Victorville Water District

FINAL

2010 Urban Water Management Plan

June 2011

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Victorville Water District
2010 Urban Water Management Plan
Contact Sheet

Date plan submitted to the Department of Water Resources: June 29, 2011

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The Water supplier is a: **Municipality**

The Water supplier is a: **Retailer**

Utility services provided by the water supplier include: **Water**

Is This Agency a Bureau of Reclamation Contractor? **No**

Is This Agency a State Water Project Contractor? **No**

Victorville Water District

URBAN WATER MANAGEMENT PLAN

FINAL
June 2011

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Victorville Water District

Urban Water Management Plan

TABLE OF CONTENTS

Page No.

Page No.

LIST OF APPENDICES

LIST OF TABLES

Page No.

LIST OF FIGURES

LIST OF ABBREVIATIONS

Abbreviation	Description
AB	Assembly Bill
ADD	Average Day Demand
af	Acre Feet
Afy	Acre Feet per Year
AWAC	Alliance for Water Awareness and Conservation
BMP	Best Management Practices
BAP	Base Annual Production
BMWD	Baldy Mesa Water District
BPS	Booster Pumping Station
CDR	Center for Demographic Research
CIMIS	California Irrigation Management Information System
CRWQCB	California Regional Water Quality Control Board
COM	Commercial Land Use
DMMs	Demand Management Measures
DOF	Department of Finance
DPH	Department of Public Health
du/ac	Dwelling Units per Acre
DWR	Department of Water Resources
EPA	Environmental Protection Agency
ETo	Evapotranspiration
FAR	Floor Area Ratio
FY	Fiscal Year
FPA	Free Production Allowance
GAFB	George Air Force Base
gpcd	Gallons per Capita per Day
gpm	Gallons per Minute
GWMP	Groundwater Management Plan
HDR	High Density Residential
HGL	Hydraulic Grade Line
HOA	Home Owners' Association
ID1	Improvement District 1
ID2	Improvement District 2
IND	Industrial Land Use
LCER	Lewis Center for Educational Research
LDR	Low Density Residential
MAF	Million Acre Feet
MCL	Maximum Contaminant Level
MDR	Medium Density Residential
MFR	Multi-Family Residential
mg	Million Gallons
mgd	Million Gallons per Day
mg/l	Milligrams per Liter
MOU	Memorandum of Understanding
MWA	Mojave Water Agency
MWDSC	Metropolitan Water District of Southern California
MXDR	Mixed Density Residential
RUWMP	Regional Urban Water Management Plan
RW	Recycled Water

Abbreviation	Description
RWA	Replacement Water Assessment
RWMP	Regional Water Management Plan
RWQCB	Regional Water Quality Control Board
SB	Senate Bill
SCAG	Southern California Association of Governments
SCLA	Southern California Logistics Airport
SFR	Single Family Residential
SOI	Sphere of Influence
SWP	State Water Project
TDS	Total Dissolved Solids
ULF	Ultra Low Flush
UWMP	Urban Water Management Plan
UWMPA	Urban Water Management Planning Act
VLDR	Very Low Density Residential
VWD	Victorville Water District
VVWD	Victor Valley Water District
VVWRA	Victor Valley Wastewater Reclamation Authority
WCS	Water Code Section
WMP	Water Master Plan
WRF	Water Reclamation Facility
WRCC	Western Regional Climate Center
WSA	Water Supply Assessment
WSDM	Water Surplus and Drought Management
WSRP	Water Shortage Response Plan
WTP	Water Treatment Plant
R^3	Regional Recharge and Recovery

DWR Table Index		
DWR Table	**DWR Name**	**Report Table Number**
1	Coordination with appropriate agencies	1.1
2	Population — current and projected	2.3
3	Water deliveries — actual, 2005	5.3
4	Water deliveries — actual, 2010	5.3
5	Water deliveries — projected, 2015	5.3
6	Water deliveries — projected, 2020	5.3
7	Water deliveries — projected 2025, 2030, and 2035	5.3
8	Low-income projected water demands	Section 5.4
9	Sales to other water agencies	Not Applicable
10	Additional water uses and losses	5.3
11	Total water use	3.1, 5.2, and 5.3
12	Retail agency demand projections provided to wholesale suppliers	Not Applicable
13	Base period ranges	6.1
14	Base daily per capita water use — 10- to 15-year range	6.2
15	Base daily per capita water use — 5-year range	6.3
16	Water supplies — current and projected	3.1
17	Wholesale supplies — existing and planned sources of water	Not Applicable
18	Groundwater — volume pumped	3.2
19	Groundwater — volume projected to be pumped	3.3
20	Transfer and exchange opportunities	Section 7.6
21	Recycled water — wastewater collection and treatment	4.1
22	Recycled water — non-recycled wastewater disposal	4.2
23	Recycled water — potential future use	4.4
24	Recycled water — 2005 UWMP use projection compared to 2010 actual	4.3
25	Methods to encourage recycled water use	Section 4.4
26	Future water supply projects	Not Applicable
27	Basis of water year data	7.2
28	Supply reliability — historic conditions	Not Applicable
29	Factors resulting in inconsistency of supply	7.1
30	Water quality — current and projected water supply impacts	Not Applicable
31	Supply reliability — current water sources	Section 7.4
32	Supply and demand comparison — normal year	7.3
33	Supply and demand comparison — single dry year	7.4
34	Supply and demand comparison — multiple dry-year events	7.5
35	Water shortage contingency — rationing stages to address water supply shortages	Section 8.1.1
36	Water shortage contingency — mandatory prohibitions	Section 8.2.1
37	Water shortage contingency — consumption reduction methods	Section 8.2
38	Water shortage contingency — penalties and charges	Section 8.2.2

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Table I-2 Urban Water Management Plan checklist, organized by subject

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location
PLAN PREPARATION				
4	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.	10620(d)(2)		Section 1.3 Appendix B
6	Notify, at least 60 days prior to the public hearing on the plan required by Section 10642, any city or county within which the supplier provides water that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. Any city or county receiving the notice may be consulted and provide comments.	10621(b)		Section 1.4 Appendix B
7	Provide supporting documentation that the UWMP or any amendments to, or changes in, have been adopted as described in Section 10640 et seq.	10621(c)		Appendix B
54	Provide supporting documentation that the urban water management plan has been or will be provided to any city or county within which it provides water, no later than 60 days after the submission of this urban water management plan.	10635(b)		Section 1.3 Appendix B
55	Provide supporting documentation that the water supplier has encouraged 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.	10642		Appendix B
56	Provide supporting documentation that the urban water supplier made the plan available for public inspection and held a public hearing about the plan. For public agencies, the hearing notice is to be provided pursuant to Section 6066 of the Government Code. The water supplier is to provide the time and place of the hearing to any city or county within which the supplier provides water. Privately-owned water suppliers shall provide an equivalent notice within its service area.	10642		Section 1.4 Appendix B
57	Provide supporting documentation that the plan has been adopted as prepared or modified.	10642		Appendix B
58	Provide supporting documentation as to how the water supplier plans to implement its plan.	10643		Section 6.3

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location
59	Provide supporting documentation that, in addition to submittal to DWR, the urban water supplier has submitted this UWMP to 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. This also includes amendments or changes.	10644(a)		Section 1.3 Appendix B
60	Provide supporting documentation that, not later than 30 days after filing a copy of its plan with the department, the urban water supplier has or will make the plan available for public review during normal business hours	10645		Section 1.3 Appendix B
SYSTEM DESCRIPTION				
8	Describe the water supplier service area.	10631(a)		Chapter 2 Figure 2.1
9	Describe the climate and other demographic factors of the service area of the supplier	10631(a)		Sections 2.3 and 2.4
10	Indicate the current population of the service area	10631(a)	Provide the most recent population data possible. Use the method described in "Baseline Daily Per Capita Water Use." See Section M.	Section 2.4
11	Provide population projections for 2015, 2020, 2025, and 2030, based on data from State, regional, or local service area population projections.	10631(a)	2035 and 2040 can also be provided to support consistency with Water Supply Assessments and Written Verification of Water Supply documents.	Section 2.4
12	Describe other demographic factors affecting the supplier's water management planning.	10631(a)		Section 2.3
SYSTEM DEMANDS				
1	Provide 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.	10608.20(e)		Section 6.2 Section 5.1 Tables 6.1 to 6.4
2	*Wholesalers:* Include an assessment of present and proposed future measures, programs, and policies to help achieve the water use reductions. *Retailers:* Conduct at least one public hearing that includes general discussion of the urban retail water supplier's implementation plan for complying with the Water Conservation Bill of 2009.	10608.36 10608.26(a)	Retailers and wholesalers have slightly different requirements	Section 1.4

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location
3	Report progress in meeting urban water use targets using the standardized form.	10608.40		Not Applicable Until 2015
25	Quantify past, current, and projected water use, identifying the uses among water use sectors, for the following: (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, conjunctive use, and (I) agriculture.	10631(e)(1)	Consider 'past' to be 2005, present to be 2010, and projected to be 2015, 2020, 2025, and 2030. Provide numbers for each category for each of these years.	Section 5.2 Table 5.3
33	Provide documentation that either the retail agency provided the wholesale agency with water use projections for at least 20 years, if the UWMP agency is a retail agency, OR, if a wholesale agency, it provided its urban retail customers with future planned and existing water source available to it from the wholesale agency during the required water-year types	10631(k)	Average year, single dry year, multiple dry years for 2015, 2020, 2025, and 2030.	[To Be Included In Appendix B]
34	Include projected water use for single-family and multifamily residential housing needed for lower income households, as identified in the housing element of any city, county, or city and county in the service area of the supplier.	10631.1(a)		Table 5.4
SYSTEM SUPPLIES				
13	Identify and quantify the existing and planned sources of water available for 2015, 2020, 2025, and 2030.	10631(b)	The 'existing' water sources should be for the same year as the "current population" in line 10. 2035 and 2040 can also be provided.	Section 3.1 Table 3.1
14	Indicate whether groundwater is an existing or planned source of water available to the supplier. If yes, then complete 15 through 21 of the UWMP Checklist. If no, then indicate "not applicable" in lines 15 through 21 under the UWMP location column.	10631(b)	Source classifications are: surface water, groundwater, recycled water, storm water, desalinated sea water, desalinated brackish groundwater, and other.	Section 3.5
15	Indicate whether a groundwater management plan been adopted by the water supplier or if there is any other specific authorization for groundwater management. Include a copy of the plan or authorization.	10631(b)(1)		Section 3.5
16	Describe the groundwater basin.	10631(b)(2)		Section 3.5
17	Indicate whether the groundwater basin is adjudicated? Include a copy of the court order or decree.	10631(b)(2)		Section 3.5

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location
18	Describe the amount of groundwater the urban water supplier has the legal right to pump under the order or decree. If the basin is not adjudicated, indicate “not applicable” in the UWMP location column.	10631(b)(2)		Section 3.5 Appendix C
19	For groundwater basins that are not adjudicated, provide information as to whether DWR 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. If the basin is adjudicated, indicate “not applicable” in the UWMP location column.	10631(b)(2)		Section 3.5
20	Provide a detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years	10631(b)(3)		Section 3.5
21	Provide a detailed description and analysis of the amount and location of groundwater that is projected to be pumped.	10631(b)(4)	Provide projections for 2015, 2020, 2025, and 2030.	Section 3.5
24	Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.	10631(d)		Section 7.7
30	Include a detailed description of all water supply projects and programs that may be undertaken by the water supplier to address water supply reliability in average, single-dry, and multiple-dry years, excluding demand management programs addressed in (f)(1). Include specific projects, describe water supply impacts, and provide a timeline for each project.	10631(h)		Section 7.2
31	Describe desalinated water project opportunities for long-term supply, including, but not limited to, ocean water, brackish water, and groundwater.	10631(i)		Section 3.6 Section 7.8
44	Provide information on recycled water and its potential for use as a water source in the service area of the urban water supplier. Coordinate with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area.	10633		Chapter 4
45	Describe 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.	10633(a)		Section 4.1

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location
46	Describe the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.	10633(b)		Section 4.1
47	Describe the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.	10633(c)		Section 4.2
48	Describe and quantify 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.	10633(d)		Section 4.3
49	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.	10633(e)		Sections 4.2 and 4.3
50	Describe the 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.	10633(f)		Section 4.4
51	Provide 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.	10633(g)		Not Applicable
WATER SHORTAGE RELIABILITY AND WATER SHORTAGE CONTINGENCY PLANNING [b]				
5	Describe water management tools and options to maximize resources and minimize the need to import water from other regions.	10620(f)		Section 3.3, 3,4 and 3.5
22	Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage and provide data for (A) an average water year, (B) a single dry water year, and (C) multiple dry water years.	10631(c)(1)		Sections 7.4 and 7.5
23	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.	10631(c)(2)		Section 7.3
35	Provide an urban water shortage contingency analysis that specifies stages of action, including up to a 50-percent water supply reduction, and an outline of specific water supply conditions at each stage	10632(a)		Chapter 8

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location
36	Provide 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.	10632(b)		Section 7.5
37	Identify 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.	10632(c)		Sections 8.4
38	Identify 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.	10632(d)		Section 8.2.1
39	Specify 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.	10632(e)		Section 8.2
40	Indicated penalties or charges for excessive use, where applicable.	10632(f)		Section 8.2.2
41	Provide an analysis of the impacts of each of the actions and conditions described in subdivisions (a) to (f), 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.	10632(g)		Section 8.3
42	Provide a draft water shortage contingency resolution or ordinance.	10632(h)		Section 8.1 Appendix E
43	Indicate a mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.	10632(i)		Section 8.5
52	Provide information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments, and the manner in which water quality affects water management strategies and supply reliability	10634	For years 2010, 2015, 2020, 2025, and 2030	Section 3.5

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location
53	Assess the water supply reliability during normal, dry, and multiple dry water years by comparing 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. Base the assessment on the information compiled under Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.	10635(a)		Section 7.4 and 7.5
DEMAND MANAGEMENT MEASURES				
26	Describe how each water demand management measures is being implemented or scheduled for implementation. Use the list provided.	10631(f)(1)	Discuss each DMM, even if it is not currently or planned for implementation. Provide any appropriate schedules.	Section 6.3
27	Describe the methods the supplier uses to evaluate the effectiveness of DMMs implemented or described in the UWMP.	10631(f)(3)		Section 6.3
28	Provide 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 ability to further reduce demand.	10631(f)(4)		Section 6.3
29	Evaluate each water demand management measure that is not currently being implemented or scheduled for implementation. The evaluation should include economic and non-economic factors, cost-benefit analysis, available funding, and the water suppliers' legal authority to implement the work.	10631(g)	See 10631(g) for additional wording.	Not Applicable
32	Include the annual reports submitted to meet the Section 6.2 requirements, if a member of the CUWCC and signer of the December 10, 2008 MOU.	10631(j)	Signers of the MOU that submit the annual reports are deemed compliant with Items 28 and 29.	Not Applicable

a The UWMP Requirement descriptions are general summaries of what is provided in the legislation. Urban water suppliers should review the exact legislative wording prior to submitting its UWMP.

b The Subject classification is provided for clarification only. It is aligned with the organization presented in Part I of this guidebook. A water supplier is free to address the UWMP Requirement anywhere with its UWMP, but is urged to provide clarification to DWR to facilitate review.

2010 URBAN WATER MANAGEMENT PLAN

This executive summary provides an overview of the content included in the Victorville Water District's (VWD) 2010 Urban Water Management Plan (UWMP). The purpose of the UWMP is to maintain efficient use of urban water supplies, continue to promote conservation programs and policies, ensure that sufficient water supplies are available for future beneficial use, and provide a mechanism for response during drought conditions. This report, which was prepared in compliance with the California Water Code, and as set forth in the guidelines and format established by the Department of Water Resources, constitutes VWD's 2010 UWMP.

As required by the Urban Water Management Plan Act (Act), this document has been prepared with the participation of the public and in coordination with appropriate agencies. Specific coordination and participation details are included in Chapter 1.

Since the 2005 UWMP was prepared, several pieces of legislation have amended the Act. While all the applicable legislation is discussed in more detail in Chapter 1, the most notable of these is the 2009 Water Conservation Act (also known as SBx7-7) mandating a per-capita reduction in water consumption of 20 percent by the year 2020.

VWD's service area is located in the southwest region of San Bernardino County and encompasses approximately 85 square miles. The majority of VWD's land use is residential, with large amounts of open space and smaller elements of commercial and industrial uses. VWD's population is anticipated to grow at about 3 percent annually.

VWD's water system supplies water solely from groundwater, pumped from the Mojave River Basin. VWD's 2010 demands were 22,733 afy, which are substantially reduced from the 2007 demands of 29,256 afy.

To establish the baseline per-capita demand and water conservation targets associated with the Water Conservation Act of 2009, a baseline period of 1996 through 2005 was selected. The corresponding baseline per-capita demand is 260 gpcd. Using Method 1, VWD's 2020 per-capita target demand is 208 gpcd. The development of the per-capita demand targets as well as the selection of the method for the conservation target is discussed in further detail in Chapter 6.

VWD has worked with Mojave Water Agency (MWA) to develop several additional sources of supply including Oro Grande Wash surface spreading project and the R^3 Project. Based on the demand projections, VWD will need to develop additional supplies beyond the current projects under development around 2030.

Chapter 1

INTRODUCTION

1.1 PURPOSE

The California Water Code requires urban water suppliers within the state to prepare and adopt Urban Water Management Plans (UWMPs) for submission to the California Department of Water Resources (DWR). The UWMPs, which must be filed every five years, must satisfy the requirements of the Urban Water Management Planning Act (UWMPA) of 1983 including amendments that have been made to the Act. The UWMPA requires urban water suppliers servicing 3,000 or more connections, or supplying more than 3,000 acre-feet (af) of water annually, to prepare an UWMP.

The purpose of the UWMP is to maintain efficient use of urban water supplies, continue to promote conservation programs and policies, ensure that sufficient water supplies are available for future beneficial use, and provide a mechanism for response during drought conditions. This report, which was prepared in compliance with the California Water Code, and as set forth in the guidelines and format established by the DWR, constitutes the Victorville Water District (VWD) 2010 UWMP.

1.2 BACKGROUND

1.2.1 Urban Water Management Planning Act

In 1983, State Assembly Bill (AB) 797 modified the California Water Code Division 6, by creating the UWMPA. Several amendments to the original UWMPA, which were introduced since 1983, have increased the data requirements and planning elements to be included in the 2005 and 2010 UWMPs.

Initial amendments to the UWMPA required that total projected water use be compared to water supply sources over the next 20 years, in 5-year increments. Recent DWR guidelines also suggest projecting through a 25-year planning horizon to maintain a 20-year timeframe until the next UWMP update has been completed and for use in developing Water Supply Assessments.

Other amendments require that UWMPs include provisions for recycled water use, demand management measures, and a water shortage contingency plan, set forth therein. Recycled water was added in the reporting requirements for water usage and figures prominently in the requirements for evaluation of alternative water supplies, when future projections predict the need for additional water supplies. Each urban water purveyor must coordinate the preparation of the water shortage contingency plan with other urban water purveyors in the area, to the extent practicable. Each water supplier must also describe their water demand management measures that are being implemented, or scheduled for implementation.

In addition to the UWMPA and its amendments, there are several other regulations that are related to the content of the UWMP. In summary, the key relevant regulations are:

- AB 1420: Requires implementation of demand management measures (DMMs)/best management practices (BMPs) and meeting the 20 percent reduction by 2020 targets to qualify for water management grants or loans.
- AB 1465: Requires water suppliers to describe opportunities related to recycled water use and stormwater recapture to offset potable water use.
- Amendments Senate Bill (SB) 610 (Costa, 2001), and SB 221 (Daucher, 2001): Became effective beginning January 1, 2002, require counties and cities to consider information relating to the availability of water to supply new large developments by mandating the preparation of further water supply planning and Water Supply Assessments.
- SB 1087: Requires water suppliers to report single family residential (SFR) and multi-family residential (MFR) projected water use for planned lower income units separately.
- Amendment SB 318 (Alpert, 2004): Requires the UWMP to describe the opportunities for development of desalinated water, including but not limited to, ocean water, brackish water, and groundwater, as a long-term supply.
- AB 105 (Wiggins, 2004): Requires urban water suppliers to submit their UWMPs to the California State Library.
- SBx7-7: Requires development and use of new methodologies for reporting population growth estimates, base per capita use, and water conservation. This water bill also extended the 2010 UWMP adoption deadline for retail agencies to July 1, 2011.
- SB 1478: This bill was signed on September 23, 2010 and extends the 2010 UWMP deadline for wholesale agencies, such as the Metropolitan Water District of Southern California (MWDSC), to July 1, 2011, as SBx7-7 did for retail agencies.

1.2.2 Previous Urban Water Management Plan

Pursuant to the UWMPA, the Victor Valley Water District (VVWD) and Baldy Mesa Water District (BMWD) previously prepared an UWMP in 2005, which was approved and adopted on December 21, 2005. This 2010 UWMP report serves as an update to the 2005 UWMP.

1.3 COORDINATION WITH APPROPRIATE AGENCIES

The UWMPA requires that the UWMP identify the water agency's coordination with appropriate agencies.

> *10620 (d) (2) 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.*

VWD was created in 2007 as a subsidiary county water district to the City of Victorville (City). The City absorbed the former Victor Valley Water District (VVWD) and Baldy Mesa Water District (BMWD) and consolidated them into a single water district (also serving the Southern California Logistics Airport (SCLA)).

VWD is the sole water supplier and water management agency for its service area. While preparing the 2010 UWMP, the VWD coordinated its efforts with relevant agencies to ensure that the data and issues discussed in the plan were presented accurately. Table 1.1 summarizes how the UWMP preparation was coordinated with different agencies.

Table 1.1 Coordination with Appropriate Agencies

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/ Not Informed
Mojave Water Agency					✓	✓	
Town of Apple Valley					✓	✓	
City of Adelanto					✓	✓	
County of San Bernardino					✓	✓	
Victor Valley Wastewater Reclamation Authority					✓	✓	

1.4 PUBLIC PARTICIPATION AND PLAN ADOPTION

The UWMPA requires that the UWMP show the water agency solicited public participation.

> 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 … After the hearing, the plan shall be adopted as prepared or as modified after the hearing.

In accordance with the UWMPA, the VWD held a public hearing on June 7, 2011 and adopted the 2010 UWMP on June 21, 2011. A copy of the adopting resolution and resolution of intent to adopt are included in Appendix A. The hearing provided an opportunity for VWD's customers, residents, and staff to learn and ask questions about the current and future water supply of VWD.

A notification was sent out to neighboring cities and the County of San Bernardino at least 60 days prior to the public hearing that the draft 2010 UWMP was under preparation, on April 6, 2011. Pursuant to California Code Section 6066, a notification of the time and place of the public hearing was published in the local newspaper on May 17, 2011. Copies of these notifications are included in Appendix B.

VWD encouraged public participation in the UWMP adoption process through the notifications to the public through the newspaper and publicizing the UWMP through its website. The draft UWMP was made available for public review on the VWD website and at the City's Water District Conservation Division counter, City Hall front counter, and City library during regular business hours.

Following adoption, the 2010 UWMP will be submitted to DWR, the California State Library, and the County of San Bernardino. Submission will take place within 30 days of adoption. The adopted UWMP will be provided for public review at the City's Water District Conservation Division counter, City Hall front counter, and City library during regular business hours and on the City's website for 30 days following submission to DWR.

1.5 REPORT ORGANIZATION

The UWMP contains eight chapters, followed by appendices that provide supporting documentation for the information presented in the report. The chapters are briefly described below:

Chapter 1 - Introduction. This chapter presents the purpose of this UWMP, describes the efforts of the VWD to coordinate the preparation of the UWMP with appropriate nearby agencies, and discusses the measures used to solicit public participation in the UWMP.

Chapter 2 - Service Area. This chapter presents a description of VWD's water service area and various characteristics of the area served including climate, population, and other demographic factors.

Chapter 3 – Water Sources. This chapter presents a description of the agency's existing and future water supply sources for the next 25 years. The description of water supplies includes information on the groundwater usage such as water rights, determination if the basin is in overdraft, adjudication decree, and other relevant information.

Chapter 4 – Water Reclamation. This chapter includes information on VWD's existing recycled water system and usage, as well as the projected expansion of recycled water use per the recent Recycled Water Master Plan prepared in 2010.

Chapter 5 – Water Demands. This chapter presents the quantity of water supplied to the agency's customers including a breakdown of demands and demand projections by user classification.

Chapter 6 – Water Conservation. This chapter is broken into two parts:

Part I addresses the requirements of the Water Conservation Act of 2009.

Part II includes a description of VWD's BMPs. This includes programs which are currently implemented or scheduled for implementation.

Chapter 7 – Reliability of Supply. In this chapter, the UWMP addresses the reliability of the agency's water supplies. This includes supplies that are vulnerable to seasonal or climatic variations. In addition, there is an analysis of supply availability in a single dry year and in multiple dry years.

Chapter 8 – Water Shortage Contingency Plan. This chapter includes an urban water shortage contingency analysis that includes stages of action to be undertaken in the event of water supply shortages; a draft water shortage contingency ordinance; prohibitions, consumption reduction methods and penalties; an analysis of revenue and expenditure impacts and measures to overcome these impacts; actions to be taken during a catastrophic interruption; and a mechanism for measuring water use reduction.

1.6 ACKNOWLEDGEMENTS

Carollo Engineers wishes to acknowledge and thank the following VWD staff:

Dana Armstrong	Solid Waste Manager
Steve Ashton	Water Supply Manager
Donna Aston	Water Conservation Supervisor
Steve Borrowman	Assistant Director of Water District
Laine Carlson	Associate Engineer
Christy Stevens	Associate Engineer

Their cooperation and courtesy in obtaining a variety of necessary information were valuable components in completing and producing this report.

The following staff of Carollo Engineers was involved in the preparation of this plan:

Jim Meyerhofer, P.E.	Principal-in-Charge
Inge Wiersema, P.E.	Project Manager
Brian Brenhaug, P.E.	Project Engineer
John Meyerhofer	Staff Engineer
Li-Chen Wang	GIS and graphics

Chapter 2

SERVICE AREA AND POPULATION

The UWMPA requires that the UWMP include a description of the water purveyor's service area and various characteristics of the area served including climate, population, and other demographic factors.

> *10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:*
>
> *10631. (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.*

2.1 LOCATION

VWD is located in the southwest region of San Bernardino County, California. VWD lies north of the San Bernardino Mountains in the Mojave Desert approximately 90 miles northeast of Los Angeles.

2.2 SERVICE AREA

VWD's service area, shown in Figure 2.1 encompasses the entire City of Victorville as well as areas within the City's sphere of influence. VWD is bounded by the City of Adelanto to the west and the City of Hesperia to the south. The City of Apple Valley, Spring Valley Lake, and the Mojave Narrows Regional Park lie to the east.

In July of 2007, both Victor Valley Water District (VVWD) and Baldy Mesa Water District (BMWD) were absorbed by VWD, and formed Improvement District 1 (ID1) and Improvement District 2 (ID2), respectively, of VWD. Each improvement district is shown in Figure 2.1. VWD ID1 encompasses approximately 58 square miles, including the Southern California Logistics Airport (SCLA), comprising approximately 14 square miles. VWD ID2 coincides with the former BMWD service area and encompasses approximately 27 square miles. The entire VWD service area encompasses about 85 square miles.

2.3 LAND USE AND DEVELOPMENT

The majority of VWD's land use is residential, with large amounts of open space and smaller elements of commercial and industrial uses.

2.3.1 Land Use Designations

The City of Victorville's General Plan identifies 14 different land use designations. The General Plan land use designations were combined in the 2010 Water Master Plan, resulting in eight land use classifications within ID1 and 11 classifications within ID2.

2.3.2 Existing Developed and Vacant Land

As a part of the VWD Water Master Plan (WMP), vacant land within the service area was identified using aerial photographs from 2005 and 2007. General plan land use for areas coinciding with these vacant areas was changed to the vacant classification to obtain a land use distribution for existing developed land. Based on the aerial map it was estimated that about 58 percent of ID1 and about 73 percent of ID2 are currently vacant or undeveloped.

Distribution of existing land use types, based on General Plan land use designations, is summarized in Table 2.1. As listed in Table 2.1, nearly 29,000 acres or approximately 64 percent of the entire service area is vacant, which means that 36 percent of the service area is currently developed.

Table 2.1 Land Uses

Land Use	Abbreviation	ID1 Area (ac)	ID2 Area (ac)	Total Area (ac)
Very Low-Density Residential	VLDR	2,542	1,738	4,280
Low-Density Residential	LDR	3,511	993	4,504
Medium-Density Residential	MDR	282	4	286
Mixed-Density Residential	MXDR	34	194	228
High-Density Residential	HDR	524	32	556
Commercial	COM	1,533	181	1,714
Industrial	IND	280	11	291
Open Space (Irrigated)	OSI	167	0	167
Open Space (Non-irrigated)	OSN	1,658	871	2,529
Other (Public / Institutional)	OTH	415	13	428
Specific Plan	SP	816	749	1,565
Vacant/Undeveloped	Vacant	16,222	12,664	28,886
Total		**27,984**	**17,451**	**45,435**

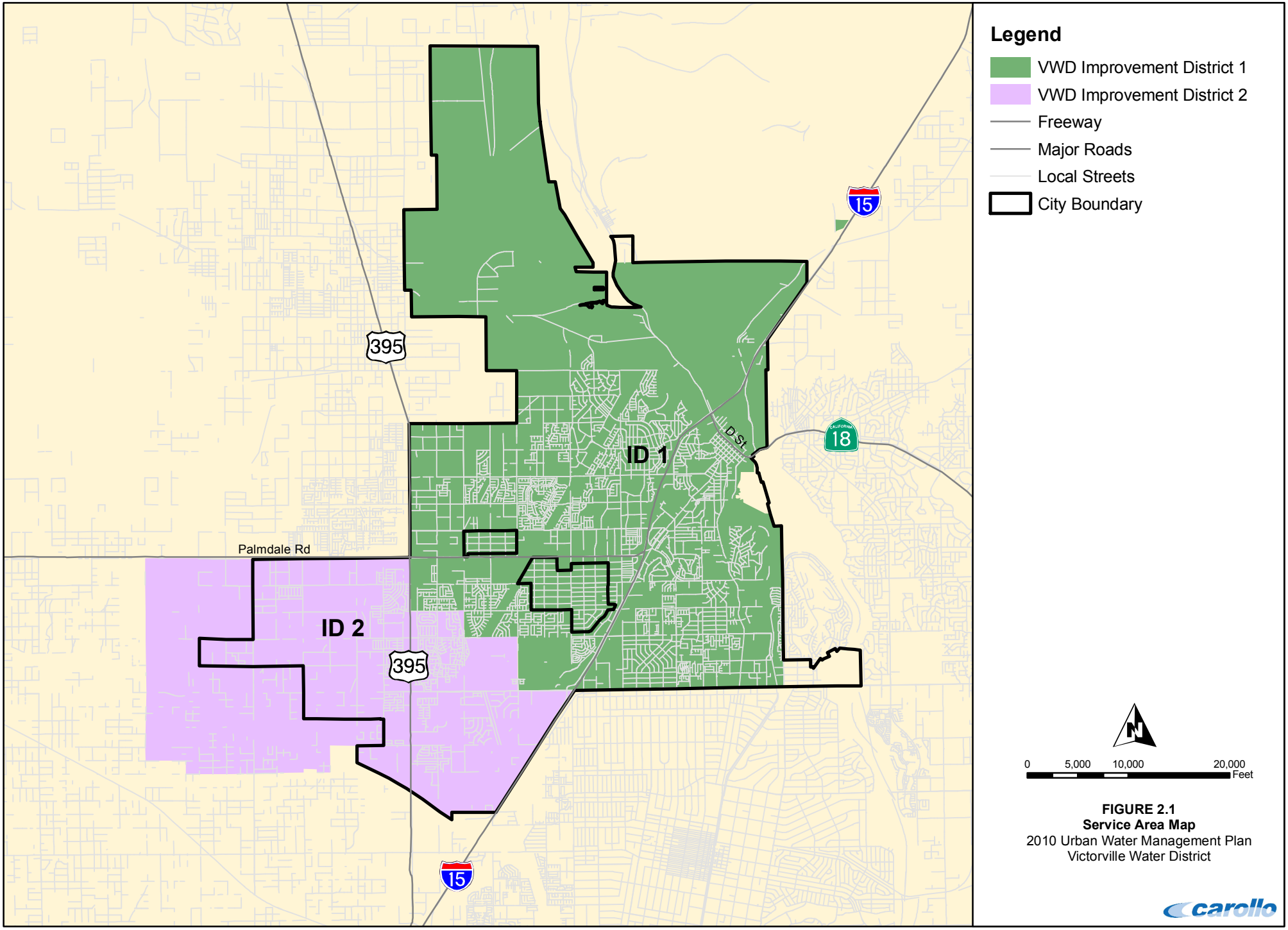

FIGURE 2.1
Service Area Map
2010 Urban Water Management Plan
Victorville Water District

carollo

2.3.3 Planned Development

Between 2000 and 2010, significant growth occurred within VWD's service area, followed by significant decline due to the economic downturn. Water demands in recent years have fallen to levels seen in 2005.

Demand projections in the WMP were based on the assumption that demand would increase at an annual rate of three percent starting in 2010. Development was assumed to occur at a rate to match the increase in demands.

2.4 POPULATION

Population projections, shown in Table 2.2 and Figure 2.2, were used in conjunction with the General Plan land uses, to forecast water requirements for VWD. Since VWD's water service area extends beyond the City boundary, the WMP's 3 percent growth rate projection was used.

Table 2.2 Projected Population

	2015	2020	2025	2030	2035
Service Area Population[(1)]	133,911	155,239	179,965	208,628	241,858
SCAG Projections for City only[(2)]		144,760			189,513

Notes:
(1) Source: Based on 2010 WMP
(2) Source SCAG April 2011

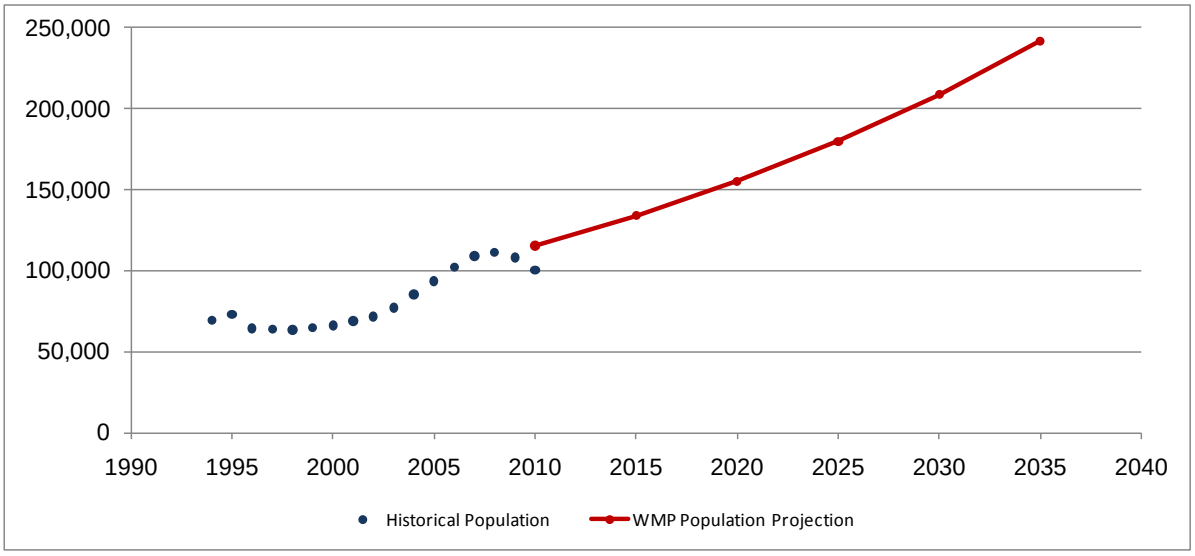

Figure 2.2 Historical and Projected Population

As discussed previously, VWD's water system service area encompasses the entire City of Victorville as well as areas within the City's sphere of influence. Population studies for

Victorville were obtained from Southern California Association of Governments (SCAG). However, these studies were based on pre-2003 population trends, which do not reflect explosive growth rates this area experienced in the period 2003 to 2006, nor the significant decline in population in the recent economic downturn. SCAG projections predict an annual growth rate of approximately two percent for areas within the City of Victorville city limits.

The WMP used an average sustained annual growth rate of three percent for its planning period of 2010 through 2030. The WMP applied this growth rate linearly to the 2005 population estimate obtained from the draft sewer master plan (99,642 population). This method of population projection was used to maintain consistency with the WMP and is considered more conservative than the SCAG projections and will account for some periods of accelerated growth, while taking into consideration that growth trends of around 7 to 8 percent per year are not likely to be sustained over a 20-year period.

As shown in Figure 2.2, the actual 2010 population is significantly lower than the 2010 population projection from the WMP. It is believed that the reduction in population seen in 2009 and 2010 is related to the recent economic downturn. For conservative planning purposes, it was decided to use the 2010 projected population, as will be discussed in more detail in Chapter 5.

2.5 CLIMATE

VWD's climate is characterized by warm summers and cool winters. The climate data for VWD is presented in Table 2.3.

Table 2.3 Climate Characteristics

Month	Standard Monthly Average ETo[(1)] (inches)	Monthly Average Rainfall[(2)] (inches)	Monthly Average Temperature[(2)] (°F)		
			Average	Minimum	Maximum
January	2.02	0.98	44.2	29.8	58.6
February	2.61	1.06	47.6	33.1	62.1
March	4.55	0.82	51.8	36.6	67.0
April	6.19	0.36	57.8	41.5	74.1
May	7.30	0.13	65.1	47.7	82.5
June	8.85	0.04	72.9	54.1	91.7
July	9.77	0.13	79.5	60.7	98.2
August	8.99	0.20	78.6	60.0	97.1
September	6.52	0.24	72.5	53.9	91.1
October	4.66	0.32	62.3	44.3	80.2
November	2.68	0.50	51.0	34.5	67.4
December	2.05	0.80	44.3	29.2	59.4
Average	**5.52**	**0.47**	**60.6**	**43.8**	**77.5**

Notes:
(1) Source: California Irrigation Management Information System (CIMIS) Station 117 – Victorville (CIMIS, 2010). Represents monthly average ETo from February 1994 to March 2011.
(2) Source: Western Regional Climate Center (WRCC) Station 049325 – Victorville, California (WRCC, 2008). Represents monthly average data from January 1917 to May 2008.

As shown in Table 2.3, summer temperatures tend to be around 80 to 90 degrees Fahrenheit (°F), while temperatures during winter tend to be around 50 to 60 °F. The warmest month of the year is July with an average maximum temperature of 98 °F, while the coldest months of the year are December and January with an average minimum temperature of 29 to 30°F.

The annual average precipitation at VWD is about 6 inches. As shown in Table 2.3, the majority of the rainfall occurs in the months November through March. January and February are the wettest months with an average rainfall of about 1 inch.

Chapter 3

WATER SUPPLY

The UWMPA requires that the UWMP include a description of the agency's existing and future water supply sources for the next 25 years. This section includes an overview of VWD's supplies along with projections of usage of each source of supply followed by a detailed discussion on each supply source. This detailed discussion includes information on imported water supplies, recycled water supplies, groundwater supply facilities, and the groundwater basin such as water rights, determination of whether the basin is in overdraft, adjudication decree, and other information from the groundwater management plan (as available).

> *10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:*
>
> *10631 (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) [to 20 years or as far as data is available]. 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:*
>
> *10631 (b) (1) A copy of any groundwater management plan adopted by the urban water supplier…*
>
> *10631 (b) (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 board has adjudicated the rights to pump groundwater…For basins that have not been adjudicated, information as to whether the department has identified the basin or basins as overdrafted…*
>
> *10631 (b) (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 records.*
>
> *10631 (b) (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 reasonable available, including, but not limited to, historic use records.*

3.1 SUPPLY OVERVIEW

VWD currently receives potable water supplies exclusively from groundwater through 36 active wells. These wells pump from the local aquifer (Mojave Groundwater Basin) and meet all of VWD's demands. The basin is replenished by infiltration of precipitation from the San Bernardino and San Gabriel mountains. VWD does not currently use surface or imported water to meet its system demands, but is planning to utilize regional water supplies in the future to aid in groundwater recharge. VWD's projected water supplies are

summarized in Table 3.1. These quantities are based on projected demands which include conservation targets.

Table 3.1 Projected Water Supply

	Annual Supply (afy)					
Supply Source	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**
Groundwater	33,649	35,108	36,178	41,940	48,620	56,364
Total	**33,649**	**35,108**	**36,178**	**41,940**	**48,620**	**56,364**

The demands associated with the supply projection are discussed in Chapter 5. As shown in Table 3.1, groundwater is VWD's sole source of water; this supply increases, as needed, to meet total demands.

3.2 DISTRIBUTION SYSTEM AND STORAGE

VWD owns and operates a potable water system that includes about 700 miles of distribution and transmission mains, 36 active wells, 4 booster pumping stations, 26 active water storage reservoirs, and 13 active pressure regulating stations within the 85 square mile service area. The two improvement districts contain seven primary pressure zones, three sub-zones, and one small, isolated pressure zone. As of 2010, the entire district serves approximately 33,505 customers accounts.

Water distribution systems rely on stored water to help equalize fluctuations between supply and demand, to supply sufficient water for firefighting, and to meet demands during an emergency or an unplanned outage of a major source of supply. VWD has 26 cylindrical tanks within its distribution system that have a combined active storage capacity of nearly 74 million gallons (mg).

The current water system operates as two hydraulically separate systems; ID1 and ID2. The Southern California Logistics Airport (SCLA) is the former site of George Air Force Base (GAFB), and is intended be a logistical hub for commercial activities in the western United States. SCLA falls within the VWD service area and is a part of ID1.

3.3 IMPORTED WATER

10631 (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 indentifies 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 5 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 information requirements of subdivisions (b) and (c), including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply.

VWD does not currently utilize imported water as a source. Mojave Water Agency (MWA) uses imported water from the State Water Project (SWP), however, to recharge VWD's groundwater. The SWP is a large water and power development and conveyance system owned and operated by the California Department of Water Resources (DWR). SWP water is delivered to MWA via the California Aqueduct, a system of water conveyance that brings water from the northern end of the state to the San Joaquin Valley and Southern California. This is further discussed in Section 3.5.

3.4 SURFACE WATER

VWD does not utilize surface water supplies.

3.5 GROUNDWATER

VWD has 36 active groundwater wells within its distribution system that are actively used to pump groundwater from the Mojave Groundwater Basin, shown in Figure 3.1, which lies beneath Victor Valley in the Mojave Desert area and is mostly located west of the Mojave River. The upstream portion of the Mojave River has constant flow; however, further downstream the river becomes subterranean. At one point near what is called the Mojave Narrows, the river is above ground for a while and then resumes its subterranean course. The river ends at Soda Lake.

Recharge into the groundwater basin comes from infiltration of precipitation runoff from the San Bernardino and San Gabriel mountains. Dry climate within Victor Valley itself limits infiltration from rainfall to recharge the basin or formation of any surface water.

MWA is responsible for managing the use, replenishment, and protection of the Mojave Basin Area. The basin has been in overdraft for the last 50 years or more with individual subareas experiencing varying degrees of overdraft (MWA, 2010). In 2004, MWA updated a Regional Water Management Plan (RWMP) for the area within its boundaries. The RWMP

established the framework for managing future water supplies within MWA's service area which encompasses 4,900 square miles.

Water rights within the Mojave River Basin have been the subject of litigation since the early 1990's. Riverside County Superior Court's stipulated Mojave Basin Area Judgment (Judgment) for the adjudication of the Mojave River groundwater basin identified MWA as the SWP contractor. The Judgment stipulated that MWA has both the authority and obligation to secure supplemental supplies as part of the solution to overdraft within the Mojave River Basin. The Judgment can be found in Appendix D.

While the increased groundwater pumping in excess of natural supplies over the last 50 years has resulted in a decline in groundwater elevations, the groundwater basins remain capable of meeting annual water demands through dry years and consecutive multiple dry years. The Judgment and RWMP are intended to bring all basins into long term hydrologic balance by 2020. Projects and water management actions are needed to continue to recharge the groundwater basins to maintain groundwater levels and protect quality. With the implementation of the RWMP, adequate supplies will be available through at least 2025 (MWA, 2005). The RWMP includes supply options for VWD listed below and discussed further in Chapter 7.

- Victorville Water Reclamation Authority (VVWRA) recycled water
- Oro Grande Wash Recharge Project
- Regional Recharge and Recovery Project (R^3)

To maintain proper water balance within each subarea, any producer, such as VWD, who produces in any year an amount of water in excess of that producer's share (Free Production Allowance or FPA) for a subarea must buy replacement water (Replacement Water Assessment or RWA). Replacement obligations can be met by buying additional water rights, buying imported water from MWA, or leasing groundwater for one year from other water rights holders. The RWA is equal to the number of af of excess production by the producer multiplied by the RWA rate per af as adopted annually by the Watermaster.

Based on this year's current municipal percentage for the VWD Subarea (MWA, 2010), the FPA for VWD's is 12,576 afy within ID1, 1,760 afy within ID2, and SCLA is 1,236 afy. Therefore, VWD's FPA is 15,572 afy at the present time, subject to further ramp down. The 15,572 afy FPA is used as the available supply for VWD without RWA. Use over this quantity is subject to replacement obligations adopted by the Watermaster and paid to the Watermaster.

The VWD is currently pumping approximately 11,000 afy beyond its FPA to meet water demands, requiring replenishment fees or purchase of water rights from other agencies in the subbasin. As discussed in Chapter 7, VWD is planning projects to mitigate the

additional pumping, however, pumping beyond the FPA will be necessary until the planned acquisition of additional water entitlements and storage occurs (e.g., groundwater storage).

3.5.1 Groundwater Quality

On January 23, 2006, the U.S. Environmental Protection Agency (EPA) reduced the allowable maximum contaminant level (MCL) of arsenic from 50 µg/L to 10 µg/L; therefore, additional treatment became necessary as the new requirement affected several existing wells of Victor Valley Water District (VVWD) and Baldy Mesa Water District (BMWD). VWD's current target water quality goal for arsenic treatment is 8 µg/L. For the five years prior to 2005, the districts investigated a variety of treatment technologies to determine the most cost-effective, reliable, and operator-friendly treatment options in preparation of the new standard.

As a result of these studies, VVWD built two coagulation/filtration treatment plants, a blending station, and associated pipelines for ID1 in late 2005. The Balsam arsenic treatment plant was permitted in February 2007, whereas the El Evado arsenic treatment plant was permitted in March 2006. The construction of one ion exchange arsenic treatment plant was completed at ID1 Well 129, which became operational in January 2007. This arsenic treatment plant was later taken out of service in October 2007 after the merger of BMWD and VVWD occurred and Well 129 could be treated with the ID2 wells at the Avenal treatment plant. Well 129 is currently blended in the ID2 Avenal arsenic blending pipeline.

Within BMWD, two ion exchange arsenic treatment plants were constructed along with associated well collection pipelines. The two arsenic treatment plants were named La Mesa treatment plant and Avenal treatment plant. While source water is currently treated at La Mesa treatment plant, blending within the existing pipeline to the Avenal treatment plant reduces the arsenic concentration to below VWD's arsenic treatment goal. As a result, the Avenal treatment plant has been taken offline. For ID2 chlorination is now conducted at the La Mesa treatment plant and the former Avenal treatment plant site.

Up until the end of 2004, water quality pumped by VVWD's groundwater wells met state and federal standards. Wellhead chlorination within ID1 was begun in November 1999 as a preventative measure. Chlorination in ID2 began in 2006 and VWD currently injects chlorine at centralized treatment facilities.

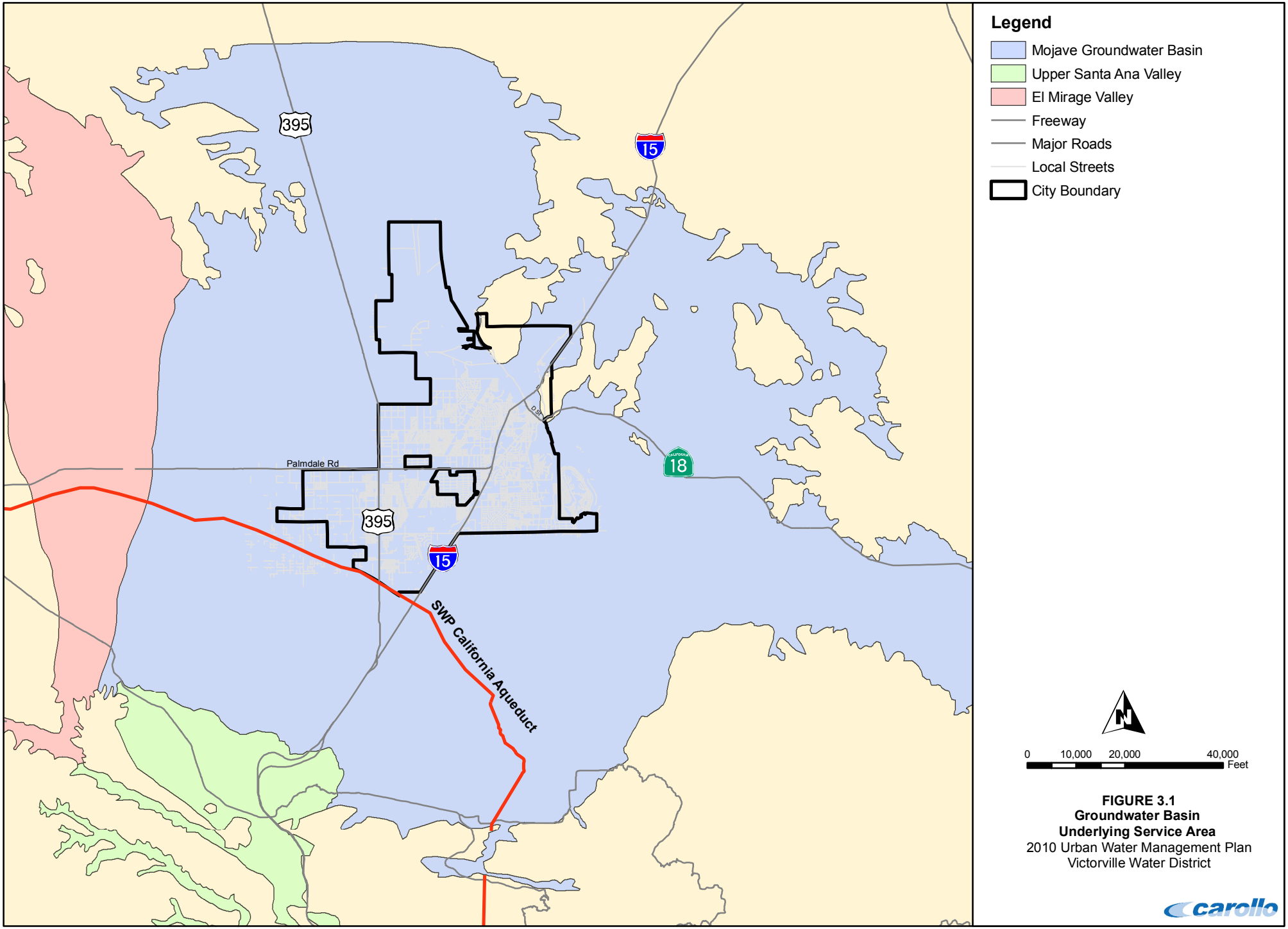

FIGURE 3.1
Groundwater Basin
Underlying Service Area
2010 Urban Water Management Plan
Victorville Water District

3.5.2 Groundwater Levels and Historical Trends

Groundwater within the VWD region of the Mojave Basin generally flows north/northeast. According to the DWR California Groundwater Bulletin 188-03, the storage capacity of the local subbasin is approximately 2.1 million af. In 1999 the MWA calculated that approximately 960,000 af of groundwater is currently stored in the subbasin. Thus, there is approximately 1.1 million af of additional storage capacity in this subbasin.

In a report prepared for VVWD by Richard C. Slade & Associates LLC, the volume of storage in the groundwater basin under VVWD's boundary was investigated. The Slade report established that there is more than 754,000 af of usable groundwater in storage under VVWD's boundaries (excluding the SCLA area). Water levels from local wells indicate that groundwater has declined approximately 30 feet over the last 20 years. Three high precipitation years occurred between 1991 and 1999, which produced a slight increase in groundwater levels (UWMP, 2005).

3.5.3 Sources of Recharge and Discharge

As mentioned in Section 3.5.1, the large Mojave Basin is replenished by infiltration of precipitation from the San Bernardino and San Gabriel mountains. There are two other projects, outlined below, designed to aid with the replenishment of groundwater in the area. The projects are intended to allow further utilization of the groundwater supplies without lowering groundwater levels.

Groundwater Recharge with Surface Spreading

Oro Grande Wash Project was established and piloted by VVWD and is now managed by MWA in conjunction with their other regional groundwater recharge projects. This project consists of surface spreading ponds located south of Sycamore Street and west of the Oro Grande Wash, as well as a pipeline from the SWP to the spreading ponds. VWD anticipates that, initially, this project will recharge 8,000 afy (WMP, 2010). A total capacity of 12,000 afy is assumed as MWA plans to expand the Oro Grande Wash Project as necessary to meet demands.

Groundwater Recharge with Injection Wells

Currently under construction, the Regional Recharge and Recovery Project (R^3) is a project being implemented by the MWA. The purpose of this project is to provide seasonal storage of imported water using the groundwater aquifer. Imported water will be injected at times that sufficient imported water is available, preferably during wet years when imported water rates are relatively low. This water can be extracted during high demand periods and/or in dry years by using groundwater wells at various locations. A new transmission main system will connect these groundwater wells in order to convey and distribute pumped groundwater to a number of water agencies in the high desert. The project could potentially provide water to Apple Valley Ranchos Water Company, City of Adelanto, City of Hesperia, Golden

State Water Company, and San Bernardino County Service Area, as well as VWD. This project is intended to increase the replenishment of the groundwater aquifer, by recharging the basin with raw imported water at eight recharge sites across MWA's service area (MWA, 2006).

The R^3 project will be implemented in multiple phases, with a total planned allocation for VWD of 16,650 afy. The Phase 1 allocation for VWD and SCLA is set at 6,800 afy or 6.1 mgd and will be available January 2012. According to the MWA 2010 RUWMP, the Phase 2 allocation for the R^3 project will begin approximately in 2015, although Phase 2 will likely depend on funding availability, monitoring results of Phase 1 performance, and water demand amongst project stakeholders. MWA's 2010 RUWMP does not state Phase 2 allocation for VWD. Supply projections in this report assume Phase 2 will allocate VWD its initially planned ultimate share of 16,650 afy.

3.5.4 Groundwater Pumping

The annual amount of groundwater pumped by VWD between 2006 and 2010 is presented in Table 3.2.

Table 3.2 Amount of Groundwater Pumped by VWD

	Historical Groundwater Pumped from Basin (afy)				
Basin Name	**2006**	**2007**	**2008**	**2009**	**2010**
Mojave Basin	28,317	29,256	25,234	24,073	22,733
% of Total Water Supply	**100%**	**100%**	**100%**	**100%**	**100%**

As shown in Table 3.2, VWD uses groundwater to meet 100% of its water demand. This value has decreased by approximately 4,000 af between 2006 and 2009.

Table 3.3 restates the groundwater supply projections presented in Table 3.1.

Table 3.3 Amount of Groundwater to be Pumped

	Annual Groundwater Pumped from Basin (afy)					
Basin Name	**2010(1)**	**2015(2)**	**2020**	**2025**	**2030**	**2035**
Mojave Basin	22,733	35,108	36,178	41,940	48,620	56,364
Total	**22,733**	**35,108**	**36,178**	**41,940**	**48,620**	**56,364**

Notes:
(1) Based on historic 2010 data; not a projection.
(2) Projection for 2015 based on 2010 demand estimates from WMP (WMP, 2010). For conservative planning purposes, demand projections are not reduced to 2010 demands.

The Mojave Basin is the only source of groundwater in the region. As was shown in Table 3.1 and further discussed in Chapter 5, overall demand is met with groundwater.

3.5.5 Basin Overdraft

As discussed previously, water rights within the Mojave River Basin have been the subject of litigation. To maintain proper water balances within each subarea, the 1996 judgment (RCSC, 1996) established an initial BAP, followed by a decreasing FPA (a percentage of their BAP which the producer is allowed to pump) in each subarea during the first five years. The judgment then provides for the Riverside County Superior Court to review and adjust, as appropriate, the FPA for each subarea annually thereafter. Any producer who produces in any year an amount of water in excess of that producer's share of the FPA for a subarea must pay the Watermaster a replacement water assessment (RWA) or lease carryover water rights from another party to satisfy the obligation. The RWA for a producer is equal to the number of af excess production by that producer multiplied by the RWA rate per af, as adopted annually by the Watermaster. MWA currently serves as the Watermaster for the 1996 adjudication. As the Watermaster, MWA continues to adjust the FPA based on natural recharge to the adjudicated basin.

Based on the most recent Watermaster Annual Report (MWA, 2010), VWD's Base Annual Production (BAP) for ID1 is 20,960 afy and for ID2 is 2,932 afy. Incorporating the current 60 percent drawdown for municipal usage within the Alto subarea (MWA, 2010), VWD's groundwater FPA is 12,576 afy within ID1 and 1,760 within ID2. The total existing groundwater pumping rights for VWD is presently 15,572 afy.

3.6 DESALINATED WATER

10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:

10631 (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.

The UWMPA requires that the UWMP address the opportunities for development of desalinated water, including ocean water, brackish water and groundwater. Table 3.4 summarizes VWD's current projects and future opportunities for desalinated water.

Table 3.4 Opportunities for Desalinated Water

Sources of Water	Existing Desalinated Water	Opportunities for Desalinated Water
Ocean Water	None	None
Brackish Ocean Water	None	None
Brackish Groundwater	None	None
Other	None	None

As summarized in Table 3.4, there is no opportunity for desalination of any kind by VWD.

3.6.1 Brackish Water and/or Groundwater Desalination

The groundwater basins located under or near the VWD are not brackish and do not require desalination. Therefore, there is no water of this nature available to VWD for direct use.

3.6.2 Seawater Desalination

Because VWD is not located in a coastal area, it is neither practical nor economically feasible for VWD to implement a seawater desalination program.

3.7 RECYCLED WATER

A large part of the wastewater that is generated within the service boundary of VWD is collected via a gravity sewer system owned and operated by the City of Victorville. The sewer system connects to a regional interceptor, which conveys the wastewater flows to the regional wastewater treatment plant that is owned and operated by the VVWRA.

VWD began development of an industrial waste water treatment plant in 2008 at the Southern California Logistics Airport (SCLA). The plant was constructed during 2009/2010 and began initial operations in July 2010. More information on VWD's water recycling system is presented in Chapter 4.

Chapter 4

RECYCLED WATER

This chapter includes information on water recycling and its potential for use as a water source for VWD in accordance with the UWMPA.

> *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. To the extent practicable, the preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies and shall include all of the following:*
>
> *10633 (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.*
>
> *10633 (b) 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.*
>
> *10633 (c) 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 determination with regard to the technical and economic feasibility of serving those uses, groundwater recharge, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.*
>
> *10633 (d) The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years.*
>
> *10633 (e) 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.*
>
> *10633 (f) 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 and to promote recirculating uses.*

4.1 COLLECTION AND TREATMENT SYSTEMS

A large part of the wastewater that is generated within the service boundary of VWD is collected via a gravity sewer system owned and operated by the City of Victorville. The sewer system connects to a regional interceptor, which conveys the wastewater flows to the regional wastewater treatment plant that is owned and operated by the Victor Valley Wastewater Reclamation Authority (VVWRA).

VVWRA is a Joint Powers Authority consisting of the Town of Apple Valley, City of Hesperia, City of Victorville, City of Adelanto, and County Service Areas of Oro Grande (Number 42) and Spring Valley Lake (Number 64) (VVWRA, 2007). VVWRA's regional plant provides treatment and distribution of recycled water. The regional plant has a current capacity of 14 mgd, 12 mgd of which is currently treated, and is located approximately 7 miles north of the City of Victorville, between SCLA and the Mojave River. Currently, the only user of recycled water is West Winds Golf Course. Based on discussions with VWD

staff, the average demand of the golf course is 300 afy. The balance of VVWRA's regional plant effluent is discharged into the Mojave River.

VWD began development of an industrial wastewater treatment plant in 2008 at the Southern California Logistics Airport (SCLA). The plant was constructed during 2009/2010 and began initial operations in July 2010.

The plant was developed primarily to treat process wastewater from the Dr. Pepper/Snapple manufacturing and bottling facility located at the SCLA. In addition, the plant will accommodate other sanitary wastewater from other parts of Victorville. The plant is sized to treat 1 MGD of industrial waste water and an additional 1.5 MGD of other sanitary flow from the City.

The treatment plant is designed to treat wastewater using anaerobic (for high strength industrial wastewater) and aerobic (for sanitary wastewater) treatment steps. The combined flows undergo complete-mix activated-sludge (CMAS) and clarification in a membrane bio-reactor (MBR) in the next treatment steps. The final process is ultraviolet (UV) disinfection before discharge.

Sludge from the facility is discharged to the VVWRA's Regional Wastewater facility for treatment and disposal.

The VWD and the High Desert Power Project (HDPP) signed an agreement in September 2010 whereby the VWD would supply HDPP with up to 4,000 afy of recycled water. The water can be supplied from a combination of sources, including VVWRA's regional wastewater treatment plant, the City of Victorville's new industrial wastewater treatment plant, or State Water Project (SWP) water. HDPP has been in operation since 2003. It has recently obtained the necessary approvals to use recycled water for cooling the plant.

The discharged effluent is considered recycled water (disinfected, tertiary treated recycled water as specified in California Code of Regulations, Title 22).

As of April 2011, the plant is taking in about 0.32 MGD of industrial waste water and 0.18 MGD of other sanitary flow. The plant is currently generating recycled water flows of approximately 0.5 MGD.

The effluent is currently being discharged to VVWRA. Once final testing has been completed, the recycled water will be used for the irrigation of Westwinds Golf Course at SCLA and High Desert Power Plant.

Some areas within VWD's service area are not connected to the sewer system, especially within ID2. The customers in these areas are connected to septic tanks, which indirectly contribute a portion to water production capacity in the basin. However, a more efficient and public health sensitive use of this wastewater would be to collect and treat it for reuse in agricultural and landscape irrigation.

VVWRA's collection and treatment flows from the VWD service area are shown in Table 4.1.

Table 4.1 VVWRA Wastewater Collection and Treatment

	Projected Annual Flow (afy)					
Type of Wastewater	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**
Estimated Wastewater Collected and Treated in Service Area(1)	8,986	10,814	13,863	16,912	19,961	23,010
Estimate Wastewater Collected and Treated by VVWRA(2)	13,051	16,904	20,688	25,011	30,581	37,391
Volume that Meets Recycled Water Standard(3)	300	3,000	3,000	3,000	3,000	3,000

Notes:
(1) Based on 2008 Draft Sewer Master Plan (SMP, 2008)
(2) 2010 through 2020 data from the VVWRA Service Area Flow Projection Study – Update No. 3 (RBF, 2009). Total was reduced by 1 MGD per year to account for Adelanto. Data for 2025 through 2035 projected based on average growth between 2015 and 2020.
(3) Flow shown meeting recycled water standard is based on the recycled water demand projections. Note that additional wastewater discharges meet tertiary treatment standards but are not put towards recycled water demands.

As shown in Table 4.1, the projected annual flow of treated wastewater from the VWD service area is anticipated to increase from about 9,000 afy to over 23,000 afy in 2035. These flow projections are based on average daily wastewater flows for each planning area in the VWD region, presented in the VVWRA Service Area Flow Projection Study (RBF, 2009). A portion of the projected flows will be converted into tertiary treated recycled water which will then be used at the Westwinds Golf Course and the High Desert Power Plant, further discussed below.

The wastewater which is not used as recycled water is discharged into the Mojave River in order to fulfill minimum Mojave River Discharge requirements. The remainder of the wastewater is put into percolation bases to assist in groundwater recharge. Water being discharged has received secondary treatment, with some unutilized tertiary water also being discharged to the Mojave River. Table 4.2 lists the current and projected disposal method for wastewater for the entire VVWRA service area, as VWD's contribution to VVWRA's total discharge is not possible to determine.

Table 4.2 VVWRA Disposal of Non-Used Recycled Wastewater

Method of Disposal	Treatment Level	Projected Annual Discharge Flow (afy)					
		2010	2015	2020	2025	2030	2035
Discharge to Mojave River[(1)]	Tertiary	8,481	9,248	11,752	14,641	18,346	22,876
Percolation[(2)]	Secondary	4,269	4,656	5,916	7,370	9,235	11,516
Total[(3)]		**12,751**	**13,904**	**17,688**	**22,011**	**27,581**	**34,391**

Notes:
(1) Projected flow based on average wastewater discharge breakdown from 2008, 2009, and 2010. It is assumed that discharge flows in the future will follow this trend.
(2) Data generated by finding the difference between Mojave River discharge and total non recycled VVWRA collection and treatment
(3) Data from Table 4.1, VVWRA collection and treatment with recycled water removed
(4) The minimum volume that VVWRA is required to discharge to the Mojave River each year is determined by the US Department of Fish and Game. The projected values shown above are in excess of the projected minimum requirement.

As shown in Table 4.2, wastewater is used to recharge local groundwater supplies via percolation basins and is discharged to the Mojave River. The water used for percolation is VVWRA wastewater that is not required to satisfy NPDES agreements specifying the minimum amount of water that must be discharged to the Mojave River. It is important to note however, that VVWRA discharges to the Mojave River more than the minimum specified in the NPDES agreement. The projected breakdown is based on the average discharge breakdown from 2008 to 2010.

4.2 RECYCLED WATER USES

Table 4.3 presents a comparison of anticipated 2010 recycled water use of VWD's wastewater by others as presented in VVWD's 2005 UWMP to the actual recycled water use by VWD's in 2010.

In VVWD's 2005 UWMP no recycled water was anticipated within VVWD's service area. Thus the projected 2010 recycled water use in Table 4.3 is listed as not applicable

Table 4.3 Projected 2010 Recycled Water Use From 2005 UWMP, Compared to Actual 2010 Recycled Water Use

Type of Use	Treatment Level	Projected[(1)] 2010 Recycled Water Use (afy)	Actual Recycled Water Use[(2)] 2010 (afy)
Golf Course Irrigation	Tertiary	n/a	300
Total		**n/a**	**300**

Notes:
(1) From VVWD's 2005 UWMP (UWMP, 2005)
(2) 2005 projections were based on recycled water being a method of disposal, but not inside the service area. VWD's service area has shifted since 2005 making a projection comparison not applicable.

4.3 POTENTIAL USES AND PROJECTED DEMAND

VWD has focused development of its recycled water distribution system for the industrial uses at SCLA. Currently, the largest planned recycled water user is the High Desert Power Plant. The only existing recycled water customer is Westwinds Golf Course. Projected demands for recycled water in the VWD service area are presented in Table 4.4.

Table 4.4 Recycled Water Uses – Actual and Potential

User Type	Treatment Level	Projected Recycled Water Demand (afy)					
		2010	2015	2020	2025	2030	2035
Golf Course Irrigation	Tertiary	300	300	300	300	300	300
Industrial Reuse[1]	Tertiary	0	2,700	2,700	2,700	2,700	2,700
Total		**300**	**3,000**	**3,000**	**3,000**	**3,000**	**3,000**

Notes:
(1) Industrial Reuse is High Desert Power Plant.
(2) Data generated from discussions with VWD staff
(3) Data only for recycled water usage within VWD's service area

As shown in Table 4.4, the current user of recycled water within the service area is Westwinds Golf Course, which receives 300 acre-feet per year (afy). The High Desert Power Project is anticipated to receive 1,000 afy of recycled water in 2015, bringing the system total to 1,300 afy. It is important to note that this data only reflects usage within the VWD's service area, not all of VVWRA.

4.4 INCENTIVES AND PLANNING

Although VWD's only uses recycled water is through the SCLA, VWD stands ready to work with other agencies to expand recycled water use when additional recycled water becomes available.

VWD has made considerable efforts towards planning and incorporating recycled water. In 2002, the City of Victorville developed a recycled water study titled Victorville Recycled Water Reuse Study. The study discussed potential sub-regional facility locations. The 2005 VVWRA report titled *Planning and Environmental Services to Develop Subregional Reclamation Facilities* explores introducing water recycling to the High Desert area.

In 2007 a water and wastewater systems master plan was written for the SCLA area. A large portion of this plan was devoted to exploring further use of recycled water within the SCLA. The City of Victorville's 2008 Sewer Master Plan has a recycled water component which discusses using recycled water to reduce the cost of capital improvements to reduce the demands projected to be placed on potable water systems. The City of Victorville, including VWD, continues to investigate recycled water utilization.

Chapter 5

WATER DEMAND

The UWMPA requires that the UWMP identify the quantity of water supplied to the agency's customers including a breakdown of demands and demand projections by user classification.

> 10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:
>
> 10631 (e) (1) Quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, 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; and (I) Agricultural.
>
> (2) The water use projections shall be in the same 5-year increments to 20 years or as far as data is available.

5.1 PAST, CURRENT, AND PROJECTED WATER USE

This section describes the historical, current, and projected water use through year 2035. It also describes the types of customer accounts in VWD and the breakdown of accounts throughout the system.

5.1.1 Historical Water Use

Water demands (or water use) represent water that leaves the distribution system through metered or unmetered connections or at pipe joints (leaks) or breaks. Water demands occur throughout the distribution system based on the number and type of customer in each location. Annual historical water demands within VWD's service area between 1994 and 2009 are presented in Table 5.1 along with population and per capita demand.

Water demands shown in Table 5.1 are based on calendar year consumption figures provided by VWD. Population is included for the same time period, using data drawn from VWD's billing records.

Table 5.1 VWD Historical Water Use

Year	Demand (afy)	Population[(1)]	Per Capita Consumption (gpcd)
1994	17,907	69,281	231
1995	17,810	72,985	218
1996	18,921	64,356	262
1997	18,835	63,822	263
1998	17,455	63,485	245
1999	18,960	64,538	262
2000	20,636	66,147	279
2001	19,859	68,884	257
2002	21,736	71,682	271
2003	22,409	77,176	259
2004	24,245	85,336	254
2005	25,923	93,567	247
2006	28,317	102,122	248
2007	29,256	108,961	240
2008	25,234	110,984	203
2009	24,073	108,010	199
Average	**21,973**	**80,708**	**246**

Notes:

(1) Historic population estimates for VWD were calculated from the number of service connections installed each year between 1990 and 2010. A benchmark of the year 2000 was used based on census data (USCB, 2000).

As shown in Table 5.1, VWD demands increased over the last 16 years, growing from almost 18,000 afy to approximately 24,000 afy. Population has increased over the same time period from approximately 69,000 to over 108,000.

5.1.2 Per-Capita Consumption

Per capita demands are calculated by dividing the total system demands by VWD's population. The resulting number is the average number of gallons consumed, per person, per day for that year. Annual per capita demands are included in Table 5.1. Over the last 16 years, the per capita consumption has ranged between 199 and 279 gpcd. As shown, VWD's average per capita demand over the last 16 years was 240 gpcd.

5.1.3 Projected Water Use

Based on the future trends in population obtained from SCAG and established per capita water consumption rates, VWD's future water requirements were estimated and are summarized in Table 5.2. This was done by establishing a per capita water consumption value, and then identifying consumption targets using this consumption value. The per

capita water consumption value was then decreased in order to meet future water conservation requirements (as discussed in more detail in Chapter 6).

Table 5.2 Demand Projections

Year	Per Capita Consumption (gpcd)[1]	Population[2]	Demand (afy)[4]
2010	176	115,512	22,733[3]
2015	234	133,911	35,108
2020	208	155,239	36,178
2025	208	179,965	41,940
2030	208	208,628	48,620
2035	208	241,858	56,364

Notes:

(1) Per capita factors from Chapter 6 reflect SBx7-7 targets.

(2) Population Projections from Table 2.2 for the VWD service area.

(3) 2010 demand value based on actual historical values. Projected 2010 usage 33,649 af at 260 gpcd baseline

(4) Demand projections incorporate 2020 conservation targets

As shown in Table 5.2, projected demands begin at 33,649 afy in 2010 and are anticipated to increase to 56,364 afy in 2035. Actual demand in 2010 was 22,733 af, and while the projection data demonstrates a considerable increase over current levels of use, they are consistent with the three percent growth model, and the per capita demand bench line values developed for VWD. The benefit of these estimates is that they do not reflect demand reductions of the past few years which may not reflect long term growth trends. Incorporating recent demand decreases in long term planning projects could potentially lead to insufficient supply, if growth resumes longer term historical trends.

Over the projected time period, the population within VWD's service area is anticipated to grow by over 126,000 to approximately 241,858. This demand projection is based on per capita consumption rates which have been specifically calculated to satisfy the water conservation targets laid out in the Water Conservation Act of 2009. The target per capita consumption values reflect a 20 percent reduction in water use by 2020. More details regarding the per capita consumption rates presented in Table 5.2 can be found in Chapter 6.

5.2 WATER USAGE BY CLASSIFICATION

The current and projected water deliveries by sector are summarized in Table 5.3 along with those for 2005. As shown, VWD does not have any unmetered accounts and is planning to continue installing meters for all future accounts.

The water loss data from 1999 to 2008 showed a range of water loss from 4 to 10 percent and an average water loss of seven percent. Due to plans to replace faulty piping in the VWD system, projections assume a future water loss of 3 percent.

Table 5.3 Water Demand Projections by Sector[1,2,3,6]

Use	2005[5]		2010[5]		2015		2020		2025		2030		2035	
	# of Accounts	Demand (afy)	# of Accounts	Demand (afy)	# of Accounts	Demand (afy)	# of Accounts	Demand (afy)	# of Accounts	Demand (afy)	# of Accounts	Demand (afy)	# of Accounts	Demand (afy)
SFR	26,697	16,104	31,028	16,050	37,482	23,244	43,452	26,930	50,373	31,219	58,396	36,191	67,697	41,955
MFR	511	1,780	652	1,774	788	2,558	914	2,976	1,059	3,450	1,228	3,999	1,423	4,636
Comm	1,343	4,619	1,271	2,656	1,535	3,838	1,780	4,457	2,063	5,167	2,392	5,989	2,773	6,943
Ind.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Land./Irr.	490	1,260	554	435	669	624	775	719	899	834	1,042	967	1,208	1,121
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unmetered System Losses[4]		2,160		1,818		936		1,086		1,259		1,459		1,692
Total	29,041	25,923	33,505	22,733	40,474	31,200	46,920	36,178	54,394	41,940	63,057	48,620	73,101	56,364

Notes:
(1) Number of accounts shown are based on average account to population ratio in 2009, and account type breakdown from 2009.
(2) Demands by each account type based on average usage breakdown by account type from 2009 for conservation water use projections (see Figure 5.1)
(3) Water uses which are not included in this table (e.g., Groundwater Recharge and Conjunctive Use) have no existing or projected demands within the City's water service area and the associated rows were removed for clarity.
(4) Assumes 3% water loss
(5) 2005 account and demand, and 2010 demand are historical data, but the account and account usage breakdown is still based on 2009 averages, as indicated in (3)
(6) Demand projections incorporate 2020 conservation targets

As shown in Table 5.3, water demands are projected to increase, but at a much slower rate than in past years. The increase in demands takes future conservation goals into account. The number of projected accounts is based on the historic account-to-population ratios from 2009 (average of 0.3 accounts per person) multiplied by population projections. The reason for basing account numbers on population is that total water use will fluctuate due to conservation measures, drought, and other factors. Population however, is linked with accounts, even if demand is reduced on a per capita basis. The projections in Table 5.3 assume that while the population within VWD continues to grow, conservation goals will be met.

The breakdown of the number of accounts by account type in 2010 is depicted graphically in Figure 5.1.

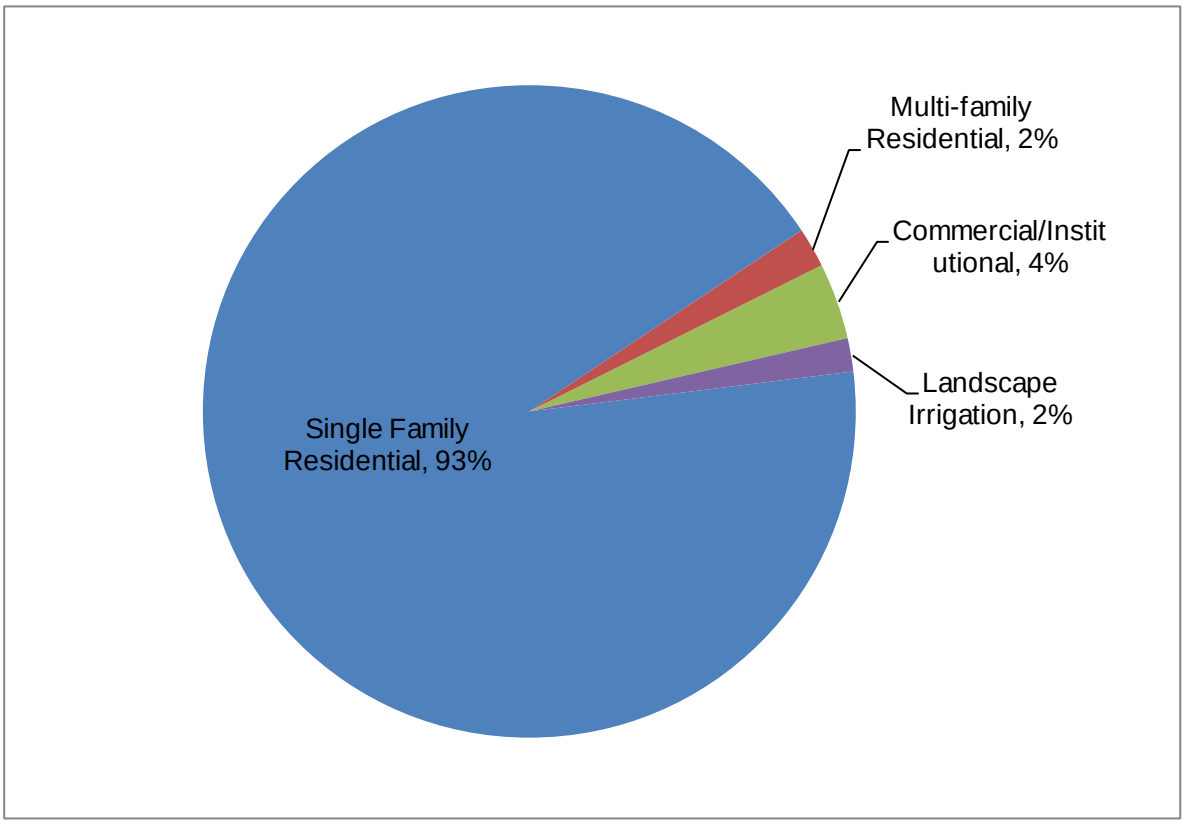

Figure 5.1 Breakdown of Average Number of Accounts by Account Type (2010)

As shown in Figure 5.1, water demands are primarily from residential uses. In 2009, residential uses (single family and multi-family) accounted for 85 percent of water consumption and 95 percent of the City's accounts. During the same year, commercial/institutional uses accounted for 13 percent of water consumption but only four percent of the City's accounts. The remaining water use was landscape irrigation, accounting for approximately two percent of accounts and two percent of total usage.

5.3 PROPOSED DEVELOPMENTS

California Water Code requires that the UWMP identify the major developments within the agency's service area that would require water supply planning.

> 10910. (a) Any city or county that determines that a project, as defined in section 10912, is subject to the California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) under Section 21080 of the Public Resources Code shall comply with this part.
>
> 10912. For the purpose of this part, the following terms have the following meanings:
>
> 10912 (a) "Project" means any of the following:
> (1) A proposed residential development of more than 500 dwelling units.
> (2) A proposed shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space.
> (3) A proposed commercial office building employing more than 1,000 persons or having more than 250,000 square feet of floor space.
> (4) A proposed hotel or motel, or both, having more than 500 rooms.
> (5) A proposed industrial, manufacturing or processing plant, or industrial park planned to house more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area.
> (6) A mixed-use project that includes one or more of the projects specified in this subdivision.
> (7) A project that would demand an amount of water equivalent to, or greater than, the amount of water required by a 500 dwelling unit project.

VWD staff identified one major development planned within its service area, the Desert Gateway/Northern Triangle. Due to the recent economic downturn, timing of this development is currently unknown.

Desert Gateway is a 10,203 acre area at the northeast edge of the City of Victorville. The development will feature retail, commercial, and residential uses, and include neighborhoods oriented towards mixed use village centers. The development is planned to contain 3,468 acres of single family residential, 293 acres of multi-family residential, 283 acres of commercial, 1,085 acres of industrial, 4,564 acres of institutional, and 510 acres of mixed use. As the Desert Gateway development lies within VWD's service area, VWD will supply water service. Water demands associated with this development are accounted for in the demand projections.

5.4 LOW INCOME HOUSING

The UWMPA requires that the UWMP identify planned low income housing demands within the agency's service area.

> 10631.1(a). The water use projections required by Section 10631 shall include projected water use for single-family and multifamily 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

The City of Victorville's 2030 General Plan (GP, 2008) provides information on Regional Housing Needs Allocation Progress (RHNA). This Housing Element of the General Plan update identify the need to construct a total of 986 extremely low income, 987 very low income, and 1,401 low income housing units between 2006 and 2014.

Assuming the 3,374 dwelling units reflect an average of 3.2 people per dwelling unit per the City General Plan and the projected 2020 per capita water usage of 208 gpcd, The total demands of 2,516 afy for low income housing water consumption will be realized by 2015.

Table 5.4 Low Income Projected Water Demands

	Demand (afy)				
	2015	**2020**	**2025**	**2030**	**2035**
Low Income Housing	2,516	2,516	2,516	2,516	2,516

Notes:
(1) Based on planned low income housing needs as described in the City of Victorville's 2008 General Plan (Victorville, 2009). The General Plan projects housing needs through 2014. It is assumed that the projection of housing needs through 2014 will be applicable through 2035.

This demand is assumed for all years beyond 2015. The 2008 General Plan Update does not provide information on single family versus multi-family low income dwelling units, so the average number of people per dwelling unit was assumed to be 3.2.

Chapter 6

WATER CONSERVATION

6.1 INTRODUCTION

The Urban Water Management Planning Act (UWMPA) requires that the UWMP address the requirements of the Water Conservation Act of 2009.

> *10608.20 (e) An urban retail water supplier shall include in its urban water management plan due in 2010 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*

6.2 WATER CONSERVATION TARGET METHODS

Senate Bill x7-7, also known as the Water Conservation Act of 2009 (SBx7-7), is the new law governing water conservation in California that was enacted November 2009. This law requires that all water suppliers increase water use efficiency with the overall goal to decrease per capita consumption within the state by 20 percent. The bill requires that the DWR develop certain criteria, methods, and standard reporting forms through a public process that can be used by water suppliers to establish their baseline water use and determine their water conservation goals.

DWR provided four different methods to establish water conservation targets. These four methods are summarized as follows.

- **Method 1 – Baseline Reduction Method.** The 2020 water conservation target of this method is defined as a 20 percent reduction of average per capita demand during a 10-year continuous baseline period that must end between 2005 and 2010.
- **Method 2 – Efficiency Standard Method.** The 2020 water conservation target of this method is based on calculating efficiency standards for indoor use separately from outdoor use for residential sectors and an overall reduction of 10 percent for commercial, industrial, and institutional (CII) sectors. The aggregated total of the efficiency standards in each area is then used to create a conservation target.
- **Method 3 – Hydrologic Region Method.** This method uses the ten regional urban water use targets for the state. Based on the water supplier's location within one of these regions, a static water use conservation target for both 2015 and 2020 is assigned.
- **Method 4 – BMP Based Method.** This method uses previous BMP of a supplier in order to establish a conservation target for 2020. Depending on how aggressively the water supplier has pursued water reduction and conservation in the past, a new conservation target for 2020 will be assigned.

The following sections first present the historic baseline calculations and gpcd. The minimum conservation target is then identified. The actual water conservation targets each method are then described in the following paragraphs. This section concludes with a recommended method for VWD. Demand projections with conservation targets incorporated were used for the water reliability calculations presented in Chapter 7.

6.2.1 Baseline Calculations

The consumption baseline is a per capita value based on historical population and historical demands. Any 10-year consecutive period between 1995 and 2010 can be selected to establish the baseline per capita demand for the water supplier using the average per capita consumption from that 10-year period. If an agency uses 10 percent or more recycled water in year 2008, the baseline value can also be determined with a 15-year consecutive period between 1990 and 2010. VWD did not account for 10 percent of total deliveries in 2008 with recycled water, and therefore must select a 10 year baseline.

In addition to the 10-year baseline period, a 5-year period needs to be selected in any year ending no earlier than 2007 to determine the minimum required reduction in water use. The selected 10-year and 5-year base period ranges are summarized in Table 6.1.

Table 6.1 Base Period Ranges

Base	Parameter	Value	Units
Water Deliveries	2008 total water deliveries	25,234	af
	2008 total volume of delivered recycled water	0	af
	2008 recycled water as a percent of total deliveries	0	%
10-year Base Period	Number of years in base period	10	years
	Year beginning base period range	1996	
	Year ending base period range	2005	
5-year Base Period	Number of years in base period	5	years
	Year beginning base period range	2003	
	Year ending base period range	2007	

The historical water consumption for the period 1995 through 2009 is shown in Figure 6.1. This figure also depicts the minimum, average, and maximum 10-year baseline values. As shown, the 10-year period with the highest baseline consumption starts in 1996 and ends in 2005.

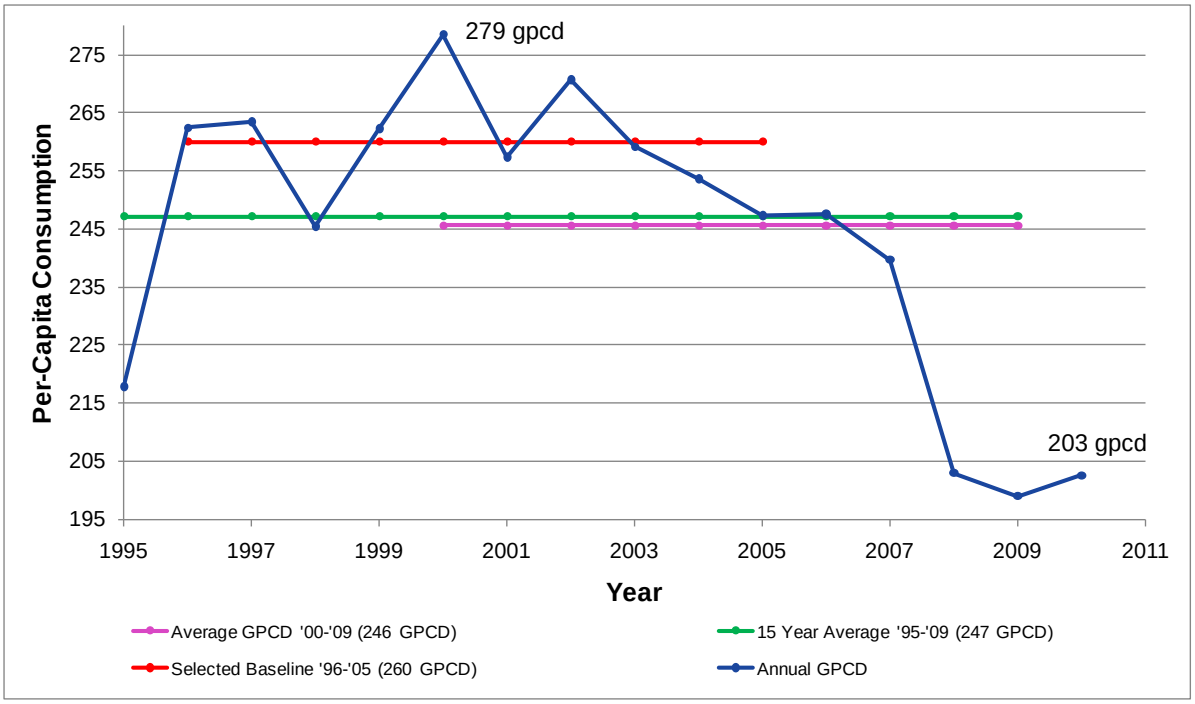

Figure 6.1 Historical Per Capita Consumption

The population, total consumption, and per capita consumption of the 10-year baseline period are shown in Table 6.2. As shown, the average per capita consumption during this period, and baseline for VWD, was 260 gpcd.

Table 6.2 Base Daily Per Capita Water Use – 10 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	1996	64,356	16.9	262
Year 2	1997	63,822	16.8	263
Year 3	1998	63,485	15.6	245
Year 4	1999	64,538	16.9	262
Year 5	2000	66,147	18.4	279
Year 6	2001	68,884	17.7	257
Year 7	2002	71,682	19.4	271
Year 8	2003	77,176	20.0	259
Year 9	2004	85,336	21.6	254
Year 10	2005	93,567	23.1	247
Average	**n/a**	**71,899**	**18.7**	**260**

6.2.2 Minimum Conservation

Table 6.3 shows the population, total volume of consumption, and per capita consumption of the five year baseline period. The five year baseline value is used to determine the minimum required reduction in water use of 249 gpcd by 2020.

Table 6.3 Base Daily Per Capita Water Use – 5 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	2003	77,176	20.0	259
Year 2	2004	85,336	21.6	254
Year 3	2005	93,567	23.1	247
Year 4	2006	102,122	25.3	248
Year 5	2007	108,961	26.1	240
Average	**n/a**	**93,432**	**23.2**	**249**

As shown in Table 6.3, the average consumption in the period 2003-2007 was 249 gpcd. The minimum per capita consumption for year 2020 is defined as 95 percent of this value. This equates to a minimum water conservation target of 237 gpcd. It is important to note that this value merely serves as a minimum conservation value. The five year baseline acts like a check, so that conservation targets are reasonably in line with recent consumption.

6.2.3 Method 1

Method 1 establishes baseline water per capita consumption based on historical population and historical demands. Under Method 1, the baseline value is reduced by twenty percent to determine the year 2020 conservation target. The intermediate target for year 2015 is the mid-point value between the baseline and year 2010 target values.

Based on 20 percent reduction from the 10 year baseline period, VWD's 2020 conservation target is 208 gpcd. This conservation value is determined by taking 20 percent of the 10 year gpcd average identified in Table 6.2.

As the water conservation target from the 10-year baseline period (208 gpcd) is lower than the minimum water conservation target (237 gpcd), VWD's water conservation targets using Method 1 are as follows:

- Year 2015 Target: 234 gpcd (10% reduction from the baseline)
- Year 2020 Target: 208 gpcd (20% reduction from the baseline)

6.2.4 Method 2

Method 2 uses performance standards for both indoor and outdoor usage to establish the supplier's 2020 water conservation target. Method 2 consists of a series of four steps and utilizes actual water use data and estimates from the water supplier. First, the method assumes a standard statewide indoor use target of 55 gpcd. Then, the landscaped area for the supplier's entire service area is determined. Commercial, institutional, and industrial water use is accounted for separately using historical billing data. The performance standards for outdoor landscape irrigation, based on acreage, and commercial, institution, and industrial use, based on demands, are then applied to those totals. Finally, the performance standards for all three sectors are added together to determine the Method 3 2020 conservation target. There is insufficient data to calculate Method 2 for VWD.

6.2.5 Method 3

The State's water conservation plan has identified specific urban water use targets for 2015 and 2020 for each of the ten hydrologic regions shown in Figure 6.2. VWD falls in Hydrologic Region 9 (South Lahontan) which has a target use of 162 gpcd for year 2020.

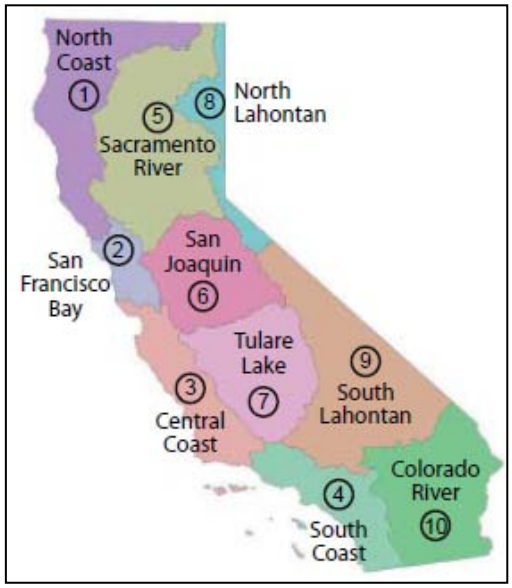

Figure 6.2 Hydrologic Regions

VWD's water conservation targets using Method 3 are as follows:

- Year 2015 Target: 211 gpcd (19% reduction)
- Year 2020 Target: 161.5 gpcd (38% reduction)

6.2.6 Method 4

Method 4 uses the supplier's BMP or DMM reports as a guide to set the 2020 conservation target. The intent behind Method 4 is to use these reports to account for what water

conserving measures the supplier has already taken in order to set a more accurate and realistic target for the future and take into consideration the supplier's previous water conservation efforts.

Method 4 is based on VWD's DMM efforts and has been released as a provisional method, subject to later revisions during the 2015 UWMP cycle. The methodology for the provisional method relies on the base daily per capita use in 2000 and reduction in the three urban use sectors:

- Residential indoor;
- Commercial, industrial, and institutional (CII); and
- Landscape use and water loss.

A discussion of each of these components, and the calculated savings in each of these sectors is included below.

Since indoor and outdoor water use is delivered through a single meter, an assumption of 70 gpcd has been provided by DWR for standard residential indoor water use. To determine indoor residential savings, Method 4 outlines two methodologies. A calculator has been developed to sum the savings for four conservation elements including single and multi-family residential housing toilets, residential washers, and showerheads. Due to insufficient data on the water savings associated with these measures, VWD will use what has been termed the "default option" to determine these savings. Based on the draft provisional method, this default value is 15 gpcd.

Baseline CII water can be easily established for VWD since all commercial, industrial, and institutional connections were metered in through the baseline period. The calculated baseline for CII use (over the same 1996 through 2005 period) was 42 gpcd.

The provisional method estimates a default value for CII savings of 10 percent of the per capita CII demand. The CII water savings are therefore 4.2 gpcd.

The landscape and water loss water use is determined by subtracting the default indoor water use of 70 gpcd and CII water use of 42 gpcd from the calculated baseline per capita use of 260. Based on calculated baseline per capita water use, the landscape and water loss use is 149 gpcd.

The draft provisional method estimates a default value for landscape and water loss savings of 21.6 percent. The landscape and water loss savings are therefore 45.7 gpcd.

Since all connections within VWD are currently metered, no water savings are associated with metering unmetered accounts.

Based on the steps above, the total water savings is estimated at 51 gpcd. When compared with the baseline demand of 260 gpcd, this would result in a water conservation target of 209 gpcd. A summary of baseline water use by sector and individual savings calculated using Method 4 is included in Table 6.4.

CII data was only available for three years in the baseline period. To generate 10 years of CII data, a ratio of CII use per total volume consumed was generated for each baseline year based on the three years of available data. When VWD updates the UWMP in 2015, the CII data will be more complete and may differ from these assumptions.

Table 6.4 Method 4 Target Determination Summary

Baseline Water Use (gpcd)				Water Savings (gpcd)				
Residential Indoor[(1)]	CII[(2)]	Landscape/ Water Loss	Total	Residential /Indoor[(3)]	CII[(4)]	Landscape Water	Metered	Total
70	42.2	147.8	260	-15.0	-4.2	-31.9	0.0	209

Notes:
(1) Assumed value based on guidelines in provisional Method 4.
(2) Source: BMP data.
(3) Default savings based on guidelines in provisional Method 4.
(4) CII water savings of 10 percent based on guidelines in provisional Method 4.
(5) Landscape and water loss savings of 21.6 percent based on guidelines in provisional Method 4.

6.2.7 Recommended Method

The water conservation targets per method as developed with data provided by VWD are summarized in Table 6.5. Method 1 results in the most feasible 2015 and 2020 conservation targets and will allow VWD the greatest freedom in reaching these goals.

Table 6.5 Conservation Method Overview

	Conservation Target (gpcd)		Reduction by 2020 (%)	
Supply Source	Year 2015	Year 2020	From Baseline[(1)]	From 2009 Usage[(2)]
Method 1	234	208	20%	+5%
Method 2	n/a	n/a	n/a	n/a
Method 3	211	161.5	38%	19%
Method 4	235	209	20%	5%

Notes:
1) Baseline consumption is 260 gpcd
2) 2009 consumption is 199 gpcd

Based on an evaluation of each method as described above and discussions with VWD staff, it was decided to use Method 1 for the 2010 UWMP. VWD target for 2020 is 208 gpcd or a reduction of 9,044 af. The following section discusses the various BMPs that are available for VWD to achieve this reduction in water use.

6.3 BEST MANAGEMENT PRACTICES

In 1991, a Memorandum of Understanding (MOU) regarding urban water conservation in California formed the California Urban Water Conservation Council (CUWCC). Council members can submit their most recent BMP Report with their UWMP to address the urban water conservation issues in the UWMPA.

However, VWD is not currently a signatory of the MOU, and is therefore not a member of the CUWCC. While VWD is not a member of CUWCC, VWD realizes the importance of the BMPs to ensure a reliable future water supply. VWD is committed to implementing water conservation and water recycling programs to maximize sustainability in meeting future water needs for its customers.

This chapter addresses the following requirements of the UWMPA.

10631 (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 prohibitions.

(N) Residential ultra-low-flush toilet replacement programs.

DWR has assigned an enhanced terminology to the BMPs. Accordingly, this chapter will refer to them as DMMs. The current implementation status of VWD's DMMs is summarized in Table 6.6. As shown, VWD has started the implementation of all DMMs with the exception of DMM 10, which only applies to wholesalers. A more detailed description of each DMM is provided in the following paragraphs.

Table 6.6 Demand Management Measures

Demand Management Measure	Implemented	Planned for Implementation	Not Applicable
DMM 1 - Water survey programs for single-family residential and multifamily residential customers	✓		
DMM 2 - Residential plumbing retrofit	✓		
DMM 3 – System water audits, leak detection, and repair	✓		
DMM 4 – Metering with commodity rates for all new connections and retrofit of existing connections	✓		
DMM 5 – Large landscape conservation programs and incentives	✓		
DMM 6 – High-efficiency washing machine rebate programs	✓		
DMM 7 – Public information programs	✓		
DMM 8 - School education programs	✓		
DMM 9 – Conservation programs for commercial, industrial, and institutional accounts	✓		
DMM 10 – Wholesale agency programs			✓
DMM 11 – Conservation pricing	✓		
DMM 12 – Water conservation coordinator	✓		
DMM 13 – Water waste prohibition	✓		
DMM 14 – Residential ultra-low-flush toilet replacement programs	✓		

6.3.1 DMM 1 - Water survey programs for single-family residential and multifamily residential customers

This program offers free water audits to residential customers. A 'free' home water audit reviews water use patterns using billing consumption history, water fixtures, appliances, etc., to locate and discover ways to conserve water and reduce monthly water bills. Customers requesting a free audit are visited by a trained Water Conservation Specialist. During the visit, the customer is shown how to operate the programmer for the sprinkler system, how to read and use the meter to determine water use applications, and how to find a leak. An irrigation audit on outdoor landscaping is performed with recommendations for improvements. Irrigation schedules can be mailed to the customer.

Participating customers are eligible to receive water saving products such as low flow shower heads, low flow kitchen and bath aerators if their homes are determined to qualify during the inspection. Additionally, self audit kits are available for all customers whether or not they request a home visit, as these kits provide information for a family to conduct their own simple indoor water use analysis to determine where they can reduce and save. These kits are available at City Hall at the Conservation counter.

To solicit program participation, flyers are distributed throughout the Conservation Division and made available at water conservation events throughout the year. Information is posted on the District Web site while other avenues such as TV commercials, radio and magazine articles, have been used depending on funding. In addition, requests for assistance also come from customers who receive notification from Conservation staff regarding water- run off occurring at the property. Usually these customers will request an audit to help in mitigating the issues that are causing the run off to occur.

6.3.2 DMM 2 - Residential plumbing retrofit

This program consists of providing qualified homes with low flow showerheads and kitchen and bath faucet aerators in order to reduce the amount of water used inside the home. Between summer 2007 and spring 2011, VWD issued 300 low flow showerheads, 500 low flow kitchen/bath faucet aerators and 500 automatic hose shut off nozzles in the implementation of DMM 2. In the spring of 2011, VWD purchased an additional 250 low flow showerheads and 500 low flow aerators in order to retrofit additional homes through fiscal year 2011-12. Retrofits are performed through the residential 'Free Water Audit' Program for qualifying homes.

In March 2004, the former VVWD signed an agreement with the Department of Water Resources for an Urban Water Conservation Capital Outlay Grant to provide matching funds for the ULFT program, and as of May 3, 2006, a total of 806 toilets were replaced under that program. From fiscal year 07-08 through June of 09, VWD continued with similar toilet replacement program, partnering with the Water Conservation Incentive Program, sponsored by MWA. These programs are further discussed in DMM 14.

Due to funding constraints, VWD's recent rebate/voucher HET toilet program ended in June of 2009. Staff continued with in-kind services to assist the Water Conservation Incentive Program (WCIP) HET toilet rebate/voucher program offered by MWA until June 2010. If the opportunity returns to participate in a regional toilet distribution program, VWD will participate by promoting the program and assisting with program administration.

In the spring of 2011, VWD applied for a Water Efficiency Grant from the U. S. Department of the Interior, Bureau of Reclamation, Water Conservation Field Services Program. This grant, if approved, would cover the costs to enable a direct install plumbing retrofit program for SF and MF disadvantaged communities within the service area.

Several studies suggest that water use savings resulting from miscellaneous interior retrofit fixtures can range between 25 and 65 gpd per housing unit. The studies also suggest that installation of retrofit fixtures in older single-family homes tend to produce more savings, while newer multi-family homes tend to produce fewer saving per housing unit.

If VWD were to increase single family account saturation of retrofits, further water conservation could be achieved. Retrofitting 10,000 single family accounts, approximately 30 percent of single family accounts, would likely decrease use by approximately 560 afy, or 6 percent of the 9,044 af reduction in 2020.

6.3.3 DMM 3 - System water audits, leak detection, and repair

Each year, VWD staff continues to perform the following steps to ensure that unnecessary water loss before sales is kept to a minimum:

- Regularly inspect for leaks in pipeline, and production/distribution facilities.
- Provides adequate staff on duty to respond quickly to pipe ruptures, leaks, and repairs, including service laterals inspections.
- Supports an ongoing valve exercising program by regularly exercising all control/shut off valves, such that leaks can be corrected in a timely manner

The VWD's leak detection program also includes an active meter replacement/inspection program and pipe replacement program.

- Beginning in 2003 and 2004, both former Districts began actively replacing older meters and incorporating the installation of radio read technology. While upgrades were stopped for a period of time due to technical and funding considerations, replacement of old meters resumes in 2010 and 2011.
- High water bill complaint issues are addressed by conservation division staff conducting field accuracy tests on the water meter in the presence of the customer, and if this does not resolve the issue, meter technicians follow up by sending out additional meters for testing.
- Meters are regularly inspected for tampering. New meter reading technology data picks up unusual water usage trending and flags the accounts which are then issued for Conservation Division follow up.
- VWD also has an ongoing program of replacing existing old, undersized, and deteriorating steel piping with PVC or ductile iron piping.

Staff from the Conservation Division conducts water analysis on an ongoing basis and performs field audit inspections for water waste and leaks for all VWD owned and maintained large landscaped areas served by VWD. In 2010 and 2011 all building facilities owned by VWD and City of Victorville were audited for water efficiency product and a dozen low flow aerators have been replaced.

During 2010 and 2011, it was determined that VWDs unaccounted water losses have not exceeded 10% of total system water. However, because VWDs water loss spectrum is between 7 to 10 %, this indicates it may be feasible to pursue a full scale system audit.

6.3.4 DMM 4 - Metering with commodity rates for all new connections and retrofit of existing connections

This DMM requires water meters for all new connections and billing by volume of use, as well as establishment of a program for retrofitting any existing unmetered connections.

Currently, all connections within VWD service area are metered and customers are billed according to the amount of water used. As VWD continues to install meters at all its new connections, this program will not provide foreseeable water conservation opportunities for the district.

6.3.5 DMM 5 - Large landscape conservation programs and incentives

ETo-based Water Budgets: This DMM calls for agencies to start assigning reference ETo-based water budgets to accounts with dedicated irrigation meters and to provide water use audits to accounts with mixed use meters. Based on 2009 agency data, VWD currently has approximately 538 accounts with dedicated irrigation meters served by potable water. In 2009, these accounts had a combined annual water demand of 486 afy, which equates to an average water use of 0.9 afy per landscape customer. Assuming that these landscape customers could save 25 percent of their water use, or 0.2 afy, through more efficient watering techniques and ETo sensors, VWD could potentially save 61 afy by implementing landscape conservation programs with 50 percent of landscaping customers. This would be 1 percent of the 9,044 af reduction needed in 2020. VWD does not assign reference ETo-based water budgets currently, but will review this DMM during fiscal year 11-12 to analyze its feasibility.

Nuisance Water Program: Currently, VWD addresses large landscapes under the Nuisance Water Program to identify areas where water is being wasted or excessively allowed to run off. As appropriate, water audits are offered and performed, and customers are informed about programs like the Cash for Grass landscape program.

Rate Structures: Additionally, VWD's water rates are designed to curb inefficient water use practices by increasing the monthly service charge as average daily use increases. Water audits are available to commercial, industrial, and CII accounts, as part of the same program that offers residential audits. Additionally, VWD will be researching irrigation efficient products and the possibility of providing rebates for these in the next fiscal budget 11-12.

Workshops: VWD has participated in workshops to educate landscape maintenance personnel to learn how to irrigate more efficiently and to become more aware of the Water

Waste Prohibition Ordinances that have been adopted. The most recent workshop was held during fiscal year 10-11.

Weather Based Irrigation Controllers: During 2005, VVWD completed a pilot study involving a two year examination of the effectiveness of using weather based irrigation controllers in VWD's service area. This pilot program showed an average water savings of 35% for the one location that completed the pilot project. A second location discontinued the project due to malfunctions of the equipment. The VWD has not pursued this DMM since then due to a low cost benefit ratio and the relative complexity and expense of the equipment.

During fiscal year 10-11, VWD Conservation Division assisted the Public Works Department with researching similar best available technologies like the ET controller to achieve higher levels of water use efficiency and reduce the overall water demands of the large landscaped areas within the City of Victorville's numerous Landscape Maintenance Districts (LMADs). In the spring of 2011, the City of Victorville applied for a Water Efficiency Grant from the U. S. Department of the Interior, Bureau of Reclamation, and Water Conservation Field Services Program. This grant, if approved, would cover the costs of implementing the weather based irrigation controllers in the LMADs.

VWD also utilizes a Cash for Grass program to achieve further water conservation through landscaping. This program is often conducted on smaller scales however, so further details can be found in Section 6.3.15.

6.3.6 DMM 6 - High-efficiency washing machine rebate programs

This program generally provides financial incentives (rebate offers) to qualifying customers who install high-efficiency washing machines in their homes.

In 2007/08, VWD implemented this measure by partnering financially through the WCIP program sponsored by MWA through AWAC by offering an $80 rebate in conjunction with program assistance and in kind staff support. This program began Feb 2008 and continued through June 2010. As a result of funding restrictions, VWD stopped financial support of this program in June 2009, but still continued providing program assistance and staff labor during inspections for eligibility. This assistance was provided by promoting the WCIP program with advertisement, commercials, magazine articles, billing stuffers, flyers and during home visits for water audits, high usage request for water analysis and cash for grass appointments instead.

6.3.7 DMM 7 - Public information programs

This program consists of distributing water use efficiency information to the public through a variety of methods including brochures, radio, television, school presentations and videos, and websites. VWD has promoted water conservation by using its website as a source of

conservation tips, which include indoor and outdoor usage, water-smart landscaping, guides to high desert gardening, and locations of local water-wise nurseries.

The VWD actively participates in regional water conservation efforts via its involvement and support of AWAC, The Alliance for Water Awareness and Conservation. AWAC is composed of a coalition of 29 partnering agencies working together to promote the efficient use of water and increase water conservation awareness throughout High Desert Communities. Since fiscal year 04-05, VWD (or its predecessors VVWD and BMWD) has provided substantial financial contributions totally over $ 95,000 to AWAC. In addition, the VWD Conservation Division staff have provided services and support to AWAC's regional conservation efforts. The AWAC Operational Plan, found in Appendix G, was developed in 2009 and can be referred to in clarifying VWD's participation in outreach activities and public information on water conservation. Components of this plan also apply to DMMs 5, 6 and 8.

VWD has adopted an efficient computerized billing format. On a regular basis, notations are placed on these billings to remind and encourage its customers to conserve water. Several pocket bulletins are printed through the American Water Works Association (AWWA) and made available to its customers at the VWD office.

VWD participated in the funding and production of a booklet entitled "A Guide to High Desert Landscaping" to help advance public awareness of the merits of xeriscaping and native desert plants. The booklet has been distributed to local nurseries, public libraries, landscaping contractors, and VWD customers.

VWD has an active advertising campaign program to inform the public on specific conservation projects such as the ULFT program. VWD has used cable television commercials, radio advertisements, newspaper advertisement, movie screen advertisements, and brochures targeted to eligible participants. These methods have brought significant customer response for both the ULFT exchange and rebate/credit phases of the program.

The local radio media has been used to remind customers of water problems and conservation measures. VWD has used TV commercials, magazine articles and newspaper articles to advertise conservation programs and service offered by the Conservation Division. VWD has also used large signs within its service area to promote conservation programs. VWD's additional outreach activities include school programs, hosting seminars on planting and irrigation, assisting AWAC in sponsoring and/or providing the funds for annual conservation workshops and presentations throughout the community.

VWD participates in business expos, water awareness month activities, public works events for students, Earth Day, Clean Air and Science Fair events. Conservation staff has participated in the development of and assisted in the City of Victorville's 'Living the Green Life' family event. A family of five was selected to participate in a series of seven topics

involving water conservation. Sessions were videotaped with the family, and the videos were then highlighted on the City of Victorville's web site. The first annual Living the Green Life family received promotional products, and their home was retrofitted with water saving and efficient product to include a high efficiency clothes washer presented to the family by the Mayor of Victorville

A public information consultant produces all VWD publications, which advise customers of current events and water conservation. VWD has also used large signs within its service area to promote conservation. VWD's additional outreach activities include school programs, hosting seminars on planting and irrigation, regular presentations throughout the community, conservation promoting, and web site information. VWD participates in business expos, water awareness month activities, home and garden shows, and plant sales.

6.3.8 DMM 8 – School education program

This DMM requires water suppliers to implement a school education program that includes providing educational materials and instructional assistance. Flyers and bulletins printed by AWWA are distributed to schools, as a supplement to efforts initiated by MWA, which has jurisdiction in managing the groundwater basin. VWD also maintains films and videos on water conservation, which are made available to local schools, service groups, and business organizations.

VWD implemented a Student Workshop Presentation Program to promote the value of water and teach water conservation during the fiscal year of 2007-08 with the intent to saturate the entire Victor Valley School District area involving a total of 6,150 students and 250 classrooms in which grades K through High School participated. This workshop presentation program is also offered to other small groups such as boy scouts etc., and continues to be made available to 2nd and 3rd grade students.

VWD also cooperates with Lewis Center for Educational Research (LCER) to provide a learning environment for local students through hands-on scientific applications, which will advance the understanding of the VWD's groundwater resources and the effects of conservation on the groundwater supply. The parties' goal is to bring together the K-12 educational network, the scientific and technological resources available at the LCER, and the expertise, technical capabilities, and resources of the VWD to create an opportunity of the High Desert Community to get involved in the process of promotion and sustainable approach to water resource management in support of all the beneficial uses of the resource. It is the firm belief of both the VWD and the LCER that if the High Desert community engages in practical, pragmatic, common sense activities, workshops, and water conservation programs, patterns of water consumption will change (in the favor of water conservation) across the High Desert, enabling the VWD to better manage native groundwater supplies within its boundaries.

VWD has staff currently trained as Project Wet Facilitators and actively continues to pursue partnering with other agencies on the Water Education for Teachers (WET) project. This program is designed to offer training to local teachers; whereas the concept, 'train the trainers' is facilitated by offering teachers the training to become facilitators and promotes awareness of water resources using classroom-ready teaching aids.

6.3.9 DMM 9 - Conservation programs for commercial, industrial, and institutional accounts

In fiscal year 05-06, VVWD implemented a Commercial Pre-Rinse Valve program to commercial customers providing high efficiency spray-rinse nozzles which provide more water saving uses over older models. The program offered a free nozzle and free installation and was made available to all restaurants and schools at no cost. This program has not been offered after the merger of the two water districts, but in fiscal year 11-12, VWD is requesting the budget to offer this type of program once again to CII customers, including schools.

VWD continues to offer indoor water audits to commercial accounts through the 'free water audit program' and provides information and resources to help commercial customers find ways to incorporate best technologies that are available, providing ways to use water more efficiently.

VWD should continue programs such as large turf area replacement, smart irrigation timers, and industrial process water use reductions. Currently, VWD has approximately 1,300 CII accounts. Assuming VWD was to implement 200 new CII programs by year 2020 and that each program would, on average, 0.5 afy per program, the total savings of the CII program could be around 100 afy, which is about 1 percent of the 9,044 afy water conservation goal for year 2020.

6.3.10 DMM 10 - Wholesale agency programs

This DMM applies to wholesale agencies and defines a wholesaler's role in terms of financial, technical, and programmatic assistance to its retail agencies implementing DMMs. VWD is not a wholesale agency, so this DMM does not apply.

6.3.11 DMM 11 – Conservation pricing

VWD's operations and other expenditures are funded by customer fees and charges. A customer of VWD is billed for the following charges.

- Service Charge, which is monthly charge for each account. VWD's Service Charge increases based average use per day, based on the four levels of average daily water usage. This aspect of VWD's pricing incorporates conservation by penalizing excessive use of water in the monthly service charge. The levels of average daily water usage and the associated service charges are shown in Table 6.7.

- Water Use Fee, which is a flat per unit rate, independent of billing classification. This implicitly penalizes excessive water usage; however, it is a flat rate structure and does not increase with increased usage.

- Other Fees and Charges, which cover additional costs of infrastructure and power, such as the developer connection fee, an initial set up fee, late payment fee, returned payment fee, delinquent notification fee, service call fee, and security deposit.

These inclining rates encourage conservation by increasing the unit charge as consumption increases.

Table 6.7 Monthly Service Charge Rate Structure

Average Daily Use (hundred cubic feet)	Rate	Monthly Service Charge
0.00-0.26	Basic	$16.50
0.27-1.17	Conservation	$17.50
1.18-6.60	Standard	$35.00
6.61+	Premium	$125.00

Notes:

6.3.12 DMM 12 - Water conservation coordinator

The Water Conservation Supervisor has overall programmatic responsibility for the water conservation programs.

This position is funded for by VWD, in addition to two other positions: Water Conservation Specialist I and II; each are tasked with varying degrees of responsibility.

6.3.13 DMM 13 - Water waste prohibition

VVWD Ordinance Number A-101-89 adopts a program of voluntary water conservation and restrictions of water use during water supply shortages and emergencies. BMWD Ordinance Number 1996-9 adopts a program of water conservation, prohibits certain water uses as well as water waste, and restrictions of water use during water supply shortages and emergencies. The VWD has adopted Ordinance Number VWD-004 which also defines and prohibits water waste.

The City of Victorville has adopted Municipal Code Section 13.60 by Ordinance (Numbers 2114, 2133, and 2135) which also implements water conservation measures and prohibits certain water uses as well as water waste. Ordinance Number 2114 was adopted on October 4, 2005, amending the City of Victorville Municipal Code Section 13, with the objective of relieving the strain on water resources, due to rapid growth, by limiting water intensive turf in new nonresidential areas and limiting turf to only the rear yards on model homes and new residential development landscaping. Furthermore, it prohibits wasteful

water practices for all users and effectively continues to reduce water waste in landscape irrigation.

Additionally, VWD's authorization is required for the watering of water intensive landscapes or turf under Municipal Code Section 13.60.115. Accordingly, Victorville Water District has placed restrictions on when automated systems which can be operated based on maximum irrigation efficiency, by establishing winter and summer watering hours as follows:

Summer watering hours: June 1 – September 30, 10pm to 6am

Winter watering hours: October 1 – May 31, 9am to 3am

VWD Conservation Division staff notify and educate homeowners when a violation is occurring and has been verified and documented by Conservation staff. VWD's Nuisance Water Program was implemented in fiscal year 07/08, pulling together the combined efforts of both former Water Districts.

Nuisance water is water that leaves a property and continually flows onto sidewalks, down gutters and into street intersections, eventually traveling into storm drains or collecting in places as standing water. The majority of nuisance water originates from landscape irrigation and most of the time can be traced back to four areas:

- Inadequate timer programming: Excessive water will flow off the property if the timer is set to run the sprinklers too long, for too many times during the day, if the timer has not been re-adjusted for an established lawn, or the timer is allowed to run during the rainy season.

- An automatic irrigation system malfunction: A faulty battery will not sustain the desired program in the unlikely event of a power outage and an irrigation valve malfunction can cause the sprinklers to run continuously.

- Sprinkler over-spray: Misaligned sprinklers, and/or excessive water pressure can cause the sprinklers to spray onto hard surfaces instead of the landscape.

- An irrigation system leak: This can be caused by a broken sprinkler, bubbler, water piping, cracked irrigation valves, or cracks in the drip tubing.

VWD promotes and advertises a water waste hot-line reporting number for anyone to call to report water waste in the neighborhood of the boundaries of the City of Victorville. This number is 1-866-955-4H2O (4426). This phone number is placed on flyers, on water bills, identified on the City Hall PA system, and placed on VWD donated water bottles used during many City and Water District events for the public.

Under the program, Water Conservation Specialists have assigned areas which are regularly surveyed by staff for issues of nuisance water occurring at businesses and residential neighborhoods. When nuisance water is observed, Water Conservation Specialists will investigate the flow until they locate the source.

After the source has been determined, contact is initiated to communicate, educate, and warn the occupant, owner, or property Management Company about the City of Victorville's Water Conservation Ordinance and of the consequences if the problems are not resolved.

1. If the nuisance water has been resolved, the location is filed for future reference into a closed reporting log. There is only one warning issued for each violation.

2. If upon recheck nuisance water continues and staff received no response from the customer, the violation is referred to the City of Victorville Code Enforcement Division and will result in actions set forth in sections 2: chapter 13.60.200 of Ordinance No. 2114, which could be an assessment of fines as a consequence for allowing the 'nuisance water' to continue to flow off the property.

VWD Conservation Division uses a computer data base program called 'Tidemark' to track, document, and forward unresolved water waste violation issues to the Code enforcement Division for further follow up. In Fiscal year 09-10, approximately 1,700 customers were notified under the Nuisance Water Program by VWD Conservation staff, and of those notified, only 59 customers were unable to resolve the issue after being provided with educational informational, timer programming assistance, offer of 'free water audit', and/or information regarding application into the Cash for Grass landscaping rebates. The 59 non-responsive customers were ultimately referred to Code Enforcement for further code violation enforcement follow up.

Although, there are over 33, 000 water services within the City of Victorville sphere of influence, Water Conservation Specialists are not alone in searching for the sources of the nuisance water. Water nuisance observations and tips are reported to the Conservation Division by concerned customers calling in to the 'Nuisance Water Hot Line' and by other City employees while they are working throughout the City performing their specialized duties, using a form designed to make reporting quick and simple—the form is forwarded to the Conservation Division for prompt follow up.

Further details on prohibitions and penalties are presented in Chapter 8, the Water Shortage Contingency Plan.

6.3.14 DMM 14 - Residential ultra-low-flush toilet replacement programs

VWD (formerly VVWD) began addressing demand management measure 14 beginning in 2004 by coordinating a residential 1.6 gpf toilet distribution event; by the end of 2005/06 an additional event had been offered. In 2007/08, continuing with the implementation of this measure, an MOU was signed in which VWD partnered with Mojave Water Agency to provide financial (up to $ 50 each--limit two per household), and in kind services to rebate/voucher a residential toilet replacement program-- replacing toilets with a gpf (gallons per flush) higher than 1.6 gpf with a High Efficiency Toilet (HET) 1.28 gpf or greater. This program began Feb 2008 and continued through June 2010. As a result of funding restrictions, VWD stopped financial support of this program in June 2009, but still continued providing program assistance and staff labor during inspections for eligibility.

As of June 2010, this program is no longer offered; however, VWD has pursued grant funding in the hopes of providing a direct install retrofit program in 2011-12, as a benefit to portions of communities within VWD service area that are disadvantaged. Additionally, depending on funding availability VWD customers may have the opportunity to participate in future toilet distribution programs offered through WCIP programs sponsored by Mojave Water Agency through 'High Desert Saves Water'.

Over time programs like these combined with the natural replacement of toilets with ULFTs or HETs could increase VWD's water savings substantially. Upon reaching a theoretical residential market saturation of 50 percent, VWD would save approximately 277 afy which is about 3 percent of the 9,044 afy water conservation goal for year 2020.

6.3.15 Cash 4 Grass—Turf Removal Programs

The former VVWD implemented the Cash for Grass landscape conversion rebate program in fiscal year 2004-05 which was made available to large landscapes as well as residential customers. This program continued as the VVWD and Baldy Mesa Water Districts merged into VWD (Victorville Water District) under the City of Victorville in fiscal yr 2007-08. This program focused on converting high water use turf lawns to low-water-use landscapes with water smart irrigation products.

During fiscal year 07-08, VWD issued a rebate of 40 cents per each square foot of grass replaced. Beginning February 2008, the VWD program partnered with Mojave Water Agency (MWA) through the WCIP (Water Conservation Incentive Program or 'High Desert Saves Water' program), which contributed an additional 50 cents per square foot of grass replaced. Since the program's inception, it is estimated that there has been an approximate water savings for Victorville Water Service area of 133 AFY (acre feet per year) or 43 million gallons per year.

Although there are huge water savings associated with this program, VWD's program was discontinued at the ending of June 2009 due to budget constraints. The Mojave Water Agency's program continued, however, through June 2010. In addition, MWA began Phase 2 of its program which started in November 2010 and ran through April 1, 2011. VWD Conservation Division has continued to support MWA's program by advertising for the program, taking applications, performing pre-inspections, and performing final inspections.

It is hoped VWD will be able to fund a similar program in the near future if the funding is made available again. In the mean time, VWD will continue to support Mojave Water Agency's Cash for Grass landscape program via staff in kind support and advertising if this becomes available again as well.

If continued, the estimated 133 afy of conservation provided by this program could potentially account for 1 percent of the 9,044 af of conservation required for year 2020.

6.3.16 Recycled Water

VWD began development of an industrial waste water treatment plant in 2008 at the Southern California Logistics Airport (SCLA). The plant was constructed during 2009/2010 and began initial operations in July 2010.

The plant was developed primarily to treat process wastewater from the Dr. Pepper/Snapple manufacturing and bottling facility located at the SCLA. In addition, the plant will accommodate other sanitary wastewater from other parts of Victorville. The plant is sized to treat 1 MGD of industrial waste water and an additional 1.5 MGD of other sanitary flow from the City. The discharged effluent is considered recycled water (disinfected, tertiary treated recycled water as specified in California Code of Regulations, Title 22). This water does not offset potable use however, because the recycled water is projected to satisfy a demand that did not previously exist. In order for VWD to effectively use recycled water to meet future conservation targets, the recycled water system would need to be expanded so that VWD could use recycled water to meet demands which are currently served by potable water.

6.4 WATER CONSERVATION IMPLEMENTATION PLAN

The DMMs currently implemented by VWD have been effective in reducing water consumption, but further efforts will need to be made to reach the 2020 water conservation target. VWD's historical per capita and future projections are shown in Figure 6.3.

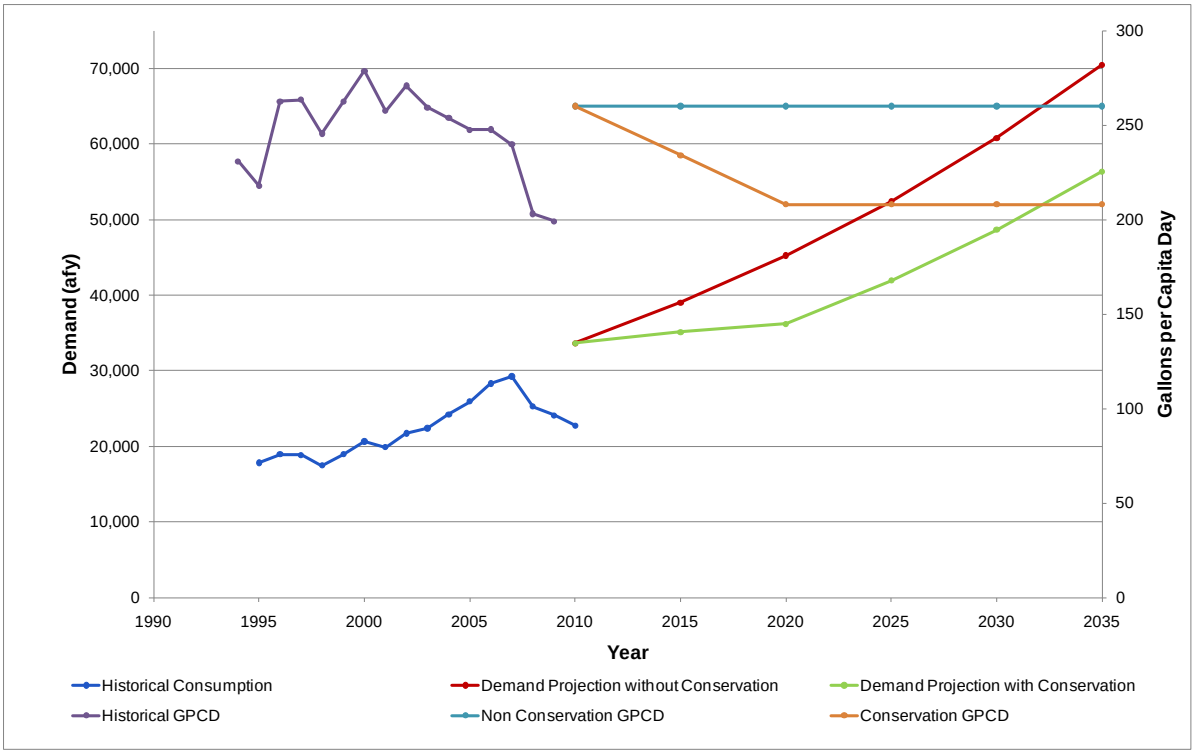

Figure 6.3 Projected Water Demands with and without Conservation

The conservation and non-conservation projections diverge rapidly after 2010, revealing the conservation that VWD will need to account for by year 2020. As discussed in Chapter 5, there is both a historic and projected value for 2010, the lower of which is the historic value with the other was generated using demand projection methodology.

The potential effect of current DMM programs in 2020 is 998 af. This value is considered to be potential because it is based on the assumption that currently implemented DMMs will continue to be practiced and will have an affect on VWD water consumption. It also assumes that rebates will attract customers to retrofit water appliances and devices during an economic slump. A breakdown of the potential water conservation amounts by DMM as described in the previous sections is graphically presented in Figure 6.4.

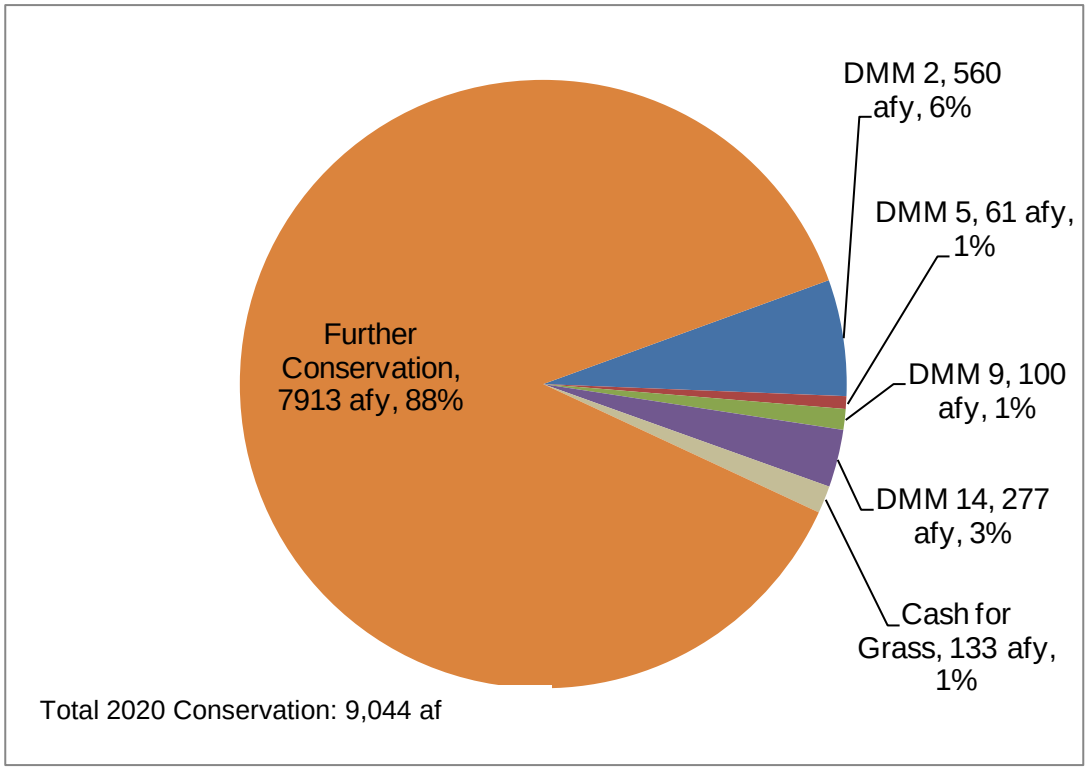

Figure 6.4 Water Conservation Methods

As shown in Figure 6.4, the current DMM and conservation programs will only account for 1,131 af of the 9,044 afy of conservation needed to reach the 36,178 af target in 2020, which equates to about 12 percent of the total water conservation goal. This figure, however, only accounts for 4 of the 13 DMMs (discounting DMM 10) which VWD can use to reduce water consumption. DMMs such as school education, water surveying and other such methods remain viable strategies to further reduce consumption. Further details on many of these programs are available in Appendix G.

To achieve the necessary amount of water conservation, VWD should prioritize its efforts towards expanding its large scale DMM programs to result in large conservation gains. Continued support of residential retrofits is also essential because of VWD's largely

residential customer base. Finally, although some DMMs do not result in quantifiable conservation, school and public education programs will provide much needed support as VWD strives to meet its 2020 conservation target.

VWD should continue its efforts to reduce outdoor water use through cash-for-grass programs, re-landscaping with drought tolerant plants, and focused water surveys for large lots with landscaping. Finally, VWD needs to continually evaluate its water rates to further encourage conservation. While VWD currently plans in increase rates in the future, other agencies have further adapted their rate plans to match conservation targets by implementing different winter versus summer rates or setting water budgets that charge for excessive or wasteful use.

Chapter 7

WATER SUPPLY RELIABILITY

7.1 INTRODUCTION

The UWMPA requires that UWMPs address the reliability of the agency's water supplies. This includes supplies that are vulnerable to seasonal or climatic variations. The UWMPA also requires that the UWMP include information on the quality of water supplies and how this affects management strategies and supply reliability. In addition, an analysis must be included to address supply availability in a single dry year and in multiple dry years. The relevant sections of the UWMPA are presented below.

> *10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:*
>
> *10631 (c) Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable.*
>
> *10631 (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 replace that source with alternative sources or water demand management measures, to the extent practicable.*
>
> *10631 (c) Provide data for each of the following: (1) An average water year, (2) A single dry water year, (3) Multiple dry water years.*
>
> *10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:*
>
> *10632 (b) 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.*
>
> *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 management strategies and supply reliability.*

This chapter addresses these UWMPA requirements as follows. First, the reliability of VWD water supply sources is described. Secondly, planned and potential future supply projects and programs that would impact overall supply availability and reliability are discussed. Subsequently, factors impacting inconsistencies of supply are described. This chapter concludes with a comparison of supply and demand under normal water year, single dry year, and multiple dry years.

7.2 FUTURE SUPPLY PROJECTS AND PROGRAMS

VWD obtains its water from groundwater pumping. In addition, 3,000 afy of non-potable demands are projected to be met with recycled water. Based on this year's current percentage for the Alto Subarea of 60 percent VWD's allotted pumping volume is

15,572 afy. In order to further increase the amount of water available from the Mojave Basin, VWD also is considering implementing groundwater recharge through surface spreading and groundwater injection. Other supply options include, but are not limited to the following.

- Negotiate additional supplies from the Regional Recharge and Recovery (R^3) Project.
- Groundwater replenishment with imported water supplies from SWP.
- Construction of a water treatment plant to treat raw water from SWP.
- Use of recycled water for non-potable demands.
- Increased water conservation measures.

Due to the uncertainty of feasibility of a recycled water system providing more than 3,000 afy, a reduction of potable water demands associated with non-potable supplies is not assumed in this UWMP analysis. However, when recycled water is used to offset potable demands, the need for additional groundwater wells can be deferred or partially avoided. Similarly, water conservation measures can be used to reduce the demand on potable water supplies.

7.3 FACTORS IMPACTING SUPPLY RELIABILTY

There are a variety of factors that can impact water supply reliability. These factors impacting VWD's supply source are indicated with an "X" in Table 7.1. A brief discussion is provided below.

Table 7.1 Factors Resulting in Inconsistency of Supply

Water Supply Sources	Specific Source Name	Legal	Environmental	Water Quality	Climatic	Additional Information
Groundwater	Mojave Basin	X	-	-	-	-

7.3.1 Legal

The Mojave Basin is one of the 22 adjudicated groundwater basins in California. This entails the court deciding who may extract groundwater, how much can be extracted, and who the Watermaster will be to ensure that the basin is managed in accordance with the court's decree. The arrangement restricts VWD's ability to procure groundwater from the Mojave Basin without incurring RWA fees. Because pumping is restricted, VWD will, as

previously discussed, need to engage in numerous conservation and groundwater recharge activities to ensure that they may continue to pump to meet demand.

7.4 WATER SUPPLY RELIABILITY

10635 (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 the state, regional, or local agency population projections within the service area of the urban water supplier.

There are two aspects of supply reliability that can be considered. The first relates to immediate service needs and is primarily a function of the availability and adequacy of the supply facilities. The second aspect is climate related, and involves the availability of water during mild or severe drought periods. This section compares water supplies and demands during three water scenarios: normal water year, single dry water year, and multiple dry water years. These scenarios are defined as follows.

- **Normal Year**
  The normal year is a year in the historical sequence that most closely represents median runoff levels and patterns. The supply quantities for this condition are derived from historical average yields.
- **Single Dry Year**
  This is defined as the year with the minimum useable supply. The supply quantities for this condition are derived from the minimum historical annual yield.
- **Multiple Dry Years**
  This is defined as the three consecutive years with the minimum useable supply. Water systems are more vulnerable to these droughts of long duration, because they deplete water storage reserves in local and state reservoirs and in groundwater basins. The supply quantities for this condition are derived from the minimum historical three consecutive years' annual average yields.

The Regional Urban Water Management Plan (RUWMP) by MWA includes water year information generated from 81 years of hydrological data. Analyzing VWD's water usage from the historical single and multiple dry years identified by MWA is not applicable to VWD for two reasons. Foremost, there is no shift between supply sources depending on the year, as VWD draws 100 percent of their supply from local groundwater no matter the climatic condition. Secondly, population within the VWD service area has increased so dramatically in recent years that looking at non-normalized demand values provides little insight into how demand will shift in drought conditions.

While looking at yearly consumption rates might not be applicable to VWD, there is still a need to accurately simulate the affects of drought conditions on demand. In order to accurately capture the affect of drought conditions, the factor used to simulate dry year demand increases in the RUWMP was applied to VWD as well. In their RUWMP, WMA decided upon a 10 percent demand increase in both single and multiple dry year scenarios.

The drought simulations which served as a backdrop for MWA's reliability estimates were based in the following water year data. As summarized in Table 7.2, MWA identified 1977 as the single driest year since 1922 and the years 1931-1934 as the multiple driest years over that same period.

Table 7.2 Basis of Water Year Data

Water Year Type	Base Year(s)
Average Water Year	1922-2003
Single Dry Water Year	1977
Multiple Dry Water Years	1931-1934

Source: Regional UWMP (MWA, 2010)

Specific historic conditions during these years are available in MWA's 2010 RUWMP. To adjust demands for dry year conditions, the RUWMP shows that the single and multiple dry year retail municipal and industrial demands historically increased between 9 and 11 percent during the first year. The 10 percent increase due to the first years of a drought used by MWA in supply reliability estimates were utilized by VWD as well. The results and details of these calculations and the determination of supply availability can be found below.

7.5 SUPPLY AND DEMAND COMPARISON

7.5.1 Average Year

Normal year demand projections are presented in Chapter 5. Projections were generated by applying unit demands that incorporate conservation targets to projected population. In, Table 7.3, this normal year demand is compared to projected supplies. While the supply is only composed of groundwater, the source of that groundwater is also presented.

Table 7.3 Normal Year Supply and Demand Comparison

	Projected Flow (afy)				
Supply Source	**2015**	**2020**	**2025**	**2030**	**2035**
Groundwater FPA	15,572	15,572	15,572	15,572	15,572
Surface Spreading	12,000	12,000	12,000	12,000	12,000
R^3 Project	16,650	16,650	16,650	16,650	16,650
Additional Water Supply Development(2)	0	0	0	4,398	12,142
Additional Groundwater Pumping(1)	0	0	0	0	0
Total Supply	**44,222**	**44,222**	**44,222**	**48,620**	**56,364**
Total Demand	**35,108**	**36,178**	**41,940**	**48,620**	**56,364**
Difference	**+9,114**	**+8,044**	**+2,282**	**0**	**0**
Difference as % of Supply	27%	23%	5%	0%	0%
Difference as % of Demand	26%	22%	5%	0%	0%

Notes:
(1) In dry years, Additional Groundwater Pumping composed of groundwater banking, in which wet year conservation and recharge allow for additional pumping in drought conditions
(2) For normal year projected supply shortages, VWD will meet demand through either expansion of current groundwater recharge (R^3 or surface spreading) or develop other water resources such as a SWP WTP.

As shown in Table 7.3, current water supplies are anticipated to be sufficient to meet demands in normal year conditions through year 2025. Beginning in 2030, VWD will need to pursue alternate methods to procure additional water supplies.

When water supply issues arise due to drought, VWD may utilize groundwater banking, listed as “Additional Groundwater Pumping”, as discussed below under dry year supply and demand projections. In normal year conditions however, further water supplies must be developed in order to meet the recurring demand which is due to projected growth. This is represented as “Additional Water Supply Development” in Table 7.3.

The projected demands will only begin to outpace available supply by 2030. Given this timeframe, VWD has the ability to plan and implement additional water supply plans to meet this projected demand.

7.5.2 Single Dry Year

Dry year effects are simulated through a drought demand based on MWA's 2010 RUWMP, as discussed above. The methodology assumes that dry year demand will increase by 10 percent above normal year demands. Projected supplies were compared to the increased demands for dry years and are presented in Table 7.4.

Table 7.4 Single Dry Year Supply and Demand Comparison

	Projected Flow (afy)				
Supply Source	**2015**	**2020**	**2025**	**2030**	**2035**
Groundwater FPA(1)	15,572	15,572	15,572	15,572	15,572
Surface Spreading	12,000	12,000	12,000	12,000	12,000
R^3 Project	16,650	16,650	16,650	16,650	16,650
Additional Water Supply Development(2)	0	0	0	4,398	12,142
Additional Groundwater Pumping(3)	0	0	1,912	4,862	5,636
Total Supply	**42,222**	**42,222**	**46,134**	**53,482**	**62,000**
Total Demand	**38,619**	**39,796**	**46,134**	**53,482**	**62,000**
Difference	**+5,603**	**+4,426**	**0**	**0**	**0**
Difference as % of Supply	13%	10%	0%	0%	0%
Difference as % of Demand	15%	11%	0%	0%	0%

Notes:
(1) Based on current (2010) FPA, but subject to change annually depending on recharge to the Basin.
(2) For normal year projected supply shortages, VWD will meet demand through either expansion of current groundwater recharge (R^3 or surface spreading) or develop other water resources such as a SWP WTP.
(3) In dry years, Additional Groundwater Pumping composed of groundwater banking, in which wet year conservation and recharge allow for additional pumping in drought conditions as discussed in MWA's 2010 UWMP.

As shown in Table 7.4, anticipated supplies from the Groundwater FPA, Surface Spreading, and the R^3 Project are sufficient to meet dry year demands through year 2020 even under drought conditions. In 2025, demands in drought years begin to exceed the available supplies from these sources by approximately 2,000 af and will require additional pumping in order to be met. This is listed as "Additional Groundwater Pumping" in Table 7.4

In utilizing a groundwater supply, the amount pumped can be safely increased if the basin

is then recharged during wet years by the amount overpumped. MWA has replenishment fees in place to pay for supply augmentation for overpumping. As discussed under normal year conditions, VWD needs develop additional supply sources to address the overpumping of the basin under normal conditions, represented as "Additional Water Supply Development" in Table 7.4. If overpumping can be addressed, then dry year and multiple dry years will be temporary exceedences that will be compensated for in wetter years, listed as "Additional Groundwater Pumping" in Table 7.4.

In their 2010 RUWMP, MWA also projects that demands will outstrip single year supply for the entire region, and that a Recharge Banking Project will be required to account for the difference. Given the availability of SWP water in non-drought years and subsequent absence in drought years, VWD anticipates taking advantage of MWA's groundwater banking to address increased demand due to drought.

7.5.3 Multiple Dry Year

For multiple dry year estimates, demands were again increased by a drought demand factor of 10 percent, the same factor used in the single dry year projection. The comparison of multiple dry year supplies and demands is presented in Table 7.5

Since single and multiple dry years are projected to have the same effect on VWD's groundwater supply, the data presented in Table 7.5, is equivalent to the data in Table 7.4 for single dry year demand projections. Whereas other types of water supplies, such as surface water, change throughout a dry year sequence, the capacity of VWD's groundwater supply is large enough that VWD's ability to draw on that supply under drought conditions would not be any different in multiple or single dry years. Note that VWD will need to develop additional supplies as discussed previously to accommodate normal year demand deficiencies.

The examination of supply reliability shows that VWD's water supply is currently adequate to meet customer's needs in both normal and dry year scenarios. In the future however, it is anticipated that VWD will need to develop additional supplies to meet projected demand on a long term basis. Furthermore, drought events are projected to increase demands such that VWD's ability to meet demands will be compromised earlier than under normal conditions.

Table 7.5 Multiple Dry Year Supply and Demand Comparison

	Projected Flow (afy)				
Supply Source	**2015**	**2020**	**2025**	**2030**	**2035**
Groundwater FPA	15,572	15,572	15,572	15,572	15,572
Surface Spreading	12,000	12,000	12,000	12,000	12,000
R^3 Project	16,650	16,650	16,650	16,650	16,650
Additional Water Supply Development(2)	0	0	0	4,398	12,142
Additional Groundwater Pumping(1)	0	0	1,912	4,862	5,636
Total Supply	**42,222**	**42,222**	**46,134**	**53,482**	**62,000**
Total Demand	**38,619**	**39,796**	**46,134**	**53,482**	**62,000**
Difference	**+5,603**	**+4,426**	**0**	**0**	**0**
Difference as % of Supply	13%	10%	0%	0%	0%
Difference as % of Demand	15%	11%	0%	0%	0%

Notes:
(1) In dry years, Additional Groundwater Pumping composed of groundwater banking, in which wet year conservation and recharge allow for additional pumping in drought conditions
(2) For normal year projected supply shortages, VWD will meet demand through either expansion of current groundwater recharge (R^3 or surface spreading) or develop other water resources such as a SWP WTP

7.6 WHOLESALE WATER DELIVERIES

While VWD is not projected to receive wholesale water deliveries directly, MWA provides replenishment water from the SWP for surface spreading and is anticipated to provide groundwater recharge related to the R^3 Project. VWD's projected supplies from supply sources related to MWA are summarized in Table 7.6.

Table 7.6 Supplies from MWA

Supply Source	2015	2020	2025	2030	2035
Surface Spreading (afy)	12,000	12,000	12,000	12,000	12,000
R^3 Project (afy)	16,650	16,650	16,650	16,650	16,650
Total (afy)	**28,650**	**28,650**	**28,650**	**28,650**	**28,650**

As shown in Table 7.6, VWD anticipates a supply of 28,650 afy from MWA's Surface Spreading and R^3 Projects. Note that this table does not list Additional Water Supply Development discussed previously.

7.7 TRANSFER AND EXCHANGE OPPORTUNITIES

Regional water transfer and exchange opportunities are described in the WMA's 2005 RUWMP. There are currently no water transfer opportunities identified for VWD.

7.8 OPPORTUNITIES FOR DESALINATED WATER

10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:

10631 (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.

The UWMPA requires that the UWMP address the opportunities for development of desalinated water, including ocean water, brackish water and groundwater. Due to VWD's inland location, there are no opportunities for seawater desalination.

While VWD makes extensive use of their groundwater supply, the groundwater quality issues can not be addressed through the use of groundwater desalination, therefore there are no opportunities for groundwater desalination either.

7.9 CLIMATE CHANGE IMPACTS ON SUPPLY RELIABILITY

California faces the possibility of water management challenges from to a variety of issues including population growth, regulatory restrictions, environmental concerns, climate change, and others. Climate change introduces a range of possibilities and potential impacts on certain water operations, particularly large infrastructure based programs like the SWP, which is utilized by the regional supplier, MWA. The most likely scenarios involve sea level rise and increased temperature variation, which will reduce the Sierra Nevada snowpack and shift more runoff to winter months instead of spring. These changes can cause major problems for the maintenance of the present water export system through the levee system of the Sacramento-San Joaquin Delta. The other important possibility is an increase in precipitation variability, with more extreme drought and flood events leading to further water crisis.

These changes would impact VWD's water supply by changing how much supplemental water is available for aquifer recharge, when these supplies may be available, and how supplemental supplies can be effectively utilized. Expected impacts to the SWP imported water supply include pumping less water south of the Delta during seasons of increased demands due to reduced supply, and relying more on groundwater storage projects resulting in pumping more local groundwater to augment reductions in surface water supplies (MWA, 2010).

Chapter 8

WATER SHORTAGE CONTINGENCY PLAN

The UWMPA requires that the UWMP include an urban water shortage contingency analysis that includes stages of action to be undertaken in the event of water supply shortages; a draft water shortage contingency resolution or ordinance; prohibitions, consumption reduction methods and penalties; an analysis of revenue and expenditure impacts and measures to overcome these impacts; actions to be taken during a catastrophic interruption; and a mechanism for measuring water use reduction.

8.1 STAGES OF ACTIONS

The UWMPA requires that the UWMP include an urban water shortage contingency analysis that addresses specified issues. Refer to Appendix F for VWD's water conservation ordinance information.

> *10632. The plan shall provide an urban water shortage contingency analysis, which includes each of the following elements, which are within the authority of the urban water supplier:*
>
> *10632 (a) 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 which are applicable to each stage.*

8.1.1 Water Shortage Stages and Reduction Objectives

Water agencies relying solely on groundwater, such as the VWD, are much less likely to experience water shortages than those agencies relying primarily on surface water due to the lack of influence of climatic variability on supplies. Nevertheless, it is still important for groundwater agencies to reduce production during drought years to avoid excessive overdraft of the groundwater basin.

VWD's rationing plan will be invoked during declared water shortages. Each stage includes a water reduction objective expressed as a percentage of normal demands. The rationing plan is dependent on the cause, severity, and anticipated duration of the water supply shortage

8.1.2 Water Reduction Stage Triggering Mechanisms

The City Manager shall promulgate a drought management plan containing regulations setting forth the criteria for implementation and termination of various water use reduction stages.

The City Manager is authorized to declare a drought, and to implement a drought management plan, in response to events including, but not limited to, the following: reductions in supply from any water purveyor, or when an insufficient supply appears likely due to water system limitations or structural failure. Such declaration may designate the entire area of the city or a portion of it if the shortage is not citywide. The City Manager

may terminate the drought declaration when it is determined that the events that triggered the drought no longer exist.

8.1.3 Administration of Water Shortage Program

The administration of a water shortage program would involve coordination among a number of local agencies. If a shortage was declared, an individual working for VWD would be identified as the Program Manager and be the primary coordinator of water shortage activities. An appropriate organizational structure for a water shortage management team would be determined based on the actual situation. Specific individuals would be designated to fill the identified roles.

8.2 WATER SHORTAGE CONTINGENCY ORDINANCE/ RESOLUTION

According to the UWMPA, the UWMP is required to include an urban water shortage contingency analysis that includes a draft water shortage contingency resolution or ordinance.

> *10632. The plan shall provide an urban water shortage contingency analysis, which includes each of the following elements, which are within the authority of the urban water supplier:*
>
> *10632 (h) A draft water shortage contingency resolution or ordinance.*
>
> *10632. The plan shall provide an urban water shortage contingency analysis, which includes each of the following elements, which are within the authority of the urban water supplier:*
>
> *10632 (d) 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.*
>
> *10632 (e) 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.*
>
> *10632 (f) Penalties or charges for excessive use, where applicable.*

The City Water Code 13.60 addresses water conservation and establishes wastewater prohibitions. This section of the City Water Code is adopted through Ordinances 2114, 2133, and 2135. VWD also has adopted Ordinance Number VWD-004 which defines and prohibits water waste, which was adopted on May 3, 2004.

8.2.1 Mandatory Prohibitions on Water Wasting

Mandatory compliance measures enacted during a water shortage are more severe than voluntary measures, produce greater savings, and are less costly to the utility. The principal

drawback to these measures could result from customer resentment if the measures are not seen as equitable. Therefore, such measures need to be accompanied by a good public relations campaign.

Mandatory measures may include the following.

• Ordinances making water waste illegal

• Ordinances controlling landscape irrigation

• Ordinances restricting non irrigation outdoor water uses

• Prohibitions on new connections or the incorporation of new areas

• Rationing

Prohibitions on new development may conflict with other policies and needs. However, if existing customers are called upon to make sacrifices during a drought period, they may feel that water agencies should concentrate on fulfilling current obligations rather than taking on new customers. Such prohibitions may need to be considered in the event of a critical shortage, such as a 50 percent reduction program. If necessary, an offset program could be considered whereby developers demonstrate that they will implement measures to conserve at least as much water in the existing community as their new project will use. In some cases, a two to one offset may be required of the new development.

8.2.2 Excessive Use Penalties

Section 13.60.160 of the City Water Code sets forth the four-stage water shortage contingency plan, a misdemeanor and violators may be punished by imprisonment, fine or both. In addition to these criminal penalties, the following civil actions can be initiated by VWD:

• First violation. A written warning of the violation shall be issued by VWD personnel to the respective water customer of VWD.

• Second violation within 12 months. A written warning of the violation shall be issued by VWD personnel to the respective water customer of VWD and a penalty not to exceed 50 dollars shall be imposed.

• Third violation within 12 months. A written warning of the violation shall be issued by VWD personnel to the respective water customer of VWD, a penalty of $200 dollars shall be imposed and immediate correction of the violation will be required.

• Subsequent violations within 24 months. A written warning of the violation shall be issued by VWD personnel to the respective water customer of VWD, a penalty not to exceed 500 dollars shall be imposed and VWD may discontinue service. If service is discontinued, it will not be re-established until the General Manager has determined that the water user has

provided reasonable assurances that future violations will not occur. A reconnection fee will be charged as stated in the Rules and Regulations for VWD.

8.2.3 Review Process

Any water user against whom a penalty is levied under this chapter shall have a right to a hearing before the City Manager or his or her designee.

8.3 REVENUE AND EXPENDITURE IMPACTS/MEASURES TO OVERCOME IMPACTS

According to the UWMPA, the UWMP is required to include an urban water shortage contingency analysis that addresses the financial impacts from reduced water sales.

> *10632. The plan shall provide an urban water shortage contingency analysis, which includes each of the following elements, which are within the authority of the urban water supplier:*
>
> *10632 (g) An analysis of the impacts of each of the actions and conditions described in subdivisions (a) to (f), 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.*
>
> *10632 (g) An analysis of the impacts of each of the proposed measures to overcome those revenue and expenditure impacts, such as the development of reserves and rate adjustments.*

The majority of operating costs for most water agencies are fixed rather than a function of the amount of water sold. As a result, when significant conservation programs are undertaken, it is frequently necessary to raise water rates because the revenue generated is based on lower total consumption while the revenue required is basically fixed. Reductions in water demands, especially peak demands, can delay the need to develop costly new water sources in growing communities. VWD's Board of Directors has the option of using reserves to offset the need to increase water rates.

During a water shortage emergency, VWD's base water service rate does not change, while the pumping expenses fall proportionally with each rationing stage. Moreover, as the third or fourth stage is declared, customers may be assessed a penalty for exceeding their water allotment. Therefore, as more restrictive rationing stages are declared, some water costs not covered by fixed service rates are compensated for by lower utility bills due to less pumping and penalties for excessive use.

8.4 ACTIONS DURING A CATASTROPHIC INTERRUPTION

The UWMPA requires that the UWMP include an urban water shortage contingency analysis that addresses a catastrophic interruption of water supplies.

> *10632. The plan shall provide an urban water shortage contingency analysis, which includes each of the following elements, which are within the authority of the urban water supplier:*
>
> *10632 (c) 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.*

During declared shortages, or when a shortage declaration appears imminent, the City Manager will activate a water shortage response team. The team includes: VWD staff, water, fire, planning, health, and other emergency City personnel. Other actions and procedures to follow during catastrophic events will be developed.

8.5 REDUCTION MEASURING MECHANISM

The UWMPA requires that the UWMP include an urban water shortage contingency analysis that addresses a catastrophic interruption of water supplies.

> *10632. The plan shall provide an urban water shortage contingency analysis, which includes each of the following elements, which are within the authority of the urban water supplier:*
>
> *10632 (i) A mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.*

VWD's water system is supplied by groundwater wells. Each well includes a flow monitoring device that records the amount of water entering VWD's distribution system. VWD will use these devices to monitor VWD-wide actual reductions in water use.

Also, VWD's water system currently has water meters on all connections. These meters record the amount of water consumed at each location. VWD will use these meters in concert with the well monitoring and budgeted water allocations for each customer to monitor day-to-day district-wide reductions in water use.