for O&M or Capital Fund |
| Decrease Capital Expenditure | • Increased savings to General Fund<br>• Delay of system rehabilitation<br>• Decrease in quality of future system facilities |
| Decrease of O&M Expenditure | • Increased savings to General Fund<br>• Less staff available to respond to emergencies<br>• 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

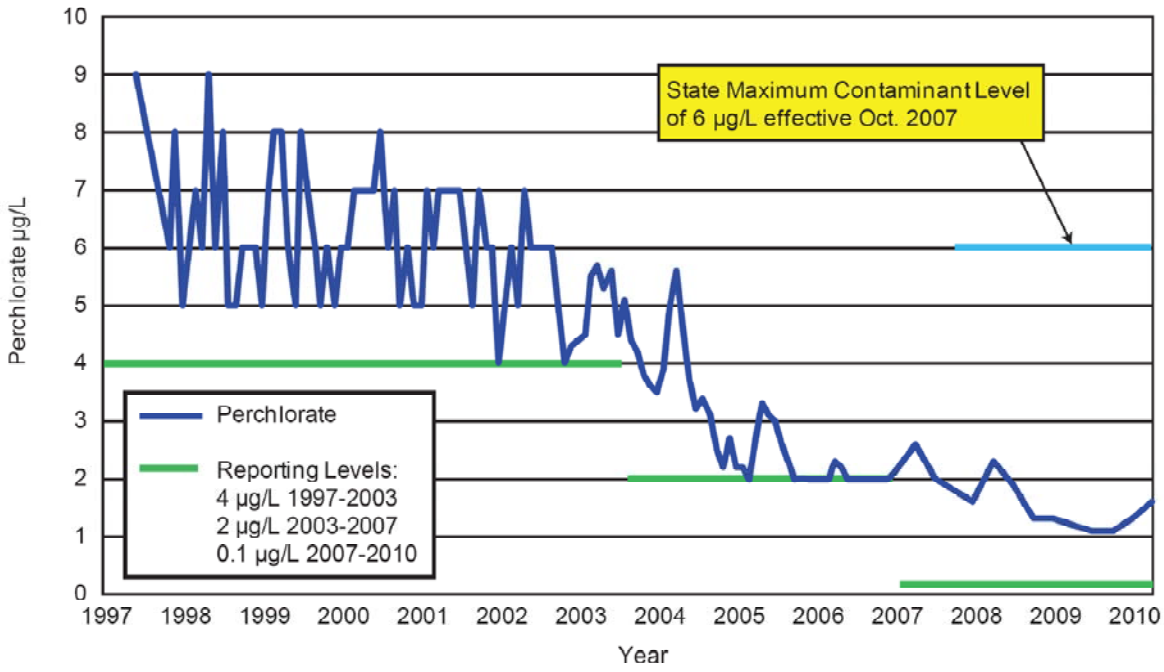
Perchlorate is a naturally-occurring and man-made compound used for ignition of solid rocket fuel. Perchlorate salts are also found in roadside flares and airbag inflators and are used in the manufacture of matches. Perchlorate is highly soluble in water. Perchlorate reduces production of thyroid hormones 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).

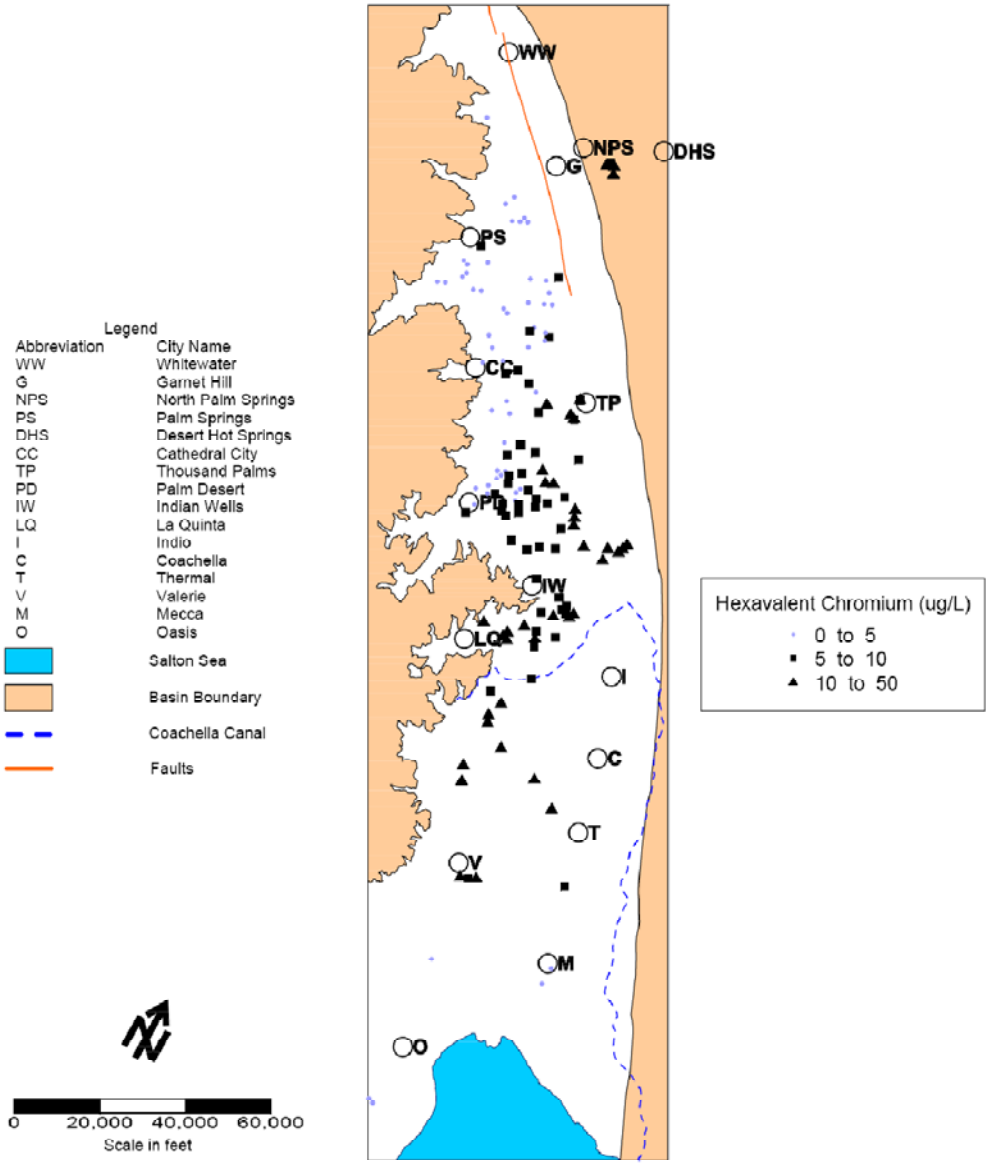



*Figure 5-2*
*Hexavalent Chromium Concentrations in Coachella Valley, 2002 - 2009*

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<br>• No runoff from irrigation<br>• Irrigation only three times per week<br>• Water efficient landscape encouraged |
| 2 | • No water served in restaurants unless requested<br>• Irrigation only twice a week<br>• Commercial car washing using recycled water only<br>• No filling swimming pools |
| 3 | • No golf course watering, except greens, unless reclaimed water is used<br>• Irrigation only once a week<br>• Water rationing by customer class<br>• 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 conveyance facilities

# APPENDIX A
# REFERENCES


Beacon Economics/UC Riverside School of Business Administration, 2010, 2010 Riverside/San Bernardino Economic Forecast.

Carollo Engineers, 2009, *Sewer Collection System Master Plan* prepared for Coachella Valley Water District.

Census, 2010, United States Census Bureau, www.census.gov.

CIMIS, 1999, California Irrigation Management Information System, CIMIS Reference Evapotranspiration Map, http://wwwcimis.water.ca.gov/cimis/pdf/etomap1.pdf.

Coachella, 2008, City of Coachella 2005 Urban Water Management Plan.

CRRWQCB, 2010, Colorado River Regional Water Quality Control Board Meeting, June 2010 to adopt conditional prohibitions on agricultural discharge until a TMDL implementation plan is incorporated into the Basin Plan.

CRRWQCB, 2010b, Colorado River Regional Water Quality Control Board, Waste Discharge Requirements for City of Coachella and Coachella Sanitary District, *Coachella Sanitary District Wastewater Treatment Plant, Order No. R7-2010-0021*.

CRRWQCB, 2010c, Colorado River Regional Water Quality Control Board, Waste Discharge Requirements for Valley Sanitary District, *Valley Sanitary District Wastewater Treatment Plant, Order No. R7-2010-0019*.

CVWD, 2005, Coachella Valley Water District, Engineer's Report on Water Supply and Replenishment Assessment – Lower Whitewater River Subbasin Area of Benefit –2005-2006.

CVWD, 2010, Coachella Valley Water Distirct, *Non-potable Water Use Agreement*, approved by CVWD Board of Directors.

CVWD, 2010a, Coachella Valley Water District, Engineer's Report on Water Supply and Replenishment Assessment – Lower Whitewater River Subbasin Area of Benefit –2010-2011.

CVWD, 2010b, Coachella Valley Water District, Engineer's Report on Water Supply and Replenishment Assessment – Upper Whitewater River Subbasin Area of Benefit –2010-2011.

CVWD, 2010c, Coachella Valley Water District, Engineer's Report on Water Supply and Replenishment Assessment – Mission Creek Subbasin Area of Benefit –2010-2011.

CVWD, 2010d, Coachella Valley Water District, *2009-2010 Annual Review*.

CVWD-DWA, 2003, Coachella Valley Water District-Desert Water Authority, *Mission Creek Groundwater Replenishment Agreement.*

# Appendix A
# References


CVWD-DWA-Metropolitan, 2003, Coachella Valley Water District-Desert Water Authority-Metropolitan Water District of Southern California, *2003 Exchange Agreement between Metropolitan Water District of Southern California*.

DWA, 2010, Engineer's Report – Groundwater Replenishment and Assessment Program for the Mission Creek Subbasin.

DWR, 1964, California Department of Water Resources, *Coachella Valley Investigation, Bulletin 108, 1964*.

DWR, 2003, California Department of Water Resources, Amendment No. 18 to Water Supply Contract between the State of California Department of Water Resources and Coachella Valley Water District (Metropolitan transfer).

DWR, 2004, California Department of Water Resources, Amendment No. 19 to Water Supply Contract between the State of California Department of Water Resources and Coachella Valley Water District (Tulare Lake Basin Water Storage District transfer).

DWR, 2005a, California Department of Water Resources, *California Water Plan Update 2005*.

DWR, 2006, California Department of Water Resources, Progress on Incorporating Climate Change into Management of California's Water Resources, Technical Memorandum Report.

DWR, 2007, California Department of Water Resources, Amendment No. 20 to Water Supply Contract between the State of California Department of Water Resources and Coachella Valley Water District (Tulare Lake Basin Water Storage District transfer).

DWR, 2010, California Department of Water Resourcs, Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use.

DWR, 2010a, California Department of Water Resources, Final State Water Project Delivery Reliability Report.

Fiske, Gary & Associates, 2001, California Urban Water Agencies Urban Water Conservation Potential.

Indio Water Authority (IWA), 2008, Indio Water Authority Water Resources Development Plan, Final Report.

Malcolm-Pirnie, 2008a, *Brackish Groundwater Treatment Pilot Study*, prepared for CVWD.

Malcolm-Pirnie, 2008b, Feasibility Study for Full-Scale Brackish Groundwater Treatment Facility, prepared for CVWD.

Malcolm-Pirnie, 2008c, Phase 2 Draft Surface Water Treatment Process Evaluation Report, prepared for CVWD.

Meko, D. M. et. al., 2007, Meko, D.M., C. A. Woodhouse, C. A. Baisan, T. Knight, J. J. Lukas, M. K. Hughes, M. W. Salzer, *Medieval drought in the Upper Colorado River Basin*, Geophysical Research Letters, Vol. 34, L10705.

Metropolitan, 2010, Metropolitan Water District of Southern California, *Draft 2010 Regional Urban Water Management Plan.*

Miller, 2010, Miller, W. Paul, *Perspectives on the Colorado River Basin,* presented at Water Education Foundation 2010 - Water & Climate Change Adaptation Symposium: From the Sierra to the Ocean, http://www.watereducation.org/userfiles/Miller.pdf.

MWH, 2002, Coachella Valley Water Management Plan and State Water Project Entitlement Transfer, Programmatic Environmental Impact Report.

NCDC, 1995, National Climate Data Center via www.worldclimate.com, Palm Springs, CA climate data.

NOAA, 2002, National Oceanic and Atmospheric Administration, Wind speed data, http://www.nws.noaa.gov.

PL 90-537, 1968, 1968 Colorado River Basin Project Act.

Poseidon, 2010, *The Carlsbad Desalination Project*, http://www.carlsbad-desal.com/.

Reclamation, 2007, U.S. Bureau of Reclamation, Colorado River Interim Guidelines for East Basin Shortages and Coordinated Operations for Lakes Powell and Mead.

Reclamation, 2011, *Drought in the Upper Colorado River Basin*, http://www.usbr.gov/uc/feature/drought.html.

Superior Court of California, 2010, Judge Roland Candee's judgment on QSA (Judicial Council Proceeding No. 4353).

SWRCB, 2010, State Water Resources Control Board, *California 20x2020 Water Conservation Plan*.

TreeFlow, 2010, Streamflow Reconstructions from Tree Rings, http://treeflow.info/index.html

USDOE, 2009, U.S. Department of Energy, Moab UMTRA Project information, http://www.moabtailings.org/.

USEPA, 2011, EPA's recommendations for enhanced monitoring for Hexavalent Chromium (Chromium-6) in Drinking Water, http://water.epa.gov/drink/info/chromium

USFWS, 2003, U.S. Fish and Wildlife Service and University of Maryland Wye Research and Education Center, *Evaluation of Endocrine Disrupting Compounds in Potomac River Fish, Final Report*.

# 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 |

| 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 |

| 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 |

# APPENDIX C
# CVWMP EXECUTIVE SUMMARY

*PREPARED FOR*
**COACHELLA VALLEY WATER DISTRICT**

# Coachella Valley Water Management Plan Update

## EXECUTIVE SUMMARY - DRAFT

December 2010

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**

**P.O. Box 1058**
**Coachella, California 92236**
**(760) 398-2651**

**Steve Robbins**
**General Manager-Chief Engineer**

**Patti Reyes**
**Planning and Special Program Manager**

**December, 2010**

(This page is intentionally left blank)

# Table of Contents

**Section Name** **Page Number**

# Table of Contents

## LIST OF TABLES



## LIST OF FIGURES

# 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.

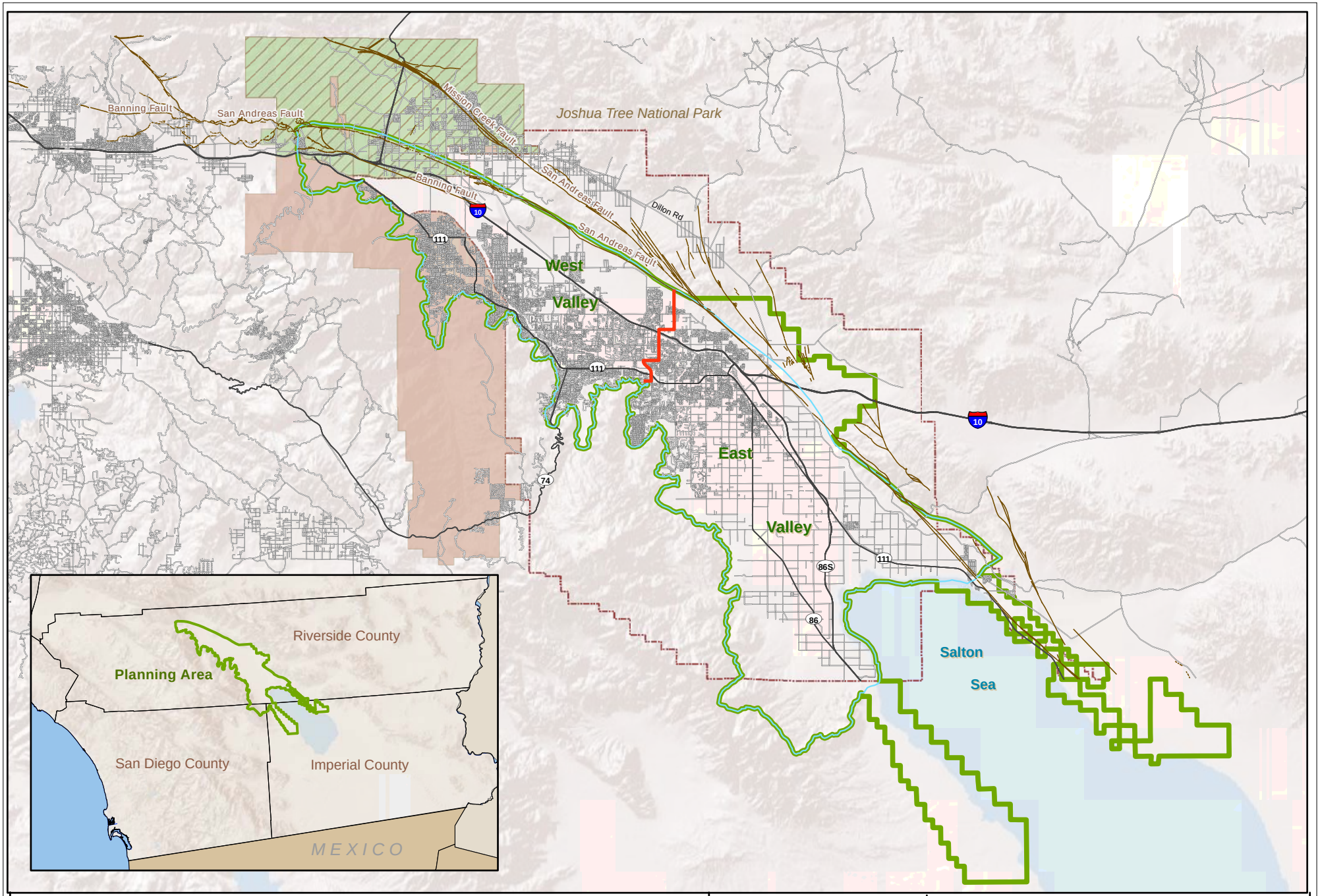
## ES-1 THE COACHELLA VALLEY

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.


Banning Fault
San Andreas Fault
Mission Creek Fault
Joshua Tree National Park
Banning Fault
San Andreas Fault
Dillon Rd
San Andreas Fault
West
Valley
East
Valley
Salton
Sea
10
111
74
86S
86
Riverside County
Planning Area
San Diego County
Imperial County
MEXICO
Key to Features
Area of Benefit Boundary
Fault
Whitewater River Sub-Basin
DWA
CVWD
Highways
Study Area
MSWD
MSWD/DWA
Source: DWR, ESRI, County of Riverside
N
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.

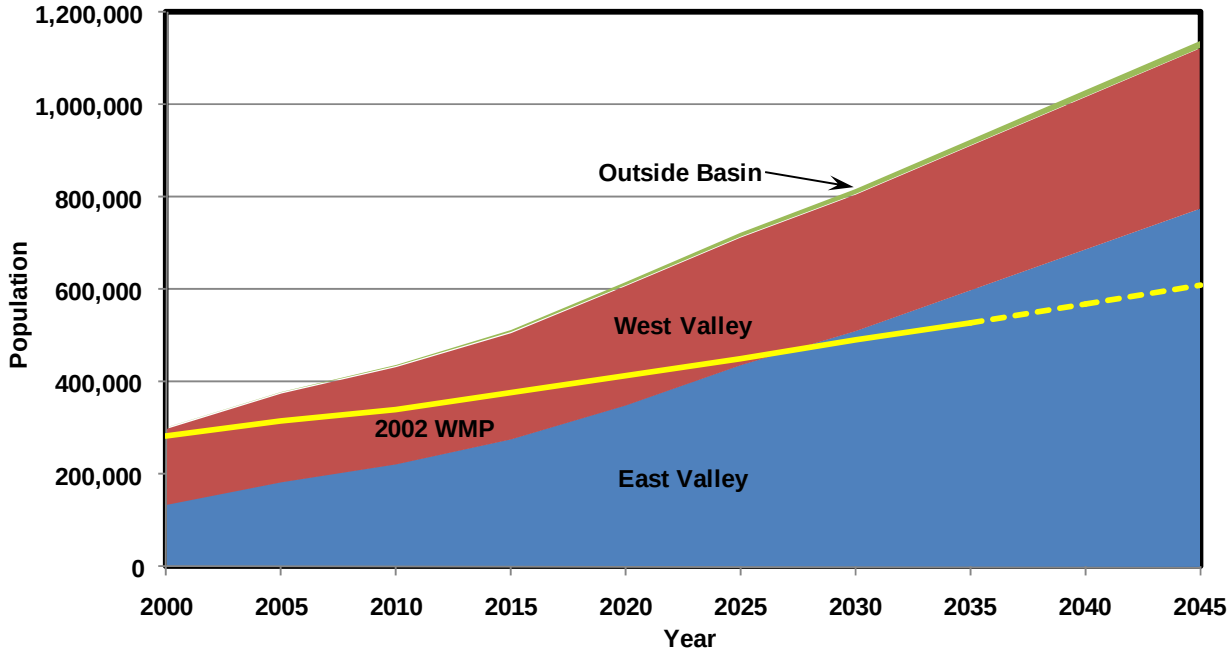
### ES-5.1 Population and Water Demand

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.

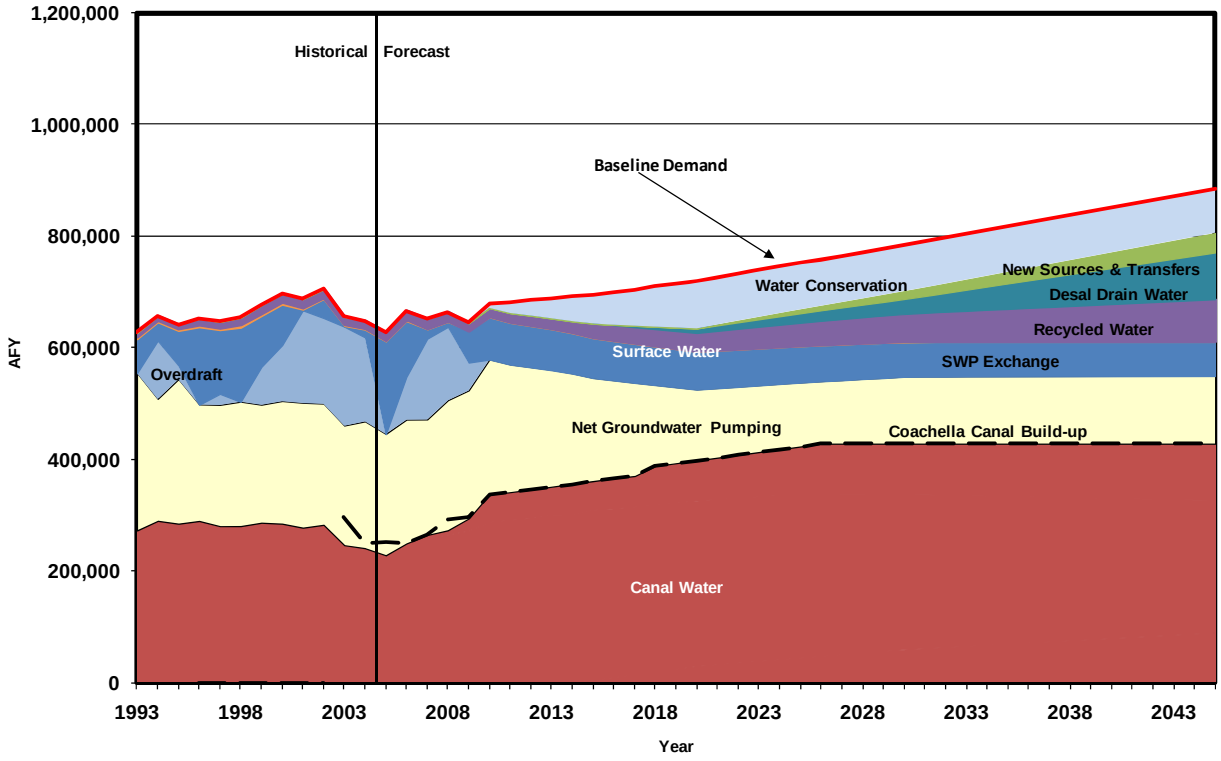
Additional water supplies needed by 2045 under various water supply scenarios range from 276,800 to 436,400 AFY (**Table ES-5**). The four scenarios incorporate the uncertainties associated with current supply sources, with the exception of climate change. The 10 percent demand contingency addresses 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

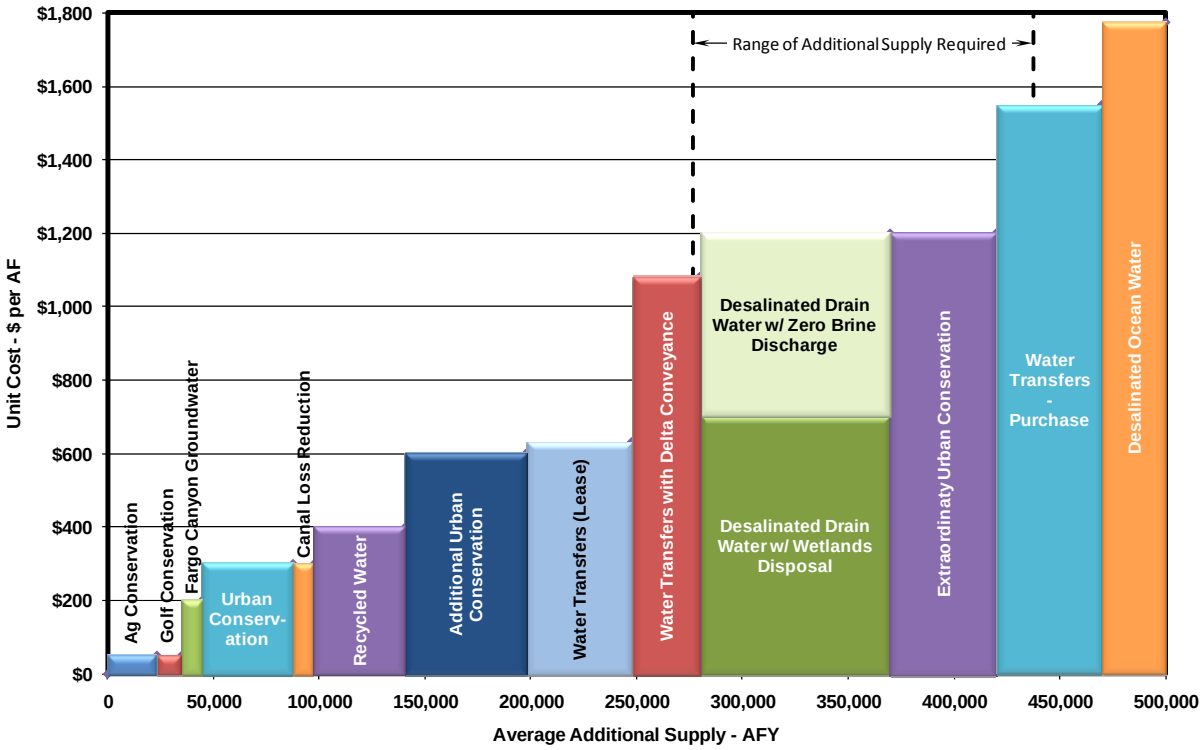
CVWD and DWA will monitor and report demands by water use sector and correlate demands with implementation of water conservation measures to determine the effectiveness of water conservation measures in achieving goals and the need for additional measures.

## 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 not 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<br>Attention: Water Management Department<br>Post Office Box 1058<br>Coachella, California 92236 |
| Hand Delivery or Shipping Address: | Coachella Valley Water District<br>Attention: Water Management Department<br>85-995 Avenue 52<br>Coachella, California 92236 |
| Hand Delivery or Shipping Address: | Coachella Valley Water District<br>Attention: Water Management Department<br>75-525 Hovley Lane East<br>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

| Monthly ETo (inches) | Jan> | <Feb | Mar | Apr> | <May | Jun | Jul | Aug | Sep> | <Oct | Nov | Dec | Totals Inches | Totals 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 Hil

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.

Cell Color Key

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.

Knowledge Requirements

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.

Data Requirements

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.

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 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.

Cell Color Key

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.

Knowledge Requirements

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.

Data Requirements

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.*

## 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 |

| 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

## 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.

Cell Color Key

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.

Knowledge Requirements

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.

Data Requirements

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 pr*

*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 |
| 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 |

# 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.

(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**

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

L136.

Jn29,Jy6