



FINAL

2015 Urban Water Management Plan *for* **Hi-Desert Water District**

July 2016

Prepared by
Kennedy/Jenks Consultants

Resolution No. 16-10

Board of Directors of the Hi-Desert Water District Adopting the 2015 Urban Water Management Plan Update

WHEREAS, the California Urban Water Management Planning Act, Water Code section 10610 et seq. (the Act) mandates that every urban water supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre feet of water annually, prepare and adopt an updated Urban Water Management Plan at least once every five years; and

WHEREAS, Hi-Desert Water District (HDWD) is an urban water supplier for the purposes of the Act, and approved and adopted its most recent 2010 Urban Water Management Plan (UWMP) and submitted that UWMP to the California Department of Water Resources in July 2011; and

WHEREAS, HDWD, in accordance with applicable law including requirements of the Act and the Water Conservation Act of 2009 has prepared its 2015 UWMP and has undertaken certain agency coordination, public notice, public involvement and outreach, public comment, and other procedures in relation to its 2015 UWMP; and

WHEREAS, HDWD has prepared its 2015 UWMP with its own staff, with the assistance of consulting professionals, and in cooperation with other governmental agencies and has utilized and relied upon industry standards and the expertise of industry professionals in preparing its UWMP and has utilized and relied upon the Department of Water Resources 2015 Urban Water Management Plans Guidebook to Assist Urban Water Suppliers; and

WHEREAS, in accordance with applicable law, including Water Code sections 10608.26 and 10642, and Government Code section 6066, the HDWD made its Draft 2015 UWMP available for public inspection, and caused to be published within the jurisdiction of the HDWD at least two notices of public hearing regarding the HDWD's 2015 UWMP, which publication dates included July 14, 2016 and July 21, 2016; and

WHEREAS, the HDWD held its public hearing on July 27, 2016 in the Board Room of the HDWD, located at 55439 29 Palms Hwy, Yucca Valley, CA 92284, regarding its 2015 UWMP, wherein, among other things, members of the public and other interested entities were provided with the opportunity to be heard in connection with the HDWD's



2015 UWMP and the proposed adoption thereof; and

WHEREAS, pursuant to the public hearing on the 2015 UWMP HDWD encouraged the active involvement of diverse social, cultural, and economic elements of the population within the HDWD service area with regard to the preparation and adoption of the 2015 UWMP, encouraged input by members of the public and any other interested party regarding all aspects of the 2015 UWMP, encouraged community input regarding the HDWD plan for complying with the Water Conservation Act of 2009, considered the economic impacts of complying with the Water Conservation Act of 2009; and

WHEREAS, the Board of Directors of HDWD has reviewed and considered the purposes and requirements of the Urban Water Management Planning Act and the Water Conservation Act of 2009, the contents of the 2015 UWMP, the documentation contained in the administrative record in support of the 2015 UWMP, and all public and agency input received with regard to the 2015 UWMP, and has determined that the factual analyses and conclusions set forth in the 2015 UWMP are supported by substantial evidence;

NOW, THEREFORE, be it resolved, determined, and ordered by the Board of Directors of the HDWD as follows:

1. The HDWD Board of Directors hereby approves and adopts the 2015 Urban Water Management for Hi-Desert Water District and ordered filed with the Secretary of the Board.
2. The General Manager is hereby authorized and directed to include a copy of this Resolution in the 2015 Urban Water Management Plan for Hi-Desert Water District and, in accordance with Water Code section 10644(a), to file the 2015 Urban Water Management Plan for Hi-Desert Water District with the California Department of Water Resources, the California State Library, and any city or county within which the HDWD provides water supplies within thirty (30) days of this adoption date.
3. The General Manager is hereby authorized and directed, in accordance with Water Code section 10645, to make the 2015 Urban Water Management Plan for Hi-Desert Water District available for public review during normal business hours not later than thirty (30) days after filing a copy thereof with the California Department of Water Resources.



4. The General Manager is hereby authorized and directed, in accordance with Water Code section 10635(b), to provide that portion of the 2015 Urban Water Management Plan for Hi-Desert Water District prepared pursuant to Water Code section 10635(a) to any city or county within which the HDWD provides water supplies not later than sixty (60) days after filing a copy thereof with the California Department of Water Resources.
5. The General Manager is hereby authorized and directed to implement the components of the 2015 Urban Water Management Plan for Hi-Desert Water District in accordance with the Urban Water Management Planning Act and the Water Conservation Act of 2009, including but not limited to, the HDWD's Water Conservation Programs and its Water Shortage Contingency Plan.
6. The General Manager is hereby authorized and directed to recommend to the Board of Directors additional steps necessary or appropriate to effectively carry out the implementation of the 2015 Urban Water Management Plan for Hi-Desert Water District, the Urban Water Management Planning Act and the Water Conservation Act of 2009.

Approved and Adopted this 27th day of July 2016 by the following vote:

Ayes: Stadum, Munsey, Mayes, Hough, Graham
Noes:
Abstain:
Absent:

ATTEST:



General Manager – Ed Muzik
Secretary of the Hi-Desert Water
District and its Board of Directors



Bob Stadum,
President of the Hi-Desert Water
District and its Board of Directors

(SEAL)



Kennedy/Jenks Consultants

2775 North Ventura Road, Suite 100
Oxnard, California 93036
805-973-5700
FAX: 805-973-1440

2015 Urban Water Management Plan Update

27 July 2016

Prepared for
Hi-Desert Water District
55439 Twentynine Palms Hwy Yucca
Valley, CA 92284

K/J Project No. 1544249*00

Table of Contents

<i>List of Tables</i>	<i>iv</i>
<i>List of Figures</i>	<i>v</i>
<i>List of Appendices</i>	<i>v</i>
Section 1: Introduction	1-1
1.1 Overview	1-1
1.2 Purpose	1-1
1.2.1 Resources Maximization	1-3
1.3 Structure and Organization of the Plan	1-3
1.4 Plan Preparation	1-4
1.4.1 Agency Coordination.....	1-4
1.4.2 Public Outreach.....	1-5
1.4.3 Plan Adoption.....	1-5
1.5 Water Management within the Hi-Desert Service Area.....	1-6
1.6 Population	1-6
1.7 Climate	1-8
1.8 Potential Effects of Climate Change.....	1-9
Section 2: Water Use	2-1
2.1 Overview	2-1
2.2 Historical Water Use.....	2-1
2.2.1 Historical Deliveries.....	2-1
2.2.2 Historical Other Water Uses.....	2-2
2.2.3 Total Historical Water Use	2-3
2.3 Existing and Targeted Per Capita Water Use	2-3
2.3.1 Base Daily Per Capita Water Use	2-6
2.3.2 Compliance Water Use Targets	2-7
2.3.3 Achievement of Interim Target.....	2-8
2.3.4 Plan to Meet the Compliance Water Use Target.....	2-8
2.4 Projected Water Use	2-8
2.4.1 Purveyor Projections	2-8
2.4.2 Projected Sales and Other Water Uses	2-9
2.4.3 Total Projected Water Use	2-9
2.4.4 Water Use Projections for Lower Income Households.....	2-10
2.5 Other Factors Affecting Water Usage	2-11
2.5.1 Codes and Standards	2-11
2.5.2 Weather Effects on Water Usage.....	2-11
2.5.3 Conservation Effects on Water Usage	2-11

Table of Contents (cont'd)

Section 3:	Water Supply.....	3-1
3.1	Overview	3-1
3.2	MWA SWP Imported Water Supply.....	3-2
3.2.1	Imported Water Supplies.....	3-2
3.2.1.1	MWA Water Supply Reliability	3-3
3.3	Local Water Supplies	3-5
3.3.1	Groundwater	3-5
3.3.1.1	Warren Valley Basin	3-5
3.3.1.2	Ames Valley Basin	3-10
3.3.2	Septic Return Flow and Recycled Water	3-12
3.3.3	Potential Supply Inconsistency	3-13
3.4	Planned Water Supply Projects and Programs	3-13
3.5	Transfers, Exchanges, and Groundwater Banking Programs	3-14
3.5.1	Opportunities for Short and Long-Term Transfers and Exchanges.....	3-14
3.5.2	Groundwater Banking Programs.....	3-14
3.5.3	Development of Desalination	3-15
3.5.3.1	Opportunities for Brackish Water and/or Groundwater Desalination	3-15
3.5.3.2	Opportunities for Seawater Desalination	3-15
3.6	Anticipated Water Supply Sources in a Normal, Single-Dry, and Multiple-Dry Years.....	3-15
Section 4:	Water Conservation and Demand Management	4-1
4.1	Demand Management.....	4-1
4.1.1	Foundational DMMs.....	4-1
4.1.1.1	Water Waste Prohibition	4-1
4.1.1.2	Metering.....	4-1
4.1.1.3	Conservation Pricing.....	4-3
4.1.1.4	Public Education and Outreach	4-3
4.1.1.5	Programs to Assess and Manage Distribution System Real Loss	4-4
4.1.1.6	Water Conservation Program Coordination and Staffing Support	4-4
4.1.2	Other DMMs.....	4-5
4.1.2.1	Regional Participation.....	4-5
4.2	Planned DMMs to Meet Water Use Targets.....	4-5
Section 5:	Water Quality	5-1
5.1	Overview	5-1
5.2	Imported Water Quality	5-1
5.3	Groundwater Quality	5-2
5.4	Groundwater Protection	5-2

Table of Contents (cont'd)

	5.4.1	Identification and Destruction of Abandoned Wells.....	5-3
	5.4.2	Hazardous Materials Response	5-3
	5.5	Water Quality Impacts on Reliability.....	5-3
Section 6:		Reliability Planning.....	6-1
	6.1	Supply and Demand Comparisons.....	6-1
	6.1.1	Normal Water Year	6-1
	6.1.2	Single-Dry Year.....	6-1
	6.1.3	Multiple-Dry Years.....	6-1
Section 7:		Water Shortage Contingency Planning.....	7-1
	7.1	Overview	7-1
	7.2	Stages of Action	7-1
	7.2.1	Long-Term Decline in Basin Reserves.....	7-1
	7.2.2	Short-Term Decline in Basin Reserves	7-2
	7.3	Prohibitions on End Uses.....	7-3
	7.4	Other Consumption Reduction Methods	7-3
	7.4.1	Controlling New Demand	7-3
	7.4.2	Education and Outreach	7-4
	7.5	Penalties, Charges, Other Enforcement of Prohibitions.....	7-4
	7.6	Determining Water Shortage Reductions.....	7-5
	7.7	Revenue and Expenditure Impacts	7-5
	7.8	Resolution or Ordinance.....	7-5
	7.9	Catastrophic Supply Interruption.....	7-6
	7.9.1	General	7-6
	7.9.2	Regional Power Outage Scenarios	7-6
	7.10	Minimum Supply Next Three Years.....	7-7
Section 8:		References.....	8-1

Table of Contents (cont'd)

List of Tables

Table 1-1:	Public Water System Covered By This Plan	1-4
Table 1-2:	Agency And Plan Structure	1-4
Table 1-3:	Agency Coordination Summary	1-5
Table 1-4:	Public Participation Timeline	1-5
Table 1-5:	Population Projections	1-6
Table 1-6:	Victorville And Newberry Springs Climate Data	1-8
Table 1-7:	Joshua Tree Climate Data	1-9
Table 2-1:	Water Deliveries - Actual 2010	2-2
Table 2-2:	Water Deliveries - Actual 2015	2-2
Table 2-3:	Historic "Other" Water Uses (Af)	2-3
Table 2-4:	Historic Total Water Use (Af)	2-3
Table 2-5:	Sbx7-7 Calculation	2-4
Table 2-6:	Baseline Period Ranges	2-6
Table 2-7:	Gallons Per Capita Per Day	2-7
Table 2-8:	Components Of Target Daily Per Capita Water Use	2-8
Table 2-9:	Demands For Potable And Raw Water - Projected 2020 To 2040	2-9
Table 2-10:	Future Sales And "Other" Water Uses (Af)	2-9
Table 2-11:	Total Projected Water Use (Afy)	2-10
Table 2-12:	Projections Of Future Low Income Household Water Use (Af)	2-10
Table 3-1:	Summary Of Current And Planned Water Supplies (Afy)	3-1
Table 3-2:	Hdwd Imported Water Supply Reliability: Average, Single-Dry And Multiple-Dry Year Conditions	3-5
Table 3-3:	Dwr Groundwater Basins	3-5
Table 3-4:	Historic Warren Valley Groundwater Production (Afy)	3-10
Table 3-5:	Warren Valley Projected Groundwater Production	3-10
Table 3-6:	Historic Ames Valley Groundwater Production (Afy)	3-11
Table 3-7:	Ames Valley Projected Groundwater Production (Afy)	3-11
Table 3-8:	Projected Recycled Water Uses (Afy)	3-13
Table 3-10:	Water Supply Calendar Year 2015 (Af)	3-16
Table 3-11:	Water Supply Estimates - Average/Normal Year (Af)	3-16
Table 3-12:	Water Supply Estimates - Single-Dry Year (Af)	3-17
Table 3-13:	Water Supply Estimates – Multiple-Dry Year (Af)	3-18
Table 4-1:	Summary Of Water Waste Prohibitions 2010 To 2015	4-2
Table 6-1:	Projected Supplies And Demands In Normal Year (Afy)	6-2
Table 6-2:	Projected Single-Dry Year Supplies And Demands (Afy)	6-3
Table 6-3:	Projected Multiple-Dry Year Supplies And Demands (Afy)	6-4
Table 7-1:	Rationing And Reduction Goals	7-2
Table 7-2:	Mandatory Prohibitions	7-3

Table of Contents (cont'd)

Table 7-3: Estimate Of Minimum Supply For The Next Three Years (Af).....	7-8
--	-----

List of Figures

Figure 1-1: Hi-Desert Water District Service Area	1-7
Figure 3-1: Warren Valley Groundwater Basin	3-6

List of Appendices

- A. UWMP Checklist
- B. Standardized Tables
- C. Outreach Materials
- D. Water System Audit output
- E. SBx7-7 Verification Table
- F. Conjunctive Use Agreement with MWA
- G. Hi-Desert County Water District v. Yucca Water Company, Ltd.
- H. Warren Valley Basin Management Plan and Addendum
- I. Ames/Reche Groundwater Storage and Recovery Program and Management Agreement
- J. Water Shortage Contingency Planning
 - a. Board Policy No. 26-04
 - b. Resolution 90-3

Section 1: Introduction

1.1 Overview

This document presents the Urban Water Management Plan 2015 (the “Plan”) for the Hi-Desert Water District (HDWD or the “District”) service area. This chapter describes the general purpose of the Plan, discusses Plan implementation, and provides general information about the District and its service area. The District and its customers have demonstrated a long term commitment towards water conservation. Water use restrictions, low flow fixture requirements, participation in water conserving rebate programs, and public outreach efforts that not only reach out to our customer base, but also the youth of our community, have all been used for decades to promote an understanding of the importance of conserving our water supply. Community understanding and District leadership are both attributes that have contributed to the District’s gallons per capita per day water usage being among the lowest in the State. We are pleased to provide the content within this document which demonstrates our dedication toward providing a reliable and sustainable water supply and our commitment toward meeting the State’s requirements.

The State of California mandates that all urban water suppliers within the state prepare an Urban Water Management Plan (UWMP). Detailed information on what must be included in these plans as well as whom must complete them can be found within California Water Code sections 10610 through 10657. According to the Urban Water Management Planning Act (Act) of 1983, an urban water supplier is defined as a supplier, either public or private, that provides water for municipal purposes either directly or indirectly to more than 3,000 customers or supplies more than 3,000 acre-feet (AF) annually.

1.2 Purpose

An UWMP is a planning tool that generally guides the actions of water management agencies. It provides managers and the public with a broad perspective on a number of water supply issues. It is not a substitute for project-specific planning documents, nor was it intended to be when mandated by the State Legislature. For example, the Legislature mandated that the Plan include a Section that “describes the opportunities for exchanges or water transfers on a short-term or long-term basis.” (California Urban Water Management Planning Act, Article 2, Section 10630(d).) The identification of such opportunities, and the inclusion of those opportunities in a general water service reliability analysis, neither commits a water management agency to pursue a particular water exchange/transfer opportunity, nor precludes a water management agency from exploring exchange/transfer opportunities not identified in the Plan. When specific projects are chosen to be implemented, detailed project plans are developed, environmental analysis, if required, is prepared, and financial and operational plans are detailed.

“A plan is intended to function as a planning tool to guide broad-perspective decision making by the management of water suppliers.” (*Sonoma County Water Coalition v. Sonoma County Water Agency* (2010) 189 Cal. App. 4th 33, 39.) It should not be viewed as an exact blueprint for supply and demand management. Water management in California is not a matter of

certainty and planning projections may change in response to a number of factors. “[L]ong-term water planning involves expectations and not certainties. Our Supreme Court has recognized the uncertainties inherent in long-term land use and water planning and observed that the generalized information required . . . in the early stages of the planning process are replaced by firm assurances of water supplies at later stages.” (Id., at 41.) From this perspective, it is appropriate to look at the UWMP as a general planning framework, not a specific action plan. It is an effort to generally answer a series of planning questions including:

- What are the potential sources of supply and what is the reasonable probable yield from them?
- What is the probable demand, given a reasonable set of assumptions about growth and implementation of good water management practices?
- How well do supply and demand figures match up, assuming that the various probable supplies will be pursued by the implementing agency?

Using these “framework” questions and resulting answers, the implementing agency will pursue feasible and cost-effective options and opportunities to meet demands.

Based on the UWMP, water suppliers will explore enhancing basic supplies from traditional sources such as the State Water Project (SWP) as well as other options. These include groundwater extraction, water exchanges and transfers, water conservation, recycling, brackish water desalination and water banking/conjunctive use. Specific planning efforts will be undertaken in regard to each option, involving detailed evaluations of how each option would fit into the overall supply/demand framework, how each option would impact the environment and how each option would affect customers. The objective of these more detailed evaluations would be to find the optimum mix of conservation and supply programs that ensure that the needs of customers are met.

The Act requires preparation of a plan that:

- Accomplishes water supply planning over a 20-year period in five year increments. (The District is going beyond the requirements of the Act by developing a plan which spans twenty-five years.)
- Identifies and quantifies adequate water supplies, including recycled water, for existing and future demands, in normal, single-dry and multiple-dry years.
- Implements conservation and efficient use of urban water supplies.

State Legislation, Senate Bill 7 of Special Extended Session 7 (SBX7-7) was signed into law in November 2009, which calls for progress towards a 20 percent reduction in per capita water use statewide by 2020. The legislation requires that retailers develop and report an interim 2015 water use target, their baseline daily per capita use and 2020 compliance daily per capita use, along with the basis for determining those estimates. This UWMP reports on HDWD’s progress in meeting the SBX7-7 targets.

1.2.1 Resources Maximization

Several documents were previously developed to enable HDWD to quantify available resources, undertake conservation best management practices, resource development, and source protection, which include the following:

- HDWD Annual Report of the Warren Valley Basin Watermaster for the Period October 9, 2013 through September 30, 2014,
- Mojave Water Agency 2014 Integrated Regional Water Management Plan (Regional Plan).
- Hi-Desert Water District Sewer Master Plan (January 2009).

Chapter 3 of this Plan describes in detail the water supply mix HDWD intends to use for the 25-year period covered in this Plan.

1.3 Structure and Organization of the Plan

This Plan is organized as follows:

- Introduction
- Water Demand
- Water Supply
- Water Conservation and Demand Management
- Water Quality
- Reliability Planning
- Water Shortage Contingency Planning
- References
- Appendices

Appendix A contains a checklist documenting how this UWMP meets the requirements of the Urban Water Management Planning Act and SBX7-7. Starting with the 2015 UWMP, urban water suppliers are required to report and submit information in standardized tables developed by the Department of Water Resources (DWR). These standardized tables are provided as Appendix B of this document.

This plan is being prepared for HDWD and is an individual rather than Regional Urban Water Management Plan. Data provided in this report are for calendar year rather than fiscal year. To the extent possible water volumes are reported in acre-feet (AF). Tables 1-1 through 1-2 document the structure of this plan.

**TABLE 1-1
PUBLIC WATER SYSTEM COVERED BY THIS PLAN**

Public Water System Number	Public Water System Name	# of Municipal Connections 2015	Volume of Water Supplied 2015 (AF)
CA3610073	Hi-Desert Water District	10,532	2,838

**TABLE 1-2
AGENCY AND PLAN STRUCTURE**

Type of Agency

Agency is a Wholesaler

Agency is a Retailer

Fiscal or Calendar Year

UWMP Tables are in Calendar Year

UWMP Tables are in Fiscal Year

Units of Measure Used in this UWMP

Acre Feet (AF)

Million Gallons (MG)

Hundred Cubic Feet (CCF)

1.4 Plan Preparation

1.4.1 Agency Coordination

Water agencies are permitted by the State to either work independently to develop an UWMP whereby they can coordinate their planning with retail agencies within their service area to develop a cooperative regional plan. The former approach has been adopted by the District; however, the Plan was developed in coordination with land use agencies, Mojave Water Agency (a wholesale water agency) and other neighboring retail water agencies. Water resource specialists with expertise in water resource management were retained to assist the local water agencies in preparing the details of the Plan. Agency coordination for this Plan is summarized in Table 1-3.

**TABLE 1-3
AGENCY COORDINATION SUMMARY**

	Received Copy of Draft	Commented on the Draft	Attended Public Meetings	Contacted for Assistance	Sent Notice of Intention to Adopt	Not Involved
Mojave Water Agency	X			X	X	
Joshua Basin Water District	X				X	
Bighorn-Desert View Water Agency	X				X	
Twentynine Palms Water District	X				X	
Town of Yucca Valley	X				X	
San Bernardino County Planning Department	X				X	

1.4.2 Public Outreach

HDWD has encouraged community participation in water planning. Notices of public meetings were published in the local press and at the water supplier website. Table 1-4 presents a timeline for public participation during the development of the Plan. A copy of the public outreach materials, including paid advertisements, newsletter covers, website postings and invitation letters are attached in Appendix C.

**TABLE 1-4
PUBLIC PARTICIPATION TIMELINE**

July 13, 2016	Preliminary Draft UWMP	Preliminary Draft released to solicit input
July 27, 2016	Public Hearing	Review contents of Draft UWMP and take comments

1.4.3 Plan Adoption

The District began preparation of this Plan in October 2015. The final draft of the Plan was adopted by the District Board on July 27, 2016 and submitted to DWR within thirty days of Board approval. This plan includes all information necessary to meet the requirements of Water Conservation Act of 2009 (Wat. Code, §§ 10608.12-10608.64) and the Urban Water Management Planning Act (Wat. Code, §§ 10610-10656).

1.5 Water Management within the Hi-Desert Service Area

HDWD was originally formed as a public agency in 1962 under the name Yucca Valley County Water District. The name was changed to Hi-Desert County Water District in 1971, and became Hi-Desert Water District in 1980. The District acquired Yucca Water Company, Ltd. in 1990. Today, the District serves more than 10,500 active connections within a 57-square mile service area includes the Town of Yucca Valley and unincorporated areas within the County of San Bernardino. HDWD primarily relies on three sources of water: Warren Valley Groundwater Basin, Ames/Means (Reche) Valley Groundwater Basin, and the State Water Project which it receives from Mojave Water Agency (MWA) and uses to recharge the Warren Valley Groundwater Basin.

The service area for HDWD is shown on Figure 1-1.

1.6 Population

MWA commissioned a population projection from Beacon Economics which was completed in December 2015. The report estimated population for a number of different geographies using different methodologies, as was appropriate for the area of interest. For the population projections of the water purveyors in the MWA service area (such as HDWD), the forecasted population growth rates were taken from the incorporated cities and applied to historical population counts for the service area to produce a population forecast. The HDWD service area is closely aligned with the municipal boundary for the Town of Yucca Valley, therefore city population growth trends and Department of Finance countywide population estimates were the primary factors of the estimates of population. It should be noted that population forecasts over any extended period of time contain a margin of error the longer the forecasted time. Forecasts are therefore an estimate using the best available information at the time (Beacon Economics, 2015). The results of the population projection are summarized below in Table 1-5.

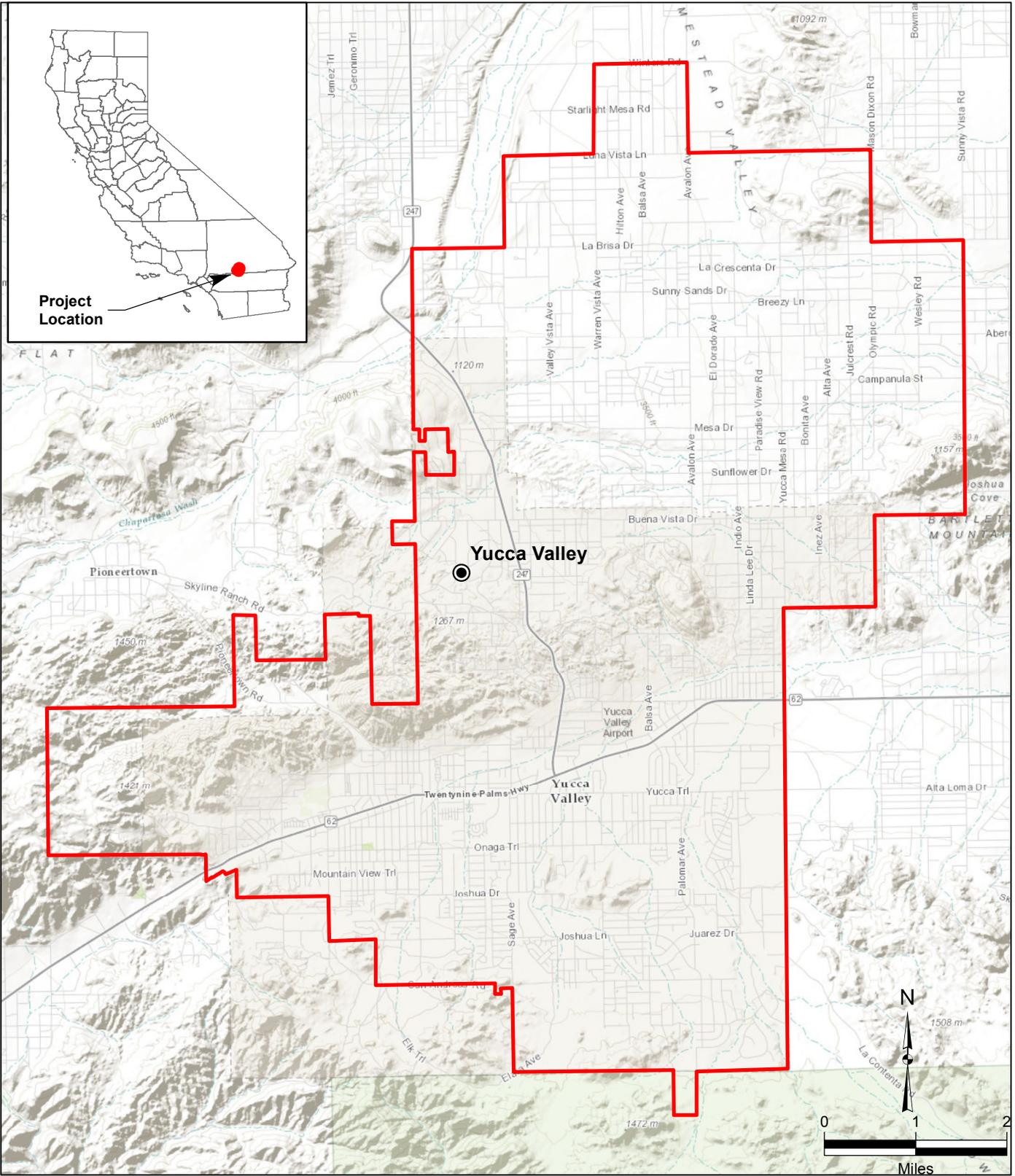
**TABLE 1-5
POPULATION PROJECTIONS**

	2015	2020	2025	2030	2035	2040
HDWD	24,520	25,548	26,911	28,435	29,939	31,276

Source:

Beacon Economics, December 2015. Mojave Water Agency Population Forecast.

Path: \\irv3\gis\Projects\Mojave Water Agency\UWMP 2015 Hi-Desert\Figure1_Hi-Desert_ServiceArea.mxd



Legend

- City
- ⊕ Hi-Desert Water District Service Area

Kennedy/Jenks Consultants

Hi-Desert Water District
Yucca Valley, California

**Hi-Desert Water District
Service Area**

KJ 1544249.00
November 2015

Figure 1-1

1.7 Climate

The climate in the District's water service area is arid with average annual rainfall of less than five inches, most of which occurs during the winter months. It is important to note that over the past five years, precipitation has been nearly zero. For these calculations, data from Stations 117 (Victorville) and 234 (Newberry Springs) were averaged to derive the climate characteristics of the HDWD service area boundary. A closer station, Station 233 (Joshua Tree), was analyzed, and included in the climate assessment as well. It is important to mention that the Joshua Tree station has been operational for a shorter period than Stations 117 and 234. However, to provide the best possible representation of the region climate, Station 233 is summarized in Table 1-7.

Temperatures range in average from 31 to 67°F during the winter and from 59 to 93°F degrees during the summer. Table 1-6 presents the region's annual average climate data from Stations 117 and 234.

**TABLE 1-6
VICTORVILLE AND NEWBERRY SPRINGS CLIMATE DATA**

Month	Standard Monthly Average Evapotranspiration (ETo) (inches)	Average Monthly Rainfall (inches)	Average Maximum Temperature (°F)	Average Minimum Temperature (°F)	Average Temperature (°F)
January	2.34	.56	63.07	33.42	45.95
February	2.63	1.58	69.87	37.80	51.33
March	5.66	.52	77.18	43.85	57.26
April	7.05	.26	80.76	46.10	60.19
May	8.46	.05	85.84	53.14	66.83
June	9.92	.02	93.78	63.14	78.32
July	9.40	.40	90.04	66.72	80.70
August	9.59	.09	87.84	67.44	82.86
September	6.86	.16	78.51	60.77	76.12
October	4.80	.22	68.82	51.91	65.23
November	3.15	.22	61.93	36.22	49.89
December	2.44	.54	59.30	31.15	43.47

Source:

California Irrigation Management Information System (CIMIS) data provided from Station No. 117 and 234, San Bernardino region, February 1994 to February 2016 and February 2015 to February 2016 respectively.

<http://www.cimis.water.ca.gov/cimis/welcome.jsp>

**TABLE 1-7
JOSHUA TREE CLIMATE DATA**

Month	Standard Monthly Average Evapotranspiration (ETo) (inches)	Average Monthly Rainfall (inches)	Average Maximum Temperature (°F)	Average Minimum Temperature (°F)	Average Temperature (°F)
January	2.83	0.33	63.93	34.05	48.43
February	3.67	0.29	68.13	37.10	52.60
March	5.98	0.16	74.88	43.15	59.88
April	7.65	0.04	79.90	47.38	65.10
May	9.69	0.01	87.33	54.68	72.83
June	10.83	0.01	99.10	62.48	83.25
July	10.19	0.90	99.90	70.13	86.33
August	9.39	0.50	99.68	69.13	85.65
September	7.4	0.27	94.40	64.13	80.10
October	5.18	0.14	82.73	51.10	67.15
November	3.29	0.17	69.25	38.70	53.90
December	2.42	0.17	59.73	32.65	45.75

Source:

California Irrigation Management Information System (CIMIS) data provided from Station No. 233, San Bernardino region, January 2012 to December 2015. <http://www.cimis.water.ca.gov/cimis/welcome.jsp>

1.8 Potential Effects of Climate Change

A topic of growing concern for water planners and managers is global warming and the potential impacts it could have on California’s future water supplies. DWR’s California Water Plan Update 2013 considers how climate change may affect water availability, water use, water quality, and the ecosystem.¹

Volume 1, Chapter 5 of the California Water Plan, “Managing an Uncertain Future,” evaluated three different scenarios of future water demand based on alternative but plausible assumptions on population growth, land use changes, water conservation and also future climate change might have on future water demands. Future updates will test different response packages, or combinations of resource management strategies, for each future scenario. These response packages help decision-makers, water managers, and planners develop integrated water management plans that provide for resources, sustainability and investments in actions with more sustainable outcomes. Further detailed guidance is currently being developed by the State of California and the United States (US) Environmental Protection Agency for use in integrated regional water management planning.

Even without population changes, water demand could increase. Precipitation and temperature influence water demand for outdoor landscaping and irrigated agriculture. Lower spring rainfall increases the need to apply irrigation water. Further, warmer temperatures increase crop evapotranspiration, which increases water demand.

¹ Final California Water Plan Update 2013

In its 2015 *State Water Project Delivery Capability Report (DCR)*, DWR included the potential effects of climate change in its analysis of SWP delivery reliability under future conditions. These effects and their potential to impact the supplies available to HDWD from Mojave Water Agency have been evaluated indirectly in *the DWR 2015 DCR*, and their potential to impact demand is considered in this UWMP.

Section 2: Water Use

2.1 Overview

This chapter describes historic and current water usage and the methodology used to project future demands within HDWD's service area. Water usage is divided into sectors such as residential, industrial, landscape, and other. To estimate future water use land use data and new housing construction information were compiled by HDWD and MWA. This information was then compared to historical trends for new water service connections and customer water usage information. In addition, weather and water conservation effects on historical water usage were factored into the evaluation. This information was incorporated in to a water demand model developed by MWA.

2.2 Historical Water Use

2.2.1 Historical Deliveries

HDWD categorizes its water use customers as follows:

- Single-Family Residential – A single family dwelling unit, generally a single lot containing a single home.
- Multi-Family Residential – Multiple dwelling units contained within one building or a complex of several buildings.
- Commercial/Industrial – This is a single water use category for water customers conducting business in the service area and includes water use for governmental and public purposes (e.g., schools, hospitals).
- Landscape – Water for landscape irrigation accounted for by a dedicated meter, whether those landscapes are in a residential, commercial, or institutional setting.
- Other – Water for fire suppression, street cleaning, line flushing, construction meters, and temporary meters.

Between 80 to 85 percent of the HDWD's demand comes from the residential sector. Actual water deliveries in 2010 and 2015 are provided in Tables 2-1 and 2-2.

**TABLE 2-1
WATER DELIVERIES - ACTUAL 2010**

Use Type	Level of Treatment	Volume (AFY)
Single family	Drinking Water	1,930
Multi-family	Drinking Water	218
Commercial	Drinking Water	287
Institutional	Drinking Water	0
Landscape	Drinking Water	90
Other	Drinking Water	16
Total		2,542

**TABLE 2-2
WATER DELIVERIES - ACTUAL 2015**

Use Type	Level of Treatment	Volume (AFY)
Single family	Drinking Water	1,717
Multi-family	Drinking Water	217
Commercial	Drinking Water	247
Institutional	Drinking Water	0
Landscape	Drinking Water	177
Other	Drinking Water	41
Total		2,400

2.2.2 Historical Other Water Uses

For several years HDWD has sold water to Black Rock Campground. Black Rock Campground is within the Joshua Basin Water District service area but that agency does not have the infrastructure needed to directly serve water to the area. From 2010 to 2015 HDWD sold approximately 2 acre-feet a year (AFY) to Black Rock Campground. These sales are reflected in Table 2-3.

HDWD has had water use related to groundwater recharge and long-term system storage, but has not had water use related to saline water barriers, agricultural irrigation, or wetlands. However, HDWD, like all water agencies, does have some system losses. Unaccounted-for water is the difference between the amount of water produced and the amount of water billed to customers. As required by DWR, as part of this UWMP, HDWD performed a distribution system water audit (see output provided in Appendix D). Over the last 12 months (January to December 2015) system losses have been approximately 14.2 percent of produced water within HDWD's system. Apparent loss (loss due to meter reading inaccuracies) are estimated to be 1.6 percent while "real loss (actual leaks) are estimated to be 12.6 percent of production (or 16.75 percent of metered and billed demand).

Table 2-3 summarizes “other” water uses, besides metered deliveries.

**TABLE 2-3
HISTORIC "OTHER" WATER USES (AF)**

Water Use^a	2010	2015
Sales	2	2
Groundwater Recharge/Storage/Banking	0	0
Long Term System Storage	0	0
Saline Water Intrusion Barrier	0	0
Agricultural Irrigation	0	0
Other	0	0
System Losses	152	436
Total	154	438

Note:

a Any water accounted for in Tables 2-1 and 2-2 is not included in this table.

2.2.3 Total Historical Water Use

Table 2-4 below presents information on all historic water uses for the years 2010 and 2015.

**TABLE 2-4
HISTORIC TOTAL WATER USE (AF)**

Water Use	2010	2015
Total Water Deliveries (from Tables 2-1 and 2-2)	2,542	2,400
Additional Water Uses and Losses (from Table 2-3)	154	438
Total	2,696	2,838

2.3 Existing and Targeted Per Capita Water Use

The Water Conservation Bill of 2009 (SBX7-7) is one of four policy bills enacted as part of the November 2009 Comprehensive Water Package (Special Session Policy Bills and Bond Summary). The Water Conservation Bill of 2009 provides the regulatory framework to support the statewide reduction in urban per capita water use described in the *20 by 2020 Water Conservation Plan*. Consistent with SBX7-7, each water supplier must determine and report its existing baseline water consumption and establish water use targets in gallons per capita per day (GPCD), and compare actual water use against the target; reporting began with the 2010 UWMP. The primary calculations required by SBX7-7 are summarized in Table 2-5.

**TABLE 2-5
SBX7-7 CALCULATION**

	2010 UWMP	2015 UWMP	2020 UWMP
Base Daily Water Use calculation (average GPCD used in past years)	First calculated and reported in 2010 plan	May be revised in 2015 Plan, must be revised if 2010 Census data not used in original calculation	NA
Interim Water Use Target (target GPCD in 2015)	First calculated and reported in 2010 plan	May be revised in 2015 Plan, must be revised if 2010 Census data not used in original calculation	NA
Compliance Water Use Target (target GPCD in 2020)	First calculated and reported in 2010 plan	May be revised in 2015 Plan, must be revised if 2010 Census data not used in original calculation	NA
Actual 2015 Water Use (in GPCD)	NA	In 2015 Plan must compare actual 2015 GPCD against 2015 target	NA
Actual 2020 Water Use (in GPCD)	NA	NA	In 2020 Plan must compare actual 2020 GPCD against 2020 target

In the 2015 UWMP a water supplier must demonstrate compliance with the target established for 2015 and demonstrate that it is on track to achieve its 2020 target. Compliance is done through review of the SBX7-7 Verification Tables submitted with the 2015 Plan (included as Appendix E).

HDWD first reported its Base Daily Water Use in its 2010 UWMP. However, at the time the 2010 UWMP was prepared full Census data was not available. HDWD is therefore required to redo the Base Daily Water Use calculation in this UWMP.

The Base Daily Water Use calculation is based on gross water use by an agency in each year and can be based on a ten-year average ending no earlier than 2004 and no later than 2010 or a 15-year average if ten percent of 2008 demand was met by recycled water. Base Daily Water Use must account for all water sent to retail customers, excluding:

- Recycled water
- Water sent to another water agency
- Water that went into storage

It is at an agency's discretion whether or not to exclude agricultural water use from the Base Daily Water Use calculation. If agricultural water use is excluded from the Base Daily Water Use calculation it must also be excluded from the calculation of actual water use in later urban water management plans. HDWD did not supply water to agriculture during the period between 1995 to 2010 so agricultural water does not factor into HDWD's SBX7-7 calculations.

An urban retail water supplier must set a 2020 water use target (herein called the Compliance Water Use Target) and a 2015 interim target (herein called the Interim Water Use Target). There are four methods for calculating the Compliance Water Use Target:

1. Eighty percent of the urban water supplier's baseline per capita daily water use
2. Per capita daily water use estimated using the sum of the following:
 - a. For indoor residential water use, 55 gallons per capita daily water use as a provisional standard. Upon completion of DWR's 2016 report to the Legislature reviewing progress toward achieving the statewide 20 percent reduction target, this standard may be adjusted by the Legislature by statute.
 - b. For landscape irrigated through dedicated or residential meters or connections, water use efficiency equivalent to the standards of the Model Water Efficient Landscape Ordinance set forth in section 490 et seq. of Title 23 of the California Code of Regulations, as in effect the later of the year of the landscape's installation or 1992.
 - c. For CII uses, a ten percent reduction in water use from the baseline CII water use by 2020.
3. Ninety-five percent of the applicable state hydrologic region target as stated in the state's April 30, 2009, draft 20 by 2020 Water Conservation Plan. HDWD falls within the Colorado Hydrologic Region (target for this region is 211 GPCD).
4. Reduce the 10 or 15-year Base Daily Per Capita Water Use a specific amount for different water sectors:
 - a. Indoor residential water use to be reduced by 15 GPCD or an amount determined by use of DWR's "BMP Calculator".
 - b. A 20 percent savings on all unmetered uses.
 - c. A 10 percent savings on baseline CII use.
 - d. A 21.6 percent savings on current landscape and water loss uses.

The Interim Water Use Target is set as a halfway point between the Base Daily Water Use GPCD and the 2020 Compliance Water Use Target GPCD.

Finally, the selected Compliance Water Use Target must be compared against what DWR calls the "Maximum Allowable GPCD". The Maximum Allowable GPCD is based on 95 percent of a 5-year average base gross water use ending no earlier than 2007 and no later than 2010. The Maximum Allowable GPCD use is used to determine whether a supplier's 2015 and 2020 per capita water use targets meet the minimum water use reduction of the SBX7-7 legislation. If an agency's Compliance Water Use Target is higher than the Maximum Allowable GPCD, the agency must instead use the Maximum Allowable GPCD as their target.

2.3.1 Base Daily Per Capita Water Use

Figure 1-1 illustrates the HDWD service area used to estimate the Base Daily Per Capita Water Use. Tables 2-6 through 2-7 summarize the Base Daily Water Use calculation for HDWD. As is shown in these tables, HDWD is not eligible to use a 15-year base period. Years 1999 to 2008 have been selected for calculation of the 10-year base period while years 2003 to 2007 have been selected for calculation of the 5-year base period.

**TABLE 2-6
BASELINE PERIOD RANGES**

Baseline	Parameter	Value	Units
10 to 15 year baseline period	2008 total water deliveries	3,245	AFY
	2008 total volume of delivered recycled water	0	AFY
	2008 recycled water as a percent of total deliveries	0	Percent
	Number of years in baseline period ¹	10	Years
	Year beginning baseline period range	1999	-
	Year ending baseline period range ²	2008	-
5 year baseline period	Number of years in baseline period	5	Years
	Year beginning baseline period range	2003	-
	Year ending baseline period range ³	2007	-

Notes:

¹If the 2008 recycled water percent is less than 10 percent, then the first baseline period is a contiguous 10-year period. If the amount of recycled water delivered in 2008 is 10 percent or greater, the first baseline period is a contiguous 10 to 15 year period.

²The ending year must be between December 31, 2004 and December 31, 2010.

³The ending year must be between December 31, 2007 and December 31, 2010.

In order to calculate Base Daily Per Capita Water Use for past years, it was necessary to develop population estimates for past years. HDWD is using population estimates developed by Mojave Water Agency. The derivation of these population estimates is provided in section 1.6.

As shown in the top portion of Table 2-7, HDWD Baseline GPCD is estimated to be 132. As shown in the second tier of Table 2-7 HDWD 5-year Baseline GPCD is 135.

**TABLE 2-7
GALLONS PER CAPITA PER DAY**

Year		Service Area Population ¹	Gross Water Use (gallons per day)	Daily Per Capita Water Use
10 to 15 Year Baseline GPCD				
1	1999	19,184	2,414,868	126
2	2000	19,198	2,530,032	132
3	2001	19,612	2,566,635	131
4	2002	20,034	2,631,805	131
5	2003	20,466	2,815,710	138
6	2004	20,907	2,808,568	134
7	2005	21,358	2,737,148	128
8	2006	21,818	3,001,400	138
9	2007	22,288	3,056,750	137
10	2008	22,768	2,896,949	127
10 to 15 Year Average Baseline GPCD				132
5 Year Baseline GPCD				
Year		Service Area Population ¹	Gross Water Use (gallons per day)	Daily Per Capita Water Use
1	2003	20,466	2,815,710	138
2	2004	20,907	2,808,568	134
3	2005	21,358	2,737,148	128
4	2006	21,818	3,001,400	138
5	2007	22,288	3,056,750	137
5 Year Average Baseline GPCD				135
2015 Compliance Year GPCD				
	2015	24,520	2,533,567	103

Notes:

1. Beacon Economics, December 2015. Mojave Water Agency Population Forecast.

2.3.2 Compliance Water Use Targets

In addition to calculating base gross water use, the legislation requires that a retail water supplier identify its demand reduction targets, using one of the four options described earlier.

HDWD is choosing to meet SBX7-7 targets as an individual agency rather than as part of a regional alliance. HDWD has selected Method 3, achieving 95% of the applicable Colorado River Hydrologic Region target. The Colorado River Hydrologic Region target is 211 GPCD, and 95% of this target is 200 GPCD. However, as shown in Table 2-7, HDWD 5-year Baseline GPCD is 135. As described earlier, the Maximum Allowable GPCD is 95% of the 5-year Baseline GPCD or 128. The Compliance Water Use Target, under Method 3 (200 GPCD) is more than the Maximum Allowable GPCD; the 2020 GPCD target therefore must be adjusted to the Maximum Allowable GPCD, 128. The Interim Water Use Target is 130 GPCD. These calculations are summarized in Table 2-8.

**TABLE 2-8
COMPONENTS OF TARGET DAILY PER CAPITA WATER USE**

Period	Value		Unit	
10-year period selected for baseline GPCD	<i>First Year</i>	1999	<i>Last Year</i>	2008
5-year period selected for maximum allowable GPCD	<i>First Year</i>	2003	<i>Last Year</i>	2007
Highest 10-year Average	132			GPCD
Highest 5-year Average	135			GPCD
Compliance Water Use Target	200			GPCD
Maximum Allowable Water Use Target (5% Reduction 5yr)	128			GPCD
2020 Target	128			GPCD
2015 Interim Target	130			GPCD
Methodology Used	Option #3			

2.3.3 Achievement of Interim Target

The HDWD 2015 GPCD was calculated using population estimates provided by Mojave Water Agency (see section 1.6). As shown in Table 2-7, HDWD had a 2015 GPCD of 103, which means the District has exceeded the reductions required by the Interim Target of 130 GPCD as well as the 2020 reduction target of 128 GPCD.

2.3.4 Plan to Meet the Compliance Water Use Target

HDWD has already met the 2020 Compliance Water Use Target. HDWD plans to keep water demands low through continued customer outreach (see Chapter 4), enforcement of its current water use restrictions, and by reducing water loss through repair and replacement of water pipelines.

2.4 Projected Water Use

2.4.1 Purveyor Projections

HDWD has collaborated with MWA to estimate population growth and growth in water demand. Based on the MWA model, it is predicted that the service area population and water demand will grow at a rate of approximately 1 percent per year from 2015 to 2040. Table 2-9 provides demand estimates for 2020 through 2040.

**TABLE 2-9
DEMANDS FOR POTABLE AND RAW WATER - PROJECTED 2020 TO 2040**

Use Type	2020	2025	2030	2035	2040
Single family	1,794	1,885	1,991	2,097	2,196
Multi-family	227	238	252	265	279
Commercial/Industrial	258	271	287	302	318
Institutional	0	0	0	0	0
Landscape	185	194	205	216	227
Other	43	45	48	50	53
Total	2,507	2,634	2,783	2,930	3,074

2.4.2 Projected Sales and Other Water Uses

HDWD anticipates continued sales to Black Rock Campground (see section 2.2.2). HDWD expect sales to be similar to the past, approximately 2 AFY. These sales are reflected in Table 2-10.

As in the past, HDWD does not anticipate future water use related to long-term system storage, saline water barriers, agricultural irrigation, or wetlands. For the purpose of projections, water loss is assumed to be similar to year 2015 and is shown in Table 2-10 as 'system loss'.

**TABLE 2-10
FUTURE SALES AND "OTHER" WATER USES (AF)**

Water Use	2020	2025	2030	2035	2040
Sales	2	2	2	2	2
Groundwater Recharge/Storage/Banking	0	0	0	0	0
Long Term System Storage	0	0	0	0	0
Saline Water Intrusion Barrier	0	0	0	0	0
Agricultural Irrigation	0	0	0	0	0
Other	0	0	0	0	0
System Losses	420	441	466	491	515
Total	422	443	468	493	517

2.4.3 Total Projected Water Use

Table 2-11 presents information on all projected water uses for the years 2020 to 2040.

**TABLE 2-11
TOTAL PROJECTED WATER USE (AFY)**

Water Use	2020	2025	2030	2035	2040
Total Water Deliveries (from Table 2-9)	2,507	2,634	2,783	2,930	3,074
Sales to Other Water Agencies (from Table 2-10)	2	2	2	2	2
Additional water uses and losses (from Table 2-10)	420	441	466	491	515
Total	2,929	3,077	3,251	3,423	3,591

2.4.4 Water Use Projections for Lower Income Households

Senate Bill 1087 requires that water use projections of an UWMP include the projected water use for single-family and multi-family residential housing 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. The Town of Yucca Valley last updated its housing element in February 2014. The housing element estimates that any four-person household making less than \$53,600 per year is “low” income. Based on the Technical Report accompanying the Housing Element, approximately 54 percent of households in the Town of Yucca Valley are low-income. Despite this, the Town of Yucca Valley housing element does not provide any information that can be used to develop trends to calculate the future number of low-income household units or associated water demand specific to the HDWD service area.

Table 2-12 makes an estimate of future low-income household water demands in the HDWD service area. Table 2-12 assumes a similar occurrence of low-income households in the HDWD service area as in the Town of Yucca Valley (i.e., 54 percent). These demands are included (and are not in addition to) the water demands described in Tables 2-9 through 2-11.

**TABLE 2-12
PROJECTIONS OF FUTURE LOW INCOME HOUSEHOLD WATER USE (AF)**

Water Use^a	2020	2025	2030	2035	2040
Estimated Low-Income Household Water Use	1,091	1,146	1,211	1,275	1,337

Note:

a Assumes 54 percent all future households in HDWD water service area qualify as “low” income per the definition provided in Senate Bill 1087.

Further, HDWD will not deny or condition approval of water services, or reduce the amount of services applied for by a proposed development that includes housing units affordable to lower income households unless one of the following occurs:

- HDWD specifically finds that it does not have sufficient water supply or has declining water supplies;

- HDWD is subject to a compliance order issued by the State Department of Public Services that prohibits new water connections; or
- the applicant has failed to agree to reasonable terms and conditions relating to the provision of services.

2.5 Other Factors Affecting Water Usage

2.5.1 Codes and Standards

The MWA model used to forecast water demand for HDWD utilizes information on historical trends for new water service connections and customer water usage information. However, the water demand forecasts do not specifically delineate potential water savings estimated to result from adopted codes, standards, ordinances, or transportation and land use plans.

2.5.2 Weather Effects on Water Usage

A major factor that affects water usage is typically weather. Historically, when the weather is hot and dry, water usage increases. The amount of increase varies according to the number of consecutive years of hot, dry weather and the conservation activities imposed. During cool, wet years, historical water usage has decreased, reflecting less water usage for exterior landscaping. California faces the prospect of significant water management challenges due to a variety of issues including population growth, regulatory restrictions and climate change. Climate change is of special concern because of the range of possibilities and their potential impacts on essential operations, particularly operations of the State Water Project. The most likely scenarios involve accelerated sea level rise and increased temperatures, which will reduce the Sierra Nevada snowpack and shift more runoff to winter months. These changes can cause major problems for the maintenance of the present water export system through the fragile levee system of the Sacramento-San Joaquin Delta. The other much-discussed climate scenario or impact is an increase in precipitation variability, with more extreme drought and flood events posing additional challenges to water managers.

These changes to the SWP water supply would impact HDWD as the groundwater relied upon by the District receives recharge from the SWP via the Morongo Pipeline. Climate change could affect how much SWP water is available, when it is available, how it can be captured and how it is used due to changes in priorities. Potential impacts to the SWP imported water supply include pumping less water south of the Delta due to reduced supply, and pumping more local groundwater to augment reductions in surface water supplies and reliability issues since groundwater is a more reliable source of water.

2.5.3 Conservation Effects on Water Usage

In recent years, water conservation has become an increasingly important factor in water supply planning in California. Since the 2005 UWMP there have been a number of regulatory changes related to conservation including new standards for plumbing fixtures, a new landscape ordinance, a state universal retrofit ordinance, new Green Building standards, demand reduction goals and more.

In 2003, HDWD, MWA, and other retail water purveyors in the MWA Service Area formed the Alliance for Water Awareness and Conservation (AWAC). The mission of the AWAC, a coalition of 25 regional organizations, is to promote the efficient use of water and increase communities' awareness of conservation as an important tool to help ensure an adequate water supply. The AWAC have developed water conservation measures that include public information and education programs. The water conservation achieved by AWAC in the HDWD service area is reflected in HDWD's historic and future water demands.

Section 3: Water Supply

3.1 Overview

This section describes the water resources available to HDWD for the 25-year period covered by this Plan. Both currently available and planned supplies are summarized in Table 3-1 and discussed in more detail below. HDWD currently has four primary sources of water supply – imported SWP water from MWA which is used to recharge the Warren Valley Groundwater Basin, groundwater from the Ames Valley and Warren Valley basins, and septic return flows.

This section assesses supplies in an average year, a single-dry year, and during multiple-dry years.

- An average year (also called normal year) is the average supply over a range of years and represents the median water supply available to HDWD.
- The single-dry year is the year that represents the lowest water supply available to HDWD.
- The multiple-dry year is the lowest average water supply available to HDWD for three or more consecutive dry years.

**TABLE 3-1
SUMMARY OF CURRENT AND PLANNED WATER SUPPLIES (AFY)**

Water Supply Source	2020	2025	2030	2035	2040
<i>Existing Supplies</i>					
Imported Water from MWA ^a	2,655	2,655	2,655	2,655	2,655
Groundwater - Warren Valley Basin ^b	1,622	1,622	1,622	1,622	1,622
Groundwater - Warren Valley Basin ^c	0	0	0	0	0
Groundwater - Warren Valley Basin ^d	13,674	15,891	17,996	19,990	21,886
Groundwater - Ames Valley Basin ^e	703	703	703	703	703
<i>Subtotal Existing Supplies</i>	<i>18,654</i>	<i>20,871</i>	<i>22,976</i>	<i>24,970</i>	<i>26,866</i>
<i>Planned Supplies</i>					
Groundwater - Warren Valley Basin ^f	1,098	1,756	1,856	1,954	2,047
Total Existing and Planned Supplies	19,751	22,627	24,832	26,924	28,913

a See Section 3.2.

b Adjudicated groundwater allocation. See Section 3.3.1.1.

c See section 3.3.2, water in the Warren Valley Basin resulting from return flow.

d Section 3.5.2. Projections based on average annual amount of water banked 1999-2014. Assumes amount of water banked will go down as demand increases. Assumes demand increases ~ 1% annually 2015 to 2040.

e Based on HDWD Annual Baseline amount as set in the Ames/Reche Groundwater Storage and Recovery Program and Management Agreement. See Section 3.3.1.2

f Groundwater supply from recharge of reclaimed water. See Section 3.3.2

3.2 MWA SWP Imported Water Supply

3.2.1 Imported Water Supplies

Imported SWP supplies constitute a significant source of water for the Yucca Valley area. As set forth herein and in MWA's 2015 UWMP, HDWD receives SWP supplies through the Morongo Basin Pipeline (MBP) and pursuant to the 1991 Agreement for Construction, Operation and Financing of the Morongo Basin Pipeline Project (the MBP Agreement). MWA is a special act district formed by the California Legislature in 1959 and approved by the electorate in 1960 to help meet the water needs within its service area. MWA, in cooperation with other water agencies, is responsible for managing the water resources within its jurisdiction to ensure a sustainable water supply for future uses. MWA's service area covers over 4,900 square miles and is divided into seven Divisions. MWA is one of the 29 State Water Contractors that holds a direct contract with DWR to receive SWP water.

In 1990, an area known as Improvement District Morongo (IDM) was formed, which is generally coterminous with the boundaries of MWA's Division 2. In the same year, the voters of IDM (by more than two-thirds vote) approved the issuance of \$66.5 million in general obligation bonds and the levy of ad valorem taxes to finance the acquisition and construction of the MBP to extend 71 miles from the California Aqueduct near Hesperia to the Yucca Valley area. As set forth in greater detail below, the construction of the MBP and the delivery of SWP supplies to HDWD is part of the physical solution developed pursuant to the 1977 Judgment and adjudication of the Warren Valley Basin. Since MWA is divided into seven Divisions, the MBP Agreement was structured for MWA to provide one-seventh of its SWP allotment to the IDM area. The MBP Agreement then apportions that one-seventh SWP allocation and the transmission capacity of the MBP on a pro-rata basis among the four public water purveyors in the IDM area, namely, HDWD (59%), Bighorn-Desert View Water Agency (9%), County Service Area No. 70 (5%), and Joshua Basin Water District (27%). Transmission capacity of the MBP was originally based on a conceived peak delivery rate of 15 cubic feet per second (CFS), or 10,900 AFY. Based on actual design and construction, however, and the subsequent addition of a second pumping station along the MBP, MWA has stated that actual system capacity is approximately 22 CFS, or about 15,930 AFY. According to MWA, this additional and available capacity in the MBP can be utilized to deliver significant water supplies to the District's Warren Valley Basin for storage and use.

At the time the District and MWA entered the MBP Agreement in 1991, MWA had a SWP Table A allotment of 50,800 AFY. Based on that allotment, the one-seventh allocation of SWP supplies made available to the IDM area was established as 7,257 AFY. Accordingly, the District's 59 percent share of that amount under the MBP Agreement is 4,282 AFY. The term of the MBP Agreement is either 50 years or the date upon which all bonds issued for the MBP have been retired. Because the bonds could be retired by 2022, and in light of other issues related to the MBP Agreement, the IDM Participants and MWA entered a 2002 Memorandum of Understanding (MWA 2002) wherein the parties agreed, among other things, that their objectives are inherently the same with regard to the MBP Agreement and that the MBP Agreement is intended to extend to at least 2041.

Through subsequent acquisitions of additional SWP supplies, MWA's Table A allotment increased to 75,800 AFY in 1998, and in 2009 MWA acquired additional rights that will incrementally increase its SWP Table A allotment to 89,800 AFY by 2020 (1963 Water Supply Contract between DWR and MWA, Amendment No. 18.) For purposes of this Plan, the District's access to SWP supplies under the MBP Agreement is based on its 59 percent share of the 7,257 AFY allotment to the IDM Participants. Notably, however, the MBP Agreement provides the District with the annual first option to take delivery of the percentage shares of the 7,257 allotment that are not utilized by other IDM Participants. HDWD can purchase all or some portion of these amounts on an annual basis for storage in the Warren Valley Basin.

In addition to the SWP supplies available to the District under the MBP Agreement, the District has intermittent access to surplus or unused SWP Table A supplies that can be acquired through MWA.

Beyond the SWP supplies discussed above, in 1994 the District signed a Conjunctive Use agreement with MWA to import additional SWP water through the MBP for recharge in the Warren Valley Basin. In 2004, the agreement was renegotiated to provide greater flexibility to both parties. A copy of this agreement is provided in Appendix F.

Water delivered through the MBP to HDWD is piped to three percolation ponds owned and operated by HDWD. Using these three recharge sites and based on a 300-day per year recharge schedule to allow for scheduled maintenance of the MBP, the District projects the total operational recharge capacity at all three sites combined is about 6,800 to 7,000 AFY, although this capacity could possibly increase with certain operational changes (source: HDWD Operations Department). Historically, the District has averaged 3,105 AFY of SWP water deliveries within the Warren Valley Basin (Annual Report of the Warren Valley Basin Watermaster 2014).

As indicated above, HDWD has a reliable contractual right to SWP supplies from MWA pursuant to the 1991 MBP Agreement. Pursuant to the 2002 MOU between the MWA, the District, and other IDM Participants, those parties have agreed that their objectives are inherently the same with regard to the MBP Agreement and that the MBP Agreement is intended to extend to at least 2041. Notwithstanding, because the term of the MBP Agreement could be tied to the retirement of the bonds that were issued for the MBP, which could occur by 2022, MWA has assured the District that SWP supplies will continue to be available to meet historic and projected customer demands within the District and throughout the IDM area. In addition to the particular arrangement between MWA and the IDM Participants for the provision of SWP supplies to Division 2, MWA maintains a carefully managed framework to ensure a sufficient and reliable supply of imported water throughout its service area.

3.2.1.1 MWA Water Supply Reliability

DWR prepares a biennial report to assist SWP contractors (including MWA) and local planners in assessing the near and long-term availability of supplies from the SWP. DWR issued its most recent update, the 2015 DWR State Water Project Delivery Capability Report (DCR), in July 2015. In the 2015 update, DWR provides SWP supply estimates for SWP contractors to use in their planning efforts, including for use in their 2015 UWMPs. The 2015 DCR includes DWR's estimates of SWP water supply availability under both current and future conditions.

The DCR estimates that MWA, on average, will receive 62 percent of its Table A allocation. Therefore it is assumed in a normal/average year that HDWD could receive 62 percent of its normal allocation or 2,655 AF ($0.62 * 4,282$ AFY). For planning purposes, it is assumed the current and planned purchase of SWP water from MWA will not exceed 2,655 AF in an average year.

The extremely dry sequence from the beginning of January 2013 through the end of 2014 was one of the driest two-year periods in the historical record. Water year 2013 was a year with two hydrologic extremes.² October through December 2012 was one of the wettest fall periods on record, but was followed by the driest consecutive 12 months on record. Accordingly, the 2013 SWP supply allocation was a low 35 percent of SWP Table A Amounts. The 2013 hydrology ended up being even drier than DWR's conservative hydrologic forecast, so the SWP began 2014 with reservoir storage lower than targeted levels and less stored water available for 2014 supplies. Compounding this low storage situation, 2014 also was an extremely dry year, with runoff for water year 2014 the fourth driest on record. Due to extraordinarily dry conditions in 2013 and 2014, the 2014 SWP water supply allocation was a historically low 5 percent of Table A Amounts. The dry hydrologic conditions that led to the low 2014 SWP water supply allocation were extremely unusual, and to date have not been included in the SWP delivery estimates presented in DWR's 2015 Delivery Capability Report.³ It is anticipated that the hydrologic record used in the DWR model will be extended to include the period through 2014 during the next update of the model, which is expected to be completed prior to issuance of the next update to the biennial SWP Delivery Capability Report.

The Delivery Capability Report modeling shows that the minimum dry-year would be 8 percent. For the purposes of this UWMP, the critical single-dry year allocation of SWP water to MWA is assumed to be a repeat of 2014, or 5 percent. Therefore it is assumed in a single-dry year that HDWD could receive 5 percent of its normal allocation or 214 AF ($0.05 * 4,282$ AF). This is depicted in Table 3-2.

The Delivery Capability Report examined a range of multiple-dry year scenarios. Under these scenarios deliveries in a multiple-dry year range from 28 to 33 percent. For this UWMP the 4-year multiple-dry year scenario, assuming a repeat of years 1931 to 1934, was assumed. Given a repeat of hydrologic conditions 1931 to 1934 the SWP is expected to deliver 33 percent of MWA's Table A allocation.

Table 3-2 summarizes the imported supply expected by HDWD under different water year types. These projections of imported water supply reliability are consistent with the supply information presented by MWA in its 2015 Urban Water Management Plan. Section 10631(k) of the UWMP Act provides that the District may rely upon the water supply information, analyses and conclusions provided by MWA for purposes of quantifying the existing and planned amounts of SWP water available to the District throughout the UWMP planning horizon, and for describing the reliability of that supply and vulnerability to seasonal or climatic shortages during average, single-dry and multiple-dry year periods.

² A water year begins in October and runs through September. For example, water year 2013 is October 2012 through September 2013.

³ SWP delivery estimates from DWR's 2015 SWP Delivery Capability Report are from computer model studies which use 82 years of historical hydrologic inflows from 1922 through 2003.

**TABLE 3-2
HDWD IMPORTED WATER SUPPLY RELIABILITY: AVERAGE, SINGLE-DRY AND
MULTIPLE-DRY YEAR CONDITIONS**

Wholesaler	Normal Year^(a)	Single-Dry Year^(b)	Multiple-Dry Year^(c)
<i>California State Water Project (SWP)</i>			
% of Table A Amount Available	62%	5%	33%
Anticipated (AFY)	2,655	214	1,413

Notes:

- a. The percent of Table A Available to MWA is taken from the SWP Delivery Capability Report, ELT Scenario, Table C.19.
- b. The percent of Table A available to MWA is based on SWP deliveries in 2014.
- c. The percent of Table A available to MWA from the SWP Delivery Capability Report, Table 6-4.

3.3 Local Water Supplies

3.3.1 Groundwater

HDWD obtains groundwater from two basins, the Warren Valley Basin and the Ames Valley Basin. These basins overlie an area defined in DWR Bulletin 118-03 as the Colorado River hydrologic region (Region 7), as further identified below in Table 3-3. Figure 3-1 shows the DWR groundwater basins in relation to the HDWD service area boundary.

**TABLE 3-3
DWR GROUNDWATER BASINS**

DWR Basin	Groundwater Basin	Budget Type ^(a)
7-12	Warren Valley	A
7-16	Ames Valley	C

Source: DWR

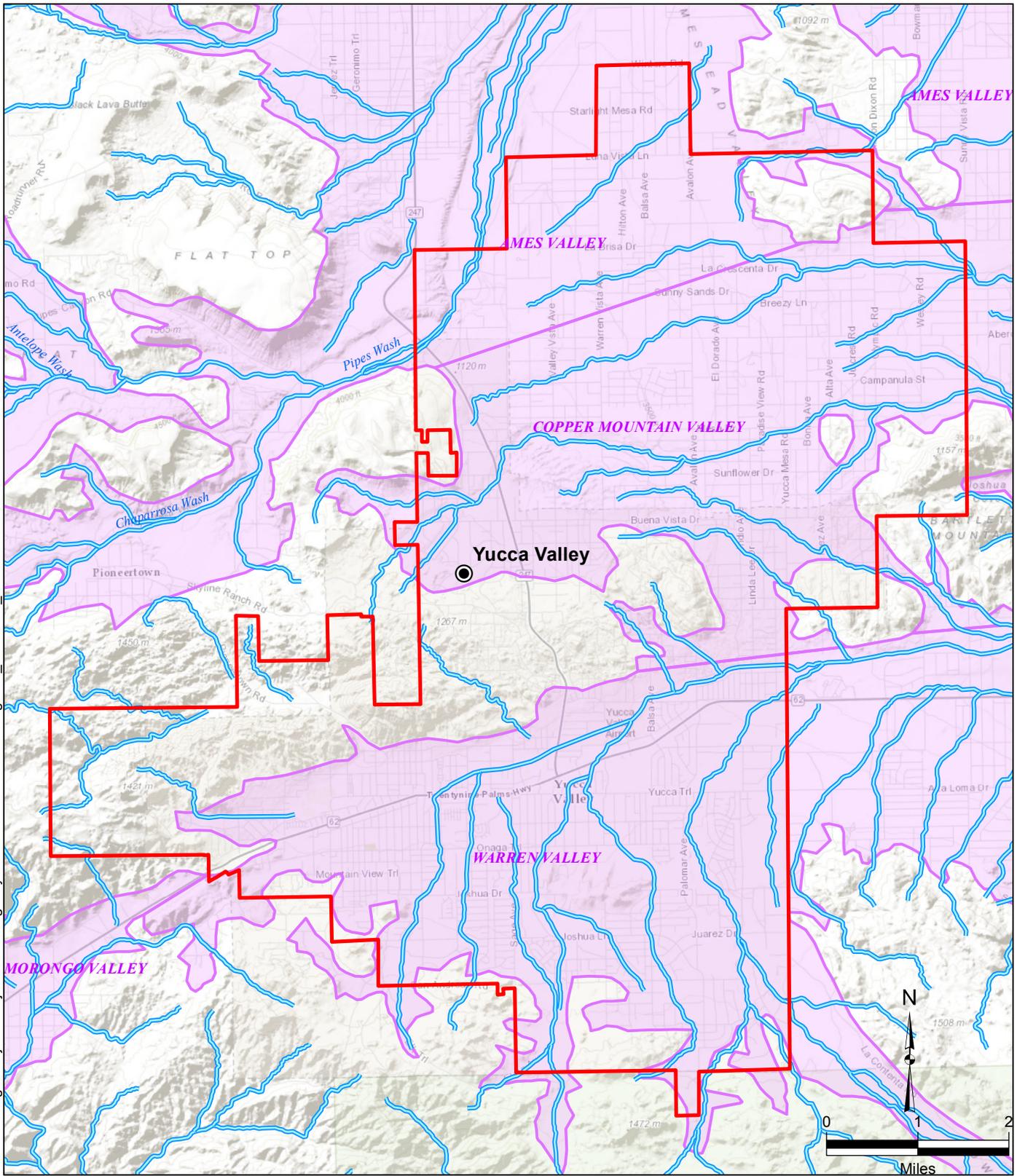
- (a) According to DWR, Type A designates a basin where either a groundwater budget or model exists, or actual extraction data is available, and Type C designates a basin where insufficient data is available to provide an estimate of the groundwater budget or basin extraction.

Currently there are nineteen (19) groundwater wells within the District’s water system. Twelve (12) are active. The total capacity of the active wells is approximately 6,400 gallons per minute (GPM) (9.2 MGD). All wells except Well 24E are in the Warren Valley Basin.

3.3.1.1 Warren Valley Basin

This section presents information about HDWD’s groundwater supply from the Warren Valley Basin. This section includes a discussion of the objectives from the adopted 1991 “Warren Valley Basin Management Plan” (WVBMP) and the adopted 1996 “Addendum to the Warren Valley Basin Management Plan” (Addendum).

Path: \\irv3\gis\Projects\Mojave Water Agency\UWMP 2015 Hi-Desert\Figure3_Hi-Desert_WaterInfrastructure.mxd



Legend

- City
- ▭ Hi-Desert Water District Service Area
- ~ River
- Groundwater Basin

Kennedy/Jenks Consultants

Hi-Desert Water District
Yucca Valley, California

**Hi-Desert Water District
Water Infrastructure**

KJ 1544249.00
November 2015

Figure 3-1

3.3.1.1 Groundwater Basin Description

The Warren Valley Basin covers an area of approximately 26.9 miles (17,200 acres) and includes the water-bearing sediments beneath the Town of Yucca Valley and the surrounding area. The Warren Valley Basin is bounded on the north by the Pinto Mountain fault, on the south by the bedrock outcrop of the Little San Bernardino Mountains, on the east by a bedrock constriction called the "Yucca Barrier", and on the west by a bedrock constriction and a topographic divide between the Warren Valley and Morongo Valley. The productive water-bearing materials in the Basin consist of unconsolidated to partly consolidated Miocene to Quaternary continental deposits and are unconfined interbedded gravels, conglomerates, and silts deposited by alluvial fan systems.

The Warren Valley Basin has an estimated total storage capacity of approximately 568,000 AF, with an estimated usable storage capacity of approximately 160,000 AF (DWR 2004). The District owns eighteen (19) wells (12 active, 7 inactive) that can be used to pump groundwater from the Warren Valley Basin.

It is estimated that in or around the 1950's, the Warren Valley Basin fell into a state of overdraft condition. As significant growth occurred in the Yucca Valley area, this overdraft condition worsened and groundwater levels declined at an accelerating rate. In its 1972 open-file report on the groundwater resources in the Yucca Valley area, the U.S. Geological Survey (USGS) estimated that the usable supply of groundwater would be depleted by the year 2000 if steps were not taken to correct the historic overproduction of the Basin.

Recognizing the severity of overdraft and the need to create an institutional framework to address the problem, HDWD filed a complaint against the Yucca Water Company and other producers in the Basin which sought to adjudicate all or substantially all of the groundwater rights in the Basin (See *Hi-Desert County Water District v. Yucca Water Company, Ltd.*, San Bernardino County Superior Court Case No. 172103.). In 1977, a Judgment was rendered in the case. A copy of this Judgment is included as Appendix G.

The Judgment established the exclusive rights to extract groundwater from the Warren Valley Basin among overlying and appropriative right holders that were parties to the case. The two appropriative right holders were the District and the Yucca Water Company, Ltd. The District subsequently acquired the Yucca Water Company and its water rights in 1990. The overlying right holders are generally categorized as the Blue Skies Country Club, 16 "Minimal Pumpers" with production rights limited to one acre-foot per year, and the Institute of Mental Physics. According to the Judgment, groundwater production by the Institute of Mental Physics does not have a significant effect on the Basin because their production is made from a subsurface drainage area known as the zone of transmission that merely intercepts outflow from the Warren Valley Basin. HDWD's adjudicated groundwater rights in the Basin total 1,622 AFY, as shown in Table 3-1 above.

In addition to limiting groundwater extraction rights in the Warren Valley Basin, the Judgment ordered the development of a physical solution for the Basin and established several fundamental elements of that solution. For instance, to allow additional development within the Basin, the Judgment did not limit groundwater production to the Basin's safe yield. In addition, the Judgment states: "In the ultimate development of the lands overlying the Warren Valley Basin, supplemental water supplies will be required. To that end, the lands overlying the Basin

were included within the Mojave Water Agency, which has a contractual right to purchase supplemental water from the State Water Resources System.” The Court appointed the District as the Watermaster to administer and enforce the provisions of the Judgment, including the requirement to develop a physical solution capable of bringing supplemental water to the Basin.

Over the following years, several studies related to the Warren Valley Basin hydrology and the importation of supplemental water from the SWP were developed. As directed by the Court, the Watermaster authorized the preparation of a basin management plan along with administration and implementation. A viable plan to address the groundwater overdraft problems of the Warren Valley Basin was based on clear management objectives.

In 1983, the Watermaster commissioned a geophysical study to determine the configuration and prospective capacity of the Warren Valley Basin. The study resulted in estimates that the Basin contained approximately 45,000 to 59,000 AF of remaining extractable water. Using a depth of 200 feet to the top of the aquifer, the total usable storage capacity of the Warren Valley Basin was estimated to be 160,000 AF. A depth of 200 feet was used since that was the depth to the groundwater table when data collection began, and a 200-foot depth avoids potential water quality impacts from septic effluent and other constituents. As discussed in Section 3.2 above, the principal component of the physical solution developed under the Judgment was the construction of the 71-mile Morongo Basin Pipeline and related facilities to bring SWP supplies to the District. Via the Morongo Basin Pipeline, SWP supplies are now utilized to replenish the Basin and to serve existing, planned and future water demands within the HDWD service territory. HDWD initiated an artificial recharge program in February 1995. Imported water from the SWP is used to recharge the Warren Valley Basin through surface spreading. Natural recharge of the basin occurs as mountain-front recharge along the San Bernardino Mountains. As a result of the artificial recharge program and increased natural recharge through conservation and awareness, water levels have recovered by 250 feet from 1995 to 2001 (Nishikawa et al, 2003).

In addition to the managed framework provided by the Judgment and physical solution, the Warren Valley Basin Watermaster, acting under the continuing jurisdiction of the Court, performs a variety of monitoring and other management activities in accordance with its Rules and Regulations (as amended, June 21, 2012). Among other functions, the Watermaster maintains an Advisory Committee comprised of local citizens and parties to the Judgment that make recommendations to the Watermaster; establishes an annual budget; levies groundwater production assessments; performs groundwater monitoring and measurement; maintains a basin wide water quality protection plan; implements the Basin Management Plan; establishes and administers groundwater storage agreements; and oversees and approves all exchanges, purchases, transfers, sales or leases of water. The Watermaster also prepares an annual report that is submitted to the Court.

3.3.1.1.2 Adopted Groundwater Management Plan

In May of 1991, the Watermaster adopted the Warren Valley Basin Management Plan (WVBMP), which further formulated the approach to implementing the physical solution for the Basin. In 1996, the Watermaster published an addendum to the Management Plan (Addendum), and that document continues to provide a foundation for water supply management and planning activities in the Warren Valley Basin. The WVBMP and the Addendum are included in Appendix H.

As indicated in the Addendum, sources of natural recharge to the Warren Valley Basin include direct percolation of precipitation and percolation of ephemeral streamflow from Water Canyon and Covington Canyon. Aside from imported SWP supplies, most other groundwater recharge to the Basin is from septic and irrigation return flows.

As growth continues, the amount of septic system return flow is expected to increase. The 2007 Water Supply Masterplan estimates septic return flows as about 32 percent of the groundwater production. However, HDWD is in the process of constructing a sewer collection system and a wastewater treatment facility to serve the area. Rather than having return flow from multiple independent septic systems, there will be groundwater recharge using treated wastewater.

Water levels continue to be monitored and reported by the Watermaster each year. The current groundwater levels vary from year to year, but levels have increased since the Watermaster began implementation of groundwater recharge using SWP water (Warren Valley Basin Watermaster Staff Report August 24, 2015).

3.3.1.1.3 Banked Groundwater

HDWD has its own conjunctive use program to take advantage of the fact that additional water is available from the SWP supply via MWA. Groundwater banking is still limited by the ability to store it locally, but many of these opportunities will continue to exist subject to applicable legal, water quality, and capacity issues. MWA supply is still greater than the demand in the service area in most years. When available, HDWD buys excess SWP water from MWA to store for future use when SWP supplies are not available. This activity also allows HDWD to take advantage of wet year supplies because of the abundant groundwater storage available in the HDWD's groundwater basins. As of December 31, 2015, HDWD had approximately 11,300 AF of water banked in the Warren Valley Basin, which was excess SWP that it had purchased from MWA since 1995. As a supply source shown in Table 3-1, projections are based on the fifteen-year banked average of 477 AFY but assume the amount of banked water will go down each year as demand increases. As described in Chapter 2 demand is expected to increase approximately 1 percent per year between 2015 and 2040.

3.3.1.1.4 Available Groundwater Supplies

Past and projected groundwater pumping for the HDWD service area from the Warren Valley Basin is summarized in Tables 3-4 and 3-5.

Projected groundwater pumping from the Warren Basin is summarized in Table 3-5. In order to meet demands (see Chapter 2) HDWD will need to pump at the levels shown in Table 3-5. As shown in Tables 3-11, 3-12, and 3-13 (which appear later in this chapter) a portion of the groundwater being extracted is available due to recharge of imported water, a portion from return flow, and in dry years some of the groundwater pumping from the Warren Basin will draw down water that HDWD "banked" previously. As described above, HDWD anticipates taking previously banked groundwater when necessary. It is HDWD policy to protect groundwater reserves and prevent long-term groundwater declines. District Code Section 5.25.010 establishes growth restrictions under certain criteria:

- **Stage 1 Condition** – Under this condition, a growth restriction of two percent is implemented. This becomes effective when reserves in the Warren Valley Basin equal or fall below five years (500 percent) of water demand for that particular year.

- **Stage 2 Condition** – Under this condition, a one percent growth rate is implemented. This becomes effective when reserves in the Warren Valley Basin equal or fall below four years (400 percent) of water demand for that particular year.
- **Stage 3 Condition** – Under this condition, a zero percent growth rate is implemented. This becomes effective when reserves in the Warren Valley Basin equal or fall below three years (300 percent) of water demand for that particular year.

**TABLE 3-4
HISTORIC WARREN VALLEY GROUNDWATER PRODUCTION (AFY)**

2011	2012	2013	2014	2015	Average
2,621	2,444	2,334	2,242	2,156	2,359

Source: Production records provided by HDWD.

**TABLE 3-5
WARREN VALLEY PROJECTED GROUNDWATER PRODUCTION**

	2020	2025	2030	2035	2040
Normal	2,226	2,374	2,548	2,720	2,888
Single-Dry Year	2,226	2,374	2,548	2,720	2,888
Multiple-Dry Year	2,226	2,374	2,548	2,720	2,888

Note: Groundwater production projections are based on demand projections shown in Table 2-11. 1,622 AF of pumping from adjudicated groundwater allocation, remainder from imported water recharged or banked, reclaimed water recharged, or native water.

3.3.1.2 Ames Valley Basin

3.3.1.2.1 Groundwater Basin Description

As indicated above, the District’s second source of local groundwater is obtained from the Ames Valley Basin. As defined by DWR in Bulletin 118, the Ames Valley Basin covers an area of approximately 169.7 square miles (110,000 acres) and is bounded by non-water-bearing rocks of the San Bernardino Mountains on the west, Iron Ridge on the north, and Hidalgo Mountain on the northeast. The Emerson, Copper Mountain, and West Calico faults also form part of the eastern and northern boundaries. A surface water drainage divide with the Copper Mountain Valley Basin forms the southern boundary. The total storage capacity of the Ames Valley Basin is estimated to be approximately 1,200,000 AF (DWR 2004). The Ames Valley region has been documented as having either historical or current overdraft conditions.

In approximately 1987, the District contracted to construct and receive water from a groundwater production well in the Ames Valley Basin area. The Bighorn-Desert View Water Agency (BDVWA) protested construction of the well, and in 1991 the District and BDVWA entered a settlement agreement (Ames Basin Agreement) which established terms and conditions for the District’s production of groundwater from its “Mainstream Well.” Following several years for groundwater studies and evaluations of groundwater recharge options, in March 2012 multiple entities, including HDWD entered into the Ames/Reche Groundwater Storage and Recovery Program and Management Agreement (“Amended Agreement” provided in Appendix I). The purpose of the agreement is to establish mechanisms for Basin management, to bring supply and demand into balance, and to establish groundwater production and storage rights of the parties. The Amended Agreement establishes annual baseline extraction amounts for producers. HDWDs Annual Baseline amount was set at 703 AFY. If HDWD does not produce 703 AF in a given year, the difference is carried over and can be used in the next two fiscal years. Under the Amended Agreement HDWD can purchase and recharge SWP in the Ames Basin; 95 percent of the recharged volume can be withdrawn in addition to the Annual Baseline volume.

Past and projected groundwater pumping for the HDWD service area from the Ames Valley Groundwater Basin is summarized in Tables 3-6 and 3-7. For the Ames Valley Basin, this UWMP assumes a supply of 703 AFY, though given groundwater storage options; HDWD is likely to have more than 703 AF available in any year.

**TABLE 3-6
HISTORIC AMES VALLEY GROUNDWATER PRODUCTION (AFY)**

	2011	2012	2013	2014	2015	Average
HDWD	299	564	707	730	682	596

Source: Production Records HDWD.

**TABLE 3-7
AMES VALLEY PROJECTED GROUNDWATER PRODUCTION (AFY)**

	2020	2025	2030	2035	2040
Normal	703	703	703	703	703
Single-Dry Year	703	703	703	703	703
Multiple-Dry Year	703	703	703	703	703

Note: Groundwater production projections are based on demand projections shown in Table 2-7 and account for conservation achieved pursuant to SBX7-7

Sustainability

The Sustainable Groundwater Management Act (SGMA) passed in 2014 and amended in 2015 creates a framework for sustainable, local groundwater management in California. SGMA directed DWR to identify priority groundwater basins for the purpose of implementing SGMA. SGMA requirements to create sustainable groundwater management agencies and sustainable groundwater management plans no later than 2022 applies only to high and medium priority

basins. The Warren Valley Basin is covered by adjudication and that adjudication will be used to manage the basin and comply with SGMA.

The Warren Valley adjudication mandates that groundwater extraction from the Warren Valley Basin does not exceed the estimated annual supplies and empowers the HDWD as Watermaster to enforce pumping limits as mandated by the Court. The Watermaster performs monitoring in accordance with the Rules and Regulations of the Warren Valley Watermaster (1995). Monitoring activities currently performed by the Watermaster include water production and verification, water level measurement, and water quality. An annual report is completed by the Watermaster each year to monitor the Warren Valley Basin's production and recharge.

The Sustainable Groundwater Management Act does not (at least under current legislation) apply to the Ames Basin as it is rated as a very low priority basin. However, as evidenced by the multiple agreements discussed above, HDWD and other entities that use Ames Basin water have taken actions to proactively manage the groundwater to ensure long-term supplies.

3.3.2 Septic Return Flow and Reclaimed Water

Currently, all residents and businesses within HDWD's service area use septic systems and subsurface disposal systems to treat and dispose of domestic wastewater. The USGS estimated that septic return flow was as high as 1,688 AFY (based on land uses in 1993) (Nishikawa et al 2003).

HDWD is actively working toward constructing a wastewater collection and centralized treatment facility known as the Wastewater Reclamation Project (WRP). The WRP is being implemented due to a Regional Water Quality Control Board resolution that amended the region's Water Quality Control Plan (Basin Plan) to include the prohibition of septic system discharges within the Town of Yucca Valley (Yucca Valley). The prohibition, which follows a three (3) phase plan, will eliminate all of Phase I discharges by June 30, 2021 and Phase 2 and 3 discharges by December 31, 2025. The three (3) phases included within the WRP will provide sewerage service to most of the Town of Yucca Valley and the treated effluent from the centralized treatment facility, referred to as the Wastewater Reclamation Facility (WRF) will be used to recharge the Warren Valley Basin. The WRF will have an initial design capacity of 1 million gallons per day (MGD), but will increase to 1.6 MGD by 2025. The current waste discharge permit for the Yucca Valley Wastewater Reclamation plant limits average daily dry weather discharge to the recharge basins to 1 MGD (Colorado River Basin Regional Water Quality Control Board Order R7-2015-0043).

After 2021, with the completion of the Yucca Valley WRP and Phase 1 of the sewer collection system, septic return will be greatly diminished. After Phases 2 and 3 of the sewer collection system are built (approximately 2025), the District assumes there will be minimal septic return. However, the septic return will be replaced by percolation of highly treated water. It is estimated that approximately 90 percent of the effluent delivered to the WRP will be returned to the Warren Basin through percolation ponds (HDWD 2009). General estimates of wastewater discharged from septic tanks reaching groundwater is 50 percent as some of the septic tank effluent stays in the vadose zone and other portions are evaporated (HDWD 2009). So despite the construction of a sewer collection system, HDWD expects return flow to increase. Table 3-8 estimates percolation of reclaimed water into the Warren Basin from the Yucca Valley Wastewater Treatment Plant.

**TABLE 3-8
PROJECTED RECLAIMED WATER USES (AFY)**

Beneficial Use Type	Level of Treatment	2020	2025	2030	2035	2040
Agriculture	Tertiary	0	0	0	0	0
Landscape Irrigation	Tertiary	0	0	0	0	0
Commercial Use	Tertiary	0	0	0	0	0
Industrial Use	Tertiary	0	0	0	0	0
Geothermal/Energy	Tertiary	0	0	0	0	0
Seawater Intrusion Barrier	Tertiary	0	0	0	0	0
Recreational Impoundment	Tertiary	0	0	0	0	0
Wetlands or Wildlife Habitat	Tertiary	0	0	0	0	0
Groundwater Recharge ^a	Tertiary	1,098	1,756	1,856	1,954	2,047
Surface Water Augmentation	Tertiary	0	0	0	0	0
Direct Potable Reuse	Tertiary	0	0	0	0	0
Other	Tertiary	0	0	0	0	0
Total		1,098	1,756	1,856	1,954	2,047

Note:

a Recharge will occur via percolation ponds overlying the Warren Valley Basin.

3.3.3 Potential Supply Inconsistency

As fully set forth herein, water provided to customers within the service area of HDWD is derived from natural and recharged groundwater supplies from the District's 12 active wells. In accordance with the analyses and accounting performed by MWA and the District regarding the variability of imported water supplies, there are no inconsistent water sources that cause reduced deliveries to users within the District's service area. A potential exception may be the use of a well with water quality issues that may prohibit the pumping of that particular well. Currently, the District uses an approved blending technique to reduce arsenic in a non-critical well (Well 16E) by blending its produced water with that of the produced water from two additional wells (Well(s) 12E and 17E) that have low or undetectable concentrations of arsenic. The same process is applied for a well that was once high in nitrates (Well 9E blended with 14E) however nitrates within this well have dropped and have been below half of the SWRCB's maximum contaminant level for the constituent for several years.

3.4 Planned Water Supply Projects and Programs

As described above, HDWD does plan to augment groundwater supplies by recharging recycled water (see Table 3-8). Recharge of reclaimed water is the only planned water supply at this time.

3.5 Transfers, Exchanges, and Groundwater Banking Programs

In addition to SWP water supplies and groundwater, HDWD may seek opportunities to purchase water supplies from other water agencies and sources. Transfers, exchanges, and groundwater banking programs, such as those described below, are important elements to enhancing the long-term reliability of the total mix of supplies currently available to meet the needs of the District's customers.

3.5.1 Opportunities for Short and Long-Term Transfers and Exchanges

A current opportunity available to HDWD to increase water supplies is to participate in voluntary water transfer programs. Since the drought of 1987-1992, the concept of water transfer has evolved into a viable supplemental source to improve supply reliability. The practice of water transfers was in part codified into law in 1986. (See California Water Code, Sections 470, 475, 480-483; 1810-1814.) These laws help define parameters for water transfers and set up a variety of approaches through which water or water rights can be transferred among individuals or agencies. According to the California Water Plan Update 2009, up to 27 million AFY of water are delivered for agricultural use every year. Over half of this water use is in the Central Valley, and much of it is delivered by, or adjacent to, SWP and Central Valley Project (CVP) conveyance facilities. This proximity to existing water conveyance facilities could allow for the voluntary transfer of water to many urban areas, including HDWD, via the MWA, imported SWP, and the MBP. Such water transfers can involve water sales, conjunctive use and groundwater substitution, and other arrangements, and usually occur as a form of spot, option, or core transfers agreement. The costs of a water transfer would vary depending on the type, term, and location of the transfer. The most likely voluntary water transfer programs would probably involve the Sacramento or southern San Joaquin Valley areas. Additional authorities that support such water transfers and exchanges include, but are not limited to, those found in Water Code section 1005 et seq.

One of the most important aspects of any resource planning process is flexibility. A flexible strategy minimizes unnecessary or redundant investments (or stranded costs). The voluntary purchase of water between willing sellers and buyers can be an effective means of achieving flexibility. However, not all water transfers have the same effectiveness in meeting resource needs. Through the resource planning process and ultimate implementation, several different types of water transfers could be undertaken.

Notably, MWA as the wholesale water agency, has participated in significant SWP Table A transfers and exchanges on behalf of HDWD and all its retailers, thereby augmenting local water supplies. As provided in MWA's 2015 UWMP, it is projected that MWA will continue to participate in such programs to ensure a sufficient and reliable source of imported water supplies to its retail members.

3.5.2 Groundwater Banking Programs

As described above, HDWD is already involved in extensive groundwater banking. It is possible that HDWD could expand banking operations in the future, but no specific expansions are planned at this time.

3.5.3 Development of Desalination

The California UWMP Act requires a discussion of potential opportunities for use of desalinated water (Water Code Section 10631(i)). HDWD has evaluated opportunities for using desalinated water in future supply options. However, at this time, none of the opportunities are practical or economically feasible for HDWD, and HDWD has no current plans to pursue them. Therefore, desalinated supplies are not included in the supply summaries in this Plan.

3.5.3.1 Opportunities for Brackish Water and/or Groundwater Desalination

The groundwater supplies in the HDWD service area are not considered brackish in nature, and desalination is not required. However, if financially feasible, HDWD and MWA (a SWP contractor) could team up with other SWP contractors to consider investing in construction of regional groundwater desalination facilities in exchange for SWP supplies. The desalinated water would be supplied to users in communities near the desalination plant(s), and a similar amount of SWP supplies would be exchanged and allocated to HDWD/MWA from the SWP contractor.

In addition, should an opportunity emerge with a local agency other than a SWP contractor, an exchange of SWP deliveries would most likely involve a third party, such as MWA. Most local groundwater desalination facilities would be projects implemented by other retailers of SWP contractors and, if an exchange program was implemented, would involve coordination and wheeling of water through the MWA contractor's facilities to HDWD.

3.5.3.2 Opportunities for Seawater Desalination

Because the District is not in a coastal area, it is neither practical nor economically feasible for HDWD to implement a seawater desalination program. However, similar to the brackish water and groundwater desalination opportunities described above, HDWD could consider partnering with other retailers and/or team with MWA to invest in the construction of other purveyors' seawater desalination facilities in exchange for SWP supplies.

3.6 Anticipated Water Supply Sources in a Normal, Single-Dry, and Multiple-Dry Years

Table 3-10 shows HDWD supplies in year 2015. In year 2015 demand in HDWD was very low (2,400 AF) meaning that some of the supply was left for groundwater recharge. Tables 3-10, 3-11, and 3-12 provide details on supplies anticipated to be available to HDWD in average/normal, single- dry, and multiple-dry years.

**TABLE 3-9
WATER SUPPLY CALENDAR YEAR 2015 (AF)**

Water Supply Source	Description of Source	Volume	Type
Imported Water from MWA ^a	<i>Groundwater Recharge, Purchased from MWA</i>	See note a	Raw Water
Groundwater - Warren Valley Basin ^b	<i>Groundwater</i>	2,156	Drinking Water
Groundwater - Warren Valley Basin ^c	<i>Groundwater</i>	See note c	Drinking Water
Groundwater - Warren Valley Basin ^d	<i>Groundwater</i>	See note d	Drinking Water
Groundwater - Ames Valley Basin ^e	<i>Groundwater</i>	682	Drinking Water
Total Supplies		2,838	

a HDWD received 2,367 AF imported water in calendar year 2015, used for groundwater recharge.

b See Section 3.3.1.1.

c It is estimated that return flow/groundwater recharge to the Warren Valley Basin was approximately 908 AF in 2015.

d Groundwater reserves in the Warren Valley Basin were approximately 11,351 AF in 2015.

e See Section 3.3.1.2

**TABLE 3-10
WATER SUPPLY ESTIMATES - AVERAGE/NORMAL YEAR (AF)**

Water Supply Source	2020	2025	2030	2035	2040
<i>Existing Supplies</i>					
Imported Water from MWA ^a	2,655	2,655	2,655	2,655	2,655
Groundwater - Warren Valley Basin ^b	1,622	1,622	1,622	1,622	1,622
Groundwater - Warren Valley Basin ^c	0	0	0	0	0
Groundwater - Warren Valley Basin ^d	13,674	15,891	17,996	19,990	21,886
Groundwater - Ames Valley Basin ^e	703	703	703	703	703
<i>Subtotal Existing Supplies</i>	18,654	20,871	22,976	24,970	26,866
<i>Planned Supplies</i>					
Groundwater - Warren Valley Basin ^f	1,098	1,756	1,856	1,954	2,047
Total Existing and Planned Supplies	19,751	22,627	24,832	26,924	28,913

a See Section 3.2.

b Adjudicated groundwater allocation. See Section 3.3.1.1.

c See section 3.3.2, water in the Warren Valley Basin resulting from return flow.

d Section 3.5.2. Projections based on average annual amount of water banked 1999-2014. Assumes amount of water banked will go down as demand increases. Assumes demand increases ~ 1% annually 2015 to 2040.

e Based on HDWD Annual Baseline amount as set in the Ames/Reche Groundwater Storage and Recovery Program and Management Agreement. See Section 3.3.1.2

f Groundwater supply from recharge of reclaimed water. See Section 3.3.2

**TABLE 3-11
WATER SUPPLY ESTIMATES - SINGLE-DRY YEAR (AF)**

Water Supply Source	2020	2025	2030	2035	2040
<i>Existing Supplies</i>					
Imported Water from MWA ^a	214	214	214	214	214
Groundwater - Warren Valley Basin ^b	1,622	1,622	1,622	1,622	1,622
Groundwater - Warren Valley Basin ^c	0	0	0	0	0
Groundwater - Warren Valley Basin ^d	13,674	15,891	17,996	19,990	21,886
Groundwater - Ames Valley Basin ^e	703	703	703	703	703
<i>Subtotal Existing Supplies</i>	16,213	18,430	20,535	22,529	24,426
<i>Planned Supplies</i>					
Groundwater - Warren Valley Basin ^f	1,098	1,756	1,856	1,954	2,047
Total Existing and Planned Supplies	17,310	20,187	22,391	24,483	26,472

a See Section 3.2.

b Adjudicated groundwater allocation. See Section 3.3.1.1.

c Groundwater made available from septic tank return flow. See Section 3.3.2.

d Section 3.5.2. Projections based on average annual amount of water banked 1999-2014. Assumes amount of water banked will go down as demand increases. Assumes demand increases ~ 1% annually 2015 to 2040.

e Based on HDWD Annual Baseline amount as set in the Ames/Reche Groundwater Storage and Recovery Program and Management Agreement. See Section 3.3.1.2

f Groundwater supply from recharge of reclaimed water. See Section 3.3.2.

**TABLE 3-12
WATER SUPPLY ESTIMATES – MULTIPLE-DRY YEAR (AF)**

Existing Supplies					
Imported Water from MWA ^a	1,413	1,413	1,413	1,413	1,413
Groundwater - Warren Valley Basin ^b	1,622	1,622	1,622	1,622	1,622
Groundwater - Warren Valley Basin ^c	0	0	0	0	0
Groundwater - Warren Valley Basin ^d	13,674	15,891	17,996	19,990	21,886
Groundwater - Ames Valley Basin ^e	703	703	703	703	703
Subtotal Existing Supplies	17,412	19,629	21,734	23,728	25,625
Planned Supplies					
Groundwater - Warren Valley Basin ^f	1,098	1,756	1,856	1,954	2,047
Total Existing and Planned Supplies	18,509	21,386	23,590	25,682	27,671
a See Section 3.2.					
b Adjudicated groundwater allocation. See Section 3.3.1.1.					
c Groundwater made available from septic tank return flow. See Section 3.3.2.					
d Section 3.5.2. Projections based on average annual amount of water banked 1999-2014. Assumes amount of water banked will go down as demand increases. Assumes demand increases ~ 1% annually 2015 to 2040.					
e Based on HDWD Annual Baseline amount as set in the Ames/Reche Groundwater Storage and Recovery Program and Management Agreement. See Section 3.3.1.2					
f Groundwater supply from recharge of reclaimed water. See Section 3.3.2.					

Section 4: Water Conservation and Demand Management

4.1 Demand Management

The purpose of the Demand Management Measures (DMM) section of this UWMP is to (a) provide a description of the past water conservation programs that HDWD has implemented since 2010 to meet its urban water use reduction targets and (b) describe the activities and actions HDWD plans to use in the future to meet its urban water use reduction targets. For the purposes of this UWMP the DMMs are categorized as “Foundational” and “Other”. Foundational DMMs, listed below, are those DMMs that the UWMP Act and Water Code specifically mention:

- a. Water waste prevention ordinances
- b. Metering
- c. Conservation pricing
- d. Public education and outreach
- e. Programs to assess and manage distribution system real loss
- f. Water conservation program coordination and staffing support

Activities outside of the Foundational DMMs that encourage less water use in the HDWD service area fall in the “Other DMM” category.

4.1.1 Foundational DMMs

4.1.1.1 Water Waste Prohibition

HDWD prohibits water waste through Ordinance 68, Resolution 90-04 and District Code Section 5.70.010. The water waste ordinances in effect from 2010 to 2015 are summarized in Table 4-1.

4.1.1.2 Metering

All of HDWD’s customers are metered and billed volumetrically on a monthly basis. Multi-family customers are typically served by a single master meter; however, individual water meters are required for any new multi-family structures.

**TABLE 4-1
SUMMARY OF WATER WASTE PROHIBITIONS 2010 TO 2015**

Prohibitions
Hose washing of sidewalks, walkways, driveways and parking areas
Using potable water to clean, fill, operate or maintain levels in decorative fountains
Allowing water leaks
Using potable water for irrigation between the hours of 0900 and 1700 during high use season (June 1 through September 30)
Irrigation, regardless of season in excess of three times per week
Limitations on potable water use for construction purposes
Providing water to customers in restaurants without customer request
Non-commercial washing of privately owned vehicles, trailers, motor homes, busses or boats except with a bucket and hose equipped with an automatic shut-off nozzle
Use of water for any purpose which results in flooding or run-off onto hardscape, driveways, streets, adjacent lands or into gutters
Use of potable water to maintain dirt roads without application to the District
Use of potable water for outdoor irrigation during and within 48 hours of measureable rainfall
Irrigation of potable water outside of newly constructed homes and buildings that are not delivered by drip or micro-spray systems
Operators of hotels and motels shall provide guests with the option of choosing not to have towels and linens laundered daily
Other Requirements
Prior to issuance of will serve from HDWD, commercial and residential applicants must identify types of fixtures to be installed and sign an agreement that affirms that such fixtures will be installed. Upon completion of the project a representative of HDWD shall inspect the facilities and certify that the required and designated fixtures have been installed.
Any building which is being substantially remodeled shall replace existing fixtures with ultra-low flow toilets or water closets, showerheads and faucets.
Upon change of user of property, as in rental properties changing tenants, owner shall sign certification that said property has been retrofitted, if not already so, and shall have service transferred and continued upon inspection of said property by a representative of the Hi-Desert Water District.
To qualify as being "retrofitted" plumbing fixtures and devices used shall be certified by the International Association of Plumbing and Mechanical Officials and comply with all applicable American National Standards Institute standards.
Faucets located in restrooms intended for use by the general public shall be of the metering or self-closing type.

Prohibitions
Multiple-dwelling unit structures are considered as one street address. Such systems must be equipped with water regulation valves adjusted to use the minimum amount of water.

4.1.1.3 Conservation Pricing

The District has meters for each customer and charges a volumetric rate for water use.

4.1.1.4 Public Education and Outreach

HDWD recognizes the continued need for a public information program to maintain and increase the public's awareness of water and the need to use it wisely. District public information activities include:

- A web site at <http://www.hdwd.com> which provides information about the District, its conservation programs, water use efficiency tips, and links to other water related sites.
- A water conservation specific website (<http://www.hdwdconserves.com/>) that highlights water saving tips for indoor, outdoor, and event usage. The website promotes xeriscaping, native plant lists, and low-water use landscape plans. The website provides classroom materials for teachers and conservation related games for kids.
- Bill inserts, newsletters, DVDs, and, pamphlets that provide information on water conservation.
- Lobby displays and television to air special water related programs.
- District Board meetings, which are aired on local cable television.
- Public access television special programs and slides.
- Newspaper and radio public service announcements and paid advertisements.
- Digital message sign on the Highway.
- District tours.

In addition to the programs it runs independently, HDWD also benefits from regional collaborations. MWA and the Alliance for Water Awareness and Conservation (AWAC) provide outreach, educational and informational materials and literature; public service announcements and paid advertisements; flyers; brochures and classes to encourage drought-tolerant landscaping, and articles in newsletters, Chamber of Commerce publications and regional newspapers. AWAC also has a speaker's bureau for groups interested in learning about water conservation. In addition, MWA operates a demonstration garden at its headquarters to showcase drought-tolerant plants, assists in hosting and staffing workshops on conservation and sponsors and hosts public events and booths at community functions.

4.1.1.5 Programs to Assess and Manage Distribution System Real Loss

HDWD utilized the Water Audit Methodology (Appendix L of the Guidebook) to estimate both real and apparent water loss. The 12 month period used in the analysis was year 2015. Based on this audit the real water loss was 403 AF, or about 12.6 percent of the water supplied.

Consistent with Senate Bill 555, HDWD will conduct a water loss audit each year and report water loss to DWR annually starting in October 2017.

Besides monitoring water loss, HDWD has two programs that target leaks.

- Pipeline replacement. The District has a program to replace the oldest and most leak-prone lines by using its Geographic Information System (GIS) to track the occurrence of leaks. When this information is combined with the pipeline inventory in the GIS, rates of leak occurrence are calculated for different types of pipe. This information is then used to identify and prioritize pipeline replacement projects. The pipeline replacement program began in 1997. Within its Capital Replacement Program (CRP), the District divided its service area into 22 regions based on geographic location and pressure zone boundaries. Priorities were then calculated for each region based on leaks per unit pipe length and available fire flow. Pipeline replacement projects are currently being implemented to address these priorities. Since 2011 HDWD has replaced 177,810 linear feet of pipeline – approximately 35,560 linear feet a year. HDWD anticipates replacing another 500,000 linear feet of pipeline. In 2015, the District received a 7.2 million dollar grant from the Proposition 84 Drought Round (the “Grant”) to assist with its watermain replacement efforts. In response to the Grant, the District has doubled its crew size for replacement efforts and is planning to replace approximately 124,000 linear feet of leaking water pipes.
- Meter replacement. The District has a water meter replacement program for those meters that have recorded an excess of 2,500 units or 1.8 million gallons of water. Replacing these meters ensures that all of the water flowing through those meters is accurately accounted for and billed. Recently, the District has started replacing old meters with Automated Meter Reading (AMR) meters so that it can more accurately detect areas of excessive water consumption. These meters are installed during each capital replacement program project and as faulty meters are identified within the system.

4.1.1.6 Water Conservation Program Coordination and Staffing Support

The District utilizes a Communication and Conservation Officer (CCO) to coordinate and manage the educational and managerial elements of the program. Together with the General Manager and his staff, they work together to coordinate conservation programs and implementation, as well as communicate and promote water conservation issues to the District Board, local developers, and the community at large.

4.1.2 Other DMMs

4.1.2.1 Regional Participation

HDWD is a participating member of AWAC. United under Mojave Water Agency and representing all retailers of the wholesale agency, the AWAC coordinates efforts to change water-use habits and empower communities with the tools to ensure adequate supplies of water for future generations:

1. Educate the local communities with the understanding of the importance of water conservation;
2. Provide the local communities with the tools to effectively reduce per capita consumption to targeted goals; and,
3. Reduce regional water use to achieve a sustainable, reliable supply to meet regional water demands.

4.1.2.1.1 Participation in Regional Rebate Programs

HDWD participated in a turf removal incentive program through MWA. MWA offered \$0.50 per square foot for turf removal. Between 2010 and 2015, within the District's service area, a total of 8,074 square feet of turf were removed. Turf was removed at four residential properties and one commercial property.

4.2 Planned DMMs to Meet Water Use Targets

HDWD has already met the 2020 Compliance Water Use Target. HDWD plans to keep water demands low through continued customer outreach, conservation measures for Commercial/Institutional/Industrial customers, and by reducing water loss through repair and replacement of water pipelines.

Section 5: Water Quality

5.1 Overview

The quality of water is dynamic in nature. This is true, for example, for SWP water brought into the Yucca Valley area via the Morongo Basin Pipeline. During periods of intense rainfall or snowmelt, routes of surface water movement are changed, and new constituents are mobilized and enter the water while other constituents are diluted or eliminated. These same basic principles apply to groundwater. For instance, depending on water depth and other factors, groundwater will pass through different layers of rock and sediment and leach different materials from those strata. Water quality is not a static feature of water, and these dynamic variables must be recognized as part of the water supply planning process.

Water quality regulations also change. This is the result of the discovery of new constituents, changing understanding of the health effects of previously known and new constituents, development of new analytical technology, and the introduction of new treatment technology. All water purveyors, including HDWD, are subject to drinking water standards set by the U.S. Environmental Protection Agency (EPA) and the State Water Resources Control Board's Drinking Water program.

Pursuant to applicable laws, an annual Consumer Confidence Report (CCR) is provided to all residents who receive water from the District. That report includes detailed information about the results of quality testing of the water supplied during the preceding year (CCR, 2014).

Several state, regional and county agencies have jurisdiction and responsibility for monitoring water quality and contaminant sites. Programs administered by these agencies include basin management, waste regulation, contaminant cleanup, public outreach, and emergency spill response.

This section provides a general description of the water quality of both imported water and existing groundwater supplies. A discussion of potential water quality impacts on the reliability of these supplies is also provided.

5.2 Imported Water Quality

MWA is HDWD's wholesale supplier for SWP water. The source of SWP water is rain and snow from the west facing Sierra Nevada, Cascade, and Coastal mountain ranges. This water travels to the Sacramento-San Joaquin Delta, which is a network of natural and artificial channels and reclaimed islands at the confluence of the Sacramento and San Joaquin rivers. The Delta forms the eastern portion of the San Francisco estuary, receiving runoff from more than 40 percent of the state's land area. It is a low-lying region interlaced with hundreds of miles of waterways. From the Delta, the water is pumped into a series of canals and reservoirs, which provides water to urban and agricultural users throughout the San Francisco Bay Area and Central and Southern California. MWA receives SWP water at four locations off the aqueduct. SWP water is transported from MWA to HDWD's service area via the 71-mile long Morongo Basin Pipeline, which conveys SWP water from the California Aqueduct in the Mojave River watershed near

Hesperia to HDWD. HDWD uses the imported water supply for recharge into the Warren Valley Groundwater Basin.

An important property of SWP water is the chemical make-up, which fluctuates dependent on Delta and weather conditions. Based on data from MWA, SWP has generally been of good quality. Water quality was measured on the SWP system just upstream of the turnout to the MWA's Mojave River and Morongo Basin pipelines (the station is referred to as CAAQUEDCT01 by MWA). Total dissolved solids (TDS) over the 10 year period from 2003 to 2012 averaged 250 mg/L and nitrate-NO₃ concentrations averaged 2.5 mg/L. These levels are well within California drinking water standards with TDS levels closely mirroring the District's native supply levels.

5.3 Groundwater Quality

HDWD currently obtains its groundwater from twelve (12) active wells. All of the District's production wells currently satisfy all applicable Maximum Contaminant Levels (MCLs). All water produced from within both the Warren Valley Basin and the Ames Valley Basin meet all federal and state drinking water regulations, with the exception of arsenic levels at one well that intermittently exceed the Running Annual Average (RAA) for MCL compliance with Arsenic. This well extracts water from the lower aquifer portions of the Warren Valley Basin. The well is currently being treated through a permitted blending process with two low arsenic concentration wells (Hi-Desert Water District 2014).

As set forth in the District's 2014 CCR, the detected amount of nitrate in the District's groundwater, 13.29 parts per million (ppm), was well within the U.S. EPA MCL of 45 ppm. However, the Regional Water Quality Control Board (RWQCB) has concluded that concentrations of nitrate in the Warren Valley Groundwater Basin may be inconsistent with the water quality objectives established by the applicable Basin Plan. In a 2003 Report, "Evaluation of the Source and Transport of High Nitrate Concentrations in Groundwater, Warren Subbasin, California" Water-Resources Investigations Report 03-4009, the U.S. Geological Survey (USGS) concluded that "septage from septic tanks was the primary source of nitrate to the groundwater system." At the current time the District is actively planning and developing the Wastewater Reclamation Project (as discussed previously in Chapter 3) in order to protect local groundwater resources and ensure the long-term maximization of local water resources within the District.

5.4 Groundwater Protection

The general goal of the District's groundwater protection activities is to maintain the groundwater resources and to ensure a reliable high quality supply. Activities to meet this goal include continued and increased monitoring, data sharing, education and coordination with other agencies that have local or regional authority or programs. To increase its groundwater protection activities, HDWD has been taking the following actions as presented below.

5.4.1 Identification and Destruction of Abandoned Wells

In general, the presence of abandoned groundwater wells represents a potential hazard to the quality of a groundwater basin. Abandoned and improperly destroyed wells can act as conduits for contaminants to reach drinking water supplies, and therefore it is vital for the long-term protection of the basin that abandoned wells be located and destroyed.

While it is the landowner's responsibility to destroy an abandoned well, the District and the Watermaster are proactive about making sure that abandoned wells are in fact destroyed. The destruction of abandoned groundwater wells should be performed in accordance with state standards. California Water Code Section 13750.5 requires that those responsible for the destruction of water wells possess a C-57 Water Well Contractor's License. Whenever a water well is destroyed, a report of completion must be filed with DWR within 60 days of the completion of the work. The San Bernardino County Department of Public Health, Division of Environmental Health Services is responsible for permitting and inspecting construction and destruction of wells. Pursuant the Watermaster Rules and Regulations discussed above, Section 10 provides that all abandoned wells shall be filled and capped pursuant to applicable code provisions by the party owning such wells, after Watermaster approval (Warren Valley Basin Watermaster Rules and Regulations, July 14, 2004, Section 10.)

For all functional and abandoned wells, a "well site control zone," the area immediately surrounding the well alternatively referred to as the "wellhead," needs to be established. The purpose of this zone is to provide protection from vandalism, tampering, or other threats at the well site. The size of this zone can be determined by using a simple radius, or an equivalent area. The well site control zone should be managed to reduce the possibility of surface flows reaching the wellhead and traveling down the unprotected casing. The California Division of Drinking Water recommends a minimum radius of 50 feet for well site control zones for all public water systems in the state. Wellhead protection applies to the abandoned wells as well as functional activities that could potentially lead to "source water contamination" according to EPA regulations.

5.4.2 Hazardous Materials Response

Currently, San Bernardino County hazardous materials teams handle responses to hazardous materials incidents. Ongoing coordination between HDWD and hazardous materials teams will allow for assessment of the potential for chemical spills to impact groundwater sites. HDWD has established protocols for staff in its "Emergency Response Plan."

5.5 Water Quality Impacts on Reliability

As discussed above, HDWD is proactively managing two specific water quality issues:

- Intermittent exceedance of arsenic levels in one well. By blending this well water with other well water HDWD is continuing to deliver water that meets all water quality standards.

- Nitrate in groundwater. Septage from septic systems is considered to be the cause of elevated nitrates in groundwater. HDWD is actively pursuing construction of a sewer system which, by 2021, will minimize septage return flows directly above the Warren Valley Basin.

With this active management HDWD does not anticipate water quality constraining supply. However, water quality issues are constantly evolving, the District will continue to take action to protect and treat water supplies when needed, however it is recognized water quality treatment can have significant costs.

Section 6: Reliability Planning

6.1 Supply and Demand Comparisons

The UWMP Act requires urban water suppliers assess water supply reliability by comparing total projected water use with the expected water supply over the next 20 years in five year increments. The Act also requires an assessment of single-dry year and multiple-dry years. This section presents the reliability assessment for HDWD's service area.

As stated in HDWD's mission statement, the goal of HDWD is "to provide a dependable water supply and wastewater treatment for the customers of the Hi-Desert Water District in a safe, efficient, and financially responsible manner." This Plan helps HDWD to achieve this goal even during dry periods based on a conservative water supply and demand assumptions over the next 25 years, as discussed in the following sections.

HDWD's current water resources are sufficient to meet demand based on existing resources and anticipated increases from new development. However, new development will require the installation of additional transmission and distribution lines and possibly new wells.

6.1.1 Normal Water Year

The Normal/Average year is a year in the historical sequence that most closely represents median runoff levels and patterns. Table 6-1 documents anticipated normal year supply over the 25-year planning period and compares this to demands for the same period. Assumptions about supplies and demands are provided in Sections 3 and 2 respectively. Table 6-1 demonstrates that HDWD anticipates adequate supplies for years 2020 to 2040 under Normal conditions. Table 6-2 also documents that HDWD should have excess water in a normal year thereby making it possible to bank water for dry periods.

6.1.2 Single-Dry Year

The single-dry year is generally the lowest annual runoff for a water source in the record. The single-dry year may differ for various sources. This section summarizes HDWD's water supplies available to meet demands over the 25-year planning period during a single-dry year and compares them to demands for the same period (see Table 6-2). Table 6-2 demonstrates the HDWD will have sufficient supplies in a single-dry year.

6.1.3 Multiple-Dry Years

The multiple-dry year is generally the lowest annual runoff for a three year or more consecutive period. The multiple-dry year period may differ for various sources. This section summarizes HDWD's water supplies available to meet demands over the 25-year planning period during a multiple-dry year period and compares them to demands for the same time frame. Table 6-3 demonstrates the HDWD will have adequate supplies in a multiple-dry year.

**TABLE 6-1
PROJECTED SUPPLIES AND DEMANDS IN NORMAL YEAR (AFY)**

Water Supply Source	2020	2025	2030	2035	2040
Existing Supplies (Table 3-10)					
Imported Water from MWA ^a	2,655	2,655	2,655	2,655	2,655
Groundwater - Warren Valley Basin ^b	1,622	1,622	1,622	1,622	1,622
Groundwater - Warren Valley Basin ^c	0	0	0	0	0
Water taken from Warren Valley Basin Reserves ^d	0	0	0	0	0
Groundwater - Ames Valley Basin ^e	703	703	703	703	703
Subtotal Existing Supplies	4,980	4,980	4,980	4,980	4,980
Planned Supplies					
Groundwater - Warren Valley Basin ^f	1,098	1,756	1,856	1,954	2,047
Total Existing and Planned Supplies	6,077	6,736	6,836	6,934	7,027
Estimated Demands (Table 2-11)	2,929	3,077	3,251	3,423	3,591
Difference (Supply - Demand)	3,148	3,659	3,585	3,511	3,436

a See Section 3.2.

b Adjudicated groundwater allocation. See Section 3.3.1.1.

c Groundwater made available from septic tank return flow. See Section 3.3.2.

d Section 3.5.2. Projections based on average annual amount of water banked 1999-2014. Assumes amount of water banked will go down as demand increases. Assumes demand increases ~ 1% annually 2015 to 2040.

e Based on HDWD Annual Baseline amount as set in the Ames/Reche Groundwater Storage and Recovery Program and Management Agreement. See Section 3.3.1.2

f Groundwater supply from recharge of reclaimed water. See Section 3.3.2.

**TABLE 6-2
PROJECTED SINGLE-DRY YEAR SUPPLIES AND DEMANDS (AFY)**

	2020	2025	2030	2035	2040
Existing Supplies (Table 3-11)					
Imported Water from MWA ^a	214	214	214	214	214
Groundwater - Warren Valley Basin ^b	1,622	1,622	1,622	1,622	1,622
Groundwater - Warren Valley Basin ^c	0	0	0	0	0
Water taken from Warren Valley Basin Reserves ^d	0	0	0	0	0
Groundwater - Ames Valley Basin ^e	703	703	703	703	703
<i>Subtotal Existing Supplies</i>	2,539	2,539	2,539	2,539	2,539
<i>Planned Supplies</i>					
Groundwater - Warren Valley Basin ^f	1,098	1,756	1,856	1,954	2,047
Total Existing and Planned Supplies	3,637	4,295	4,395	4,493	4,586
Estimated Demands (Table 2-11)	2,929	3,077	3,251	3,423	3,591
<i>Difference (Supply - Demand)</i>	708	1,219	1,144	1,070	995

a See Section 3.2.

b Adjudicated groundwater allocation. See Section 3.3.1.1.

c Groundwater made available from septic tank return flow. See Section 3.3.2.

d Section 3.5.2. Projections based on average annual amount of water banked 1999-2014. Assumes amount of water banked will go down as demand increases. Assumes demand increases ~ 1% annually 2015 to 2040.

e Based on HDWD Annual Baseline amount as set in the Ames/Reche Groundwater Storage and Recovery Program and Management Agreement. See Section 3.3.1.2

f Groundwater supply from recharge of reclaimed water. See Section 3.3.2.

**TABLE 6-3
PROJECTED MULTIPLE-DRY YEAR SUPPLIES AND DEMANDS (AFY)**

	2020	2025	2030	2035	2040
Existing Supplies (Table 3-12)					
Imported Water from MWA ^a	1,413	1,413	1,413	1,413	1,413
Groundwater - Warren Valley Basin ^b	1,622	1,622	1,622	1,622	1,622
Groundwater - Warren Valley Basin ^c	0	0	0	0	0
Water taken from Warren Valley Basin Reserves ^d	0	0	0	0	0
Groundwater - Ames Valley Basin ^e	703	703	703	703	703
Subtotal Existing Supplies	3,738	3,738	3,738	3,738	3,738
Planned Supplies					
Groundwater - Warren Valley Basin ^f	1,098	1,756	1,856	1,954	2,047
Total Existing and Planned Supplies	4,836	5,494	5,594	5,692	5,785
Estimated Demands (Table 2-11)	2,929	3,077	3,251	3,423	3,591
Difference (Supply - Demand)	1,907	2,418	2,343	2,269	2,194

a See Section 3.2.

b Adjudicated groundwater allocation. See Section 3.3.1.1.

c Groundwater made available from septic tank return flow. See Section 3.3.2.

d Section 3.5.2. Projections based on average annual amount of water banked 1999-2014. Assumes amount of water banked will go down as demand increases. Assumes demand increases ~ 1% annually 2015 to 2040.

e Based on HDWD Annual Baseline amount as set in the Ames/Reche Groundwater Storage and Recovery Program and Management Agreement. See Section 3.3.1.2

f Groundwater supply from recharge of reclaimed water. See Section 3.3.2.

Section 7: Water Shortage Contingency Planning

7.1 Overview

Water supplies may be interrupted or reduced significantly in a number of ways, such as a drought which limits supplies, an earthquake which damages water delivery or storage facilities, a regional power outage, or a chemical spill that affects water quality. This chapter of the Plan describes how HDWD plans to respond to such emergencies so that emergency needs are met promptly and equitably.

The HDWD has developed two distinct policies for addressing water shortage emergencies. The first is intended for long-term shortage due to a decline in groundwater storage reserves of the groundwater basins. This policy, adopted Board Policy No. 26-04, addresses the response to a long-term water shortage and includes growth restrictions based on three stages of conditions (Appendix J) and as described in this section. The second policy is intended for short-term water shortages, such as a natural disaster or other catastrophic events, and includes a three-stage plan for responding to the shortage. This policy, adopted via Resolution No. 90-3, includes mandatory stages to address a reduction in water supply (Appendix J). Prohibitions, penalties and financial impacts of shortages have been developed by HDWD and are summarized in this chapter.

7.2 Stages of Action

The District has two distinct policies for addressing water shortage emergencies. Each of those policies is further described below.

7.2.1 Long-Term Decline in Basin Reserves

Hi-Desert Water District Code Section 5.25.010 addresses situations when the District enters into periods of prolonged drought and decline in basin reserves. It has been the goal of the District to replenish the Warren Basin and establish sufficient reserves in the event of high growth peaks and droughts that occur on a cyclical basis. HDWD Code Section 5.25.010 establishes growth restrictions under certain criteria:

- **Stage 1 Condition** – Under this condition, no growth restriction is implemented.
- **Stage 2 Condition** – Under this condition, a growth restriction of two percent is implemented. This becomes effective when reserves in the Warren Valley Basin equal or fall below five years (500 percent) of water demand for that particular year.
- **Stage 3 Condition** – Under this condition, a one percent growth rate is implemented. This becomes effective when reserves in the Warren Valley Basin equal or fall below four years (400 percent) of water demand for that particular year.

- **Stage 4 Condition** – Under this condition, a zero percent growth rate is implemented. This becomes effective when reserves in the Warren Valley Basin equal or fall below three years (300 percent) of water demand for that particular year.

The growth restrictions would be implemented by limiting the number of new meters sold by the District for new development.

By placing these restrictions, this provides opportunity to once again replenish the reserves within the Warren Basin. Once reserves exceed five years of demand, all growth restrictions shall be lifted.

7.2.2 Short-Term Decline in Basin Reserves

Demand reduction stages may be triggered by a shortage of water due to a natural disaster, limitations in production capacity, or other catastrophe. The guidelines for triggering the stages are listed in Table 7-1. However, circumstances may arise where HDWD may deviate from these guidelines, such as in a case where the Governor declares a water shortage emergency and/or institutes a statewide rationing program.

In the event the production capacity becomes limited due to a natural disaster or other catastrophe that impairs the District's ability to produce water, Resolution No. 90-3 is in effect which was adopted by the Board in 1990. This Resolution provides various response stages, as summarized in Table 7-1. The initial provisions of the Resolution are implemented when the water supply system reaches 80 percent of capacity for three consecutive days. When demand increases further, Stage 2 becomes effective and places increasing restrictions on water use, particularly outdoor water use. If delivery capacity continues to be inadequate, Stage 3 becomes effective and requests voluntary conservation measures until such time as delivery problems can be mitigated.

HDWD will manage water supplies to minimize the social and economic impact of water shortages. Resolution No. 90-3 is designed to provide a minimum 50 percent of normal supply during a severe or extended water shortage.

**TABLE 7-1
RATIONING AND REDUCTION GOALS**

Stage	Water Supply Conditions	Demand Reduction Goal
1	Daily water demand is at least 80% of available production capacity for three consecutive days.	10% reduction
2	Daily water demand has reached 90% of available production capacity; remains in effect until daily water demand falls to less than 85% of available production capacity.	30% reduction
3	Daily water demand has exceeded available production capacity.	50% reduction

Source: HDWD Resolution No. 90-3.

7.3 Prohibitions on End Uses

The HDWD Board of Directors has adopted several ordinances, including provisions from AWAC, aimed at water conservation and outlawing wasteful water practices.

On June 17, 1992, the HDWD Board of Directors adopted Ordinance No. 68, which establishes the prohibitions and restrictions on the use of water, as summarized in Table 7-2.

**TABLE 7-2
MANDATORY PROHIBITIONS**

Examples of Prohibitions	Stage When Prohibition Becomes Mandatory
Using potable water for street washing	Always
Washing privately owned vehicles, trailers, and boats	1
Irrigation more often than one day per week	1
Filling and refilling pools and spas	1
Use of water for construction	1
Any irrigation	2
Any car washing with the exception of approved commercial facilities	2
Any construction water use	2

7.4 Other Consumption Reduction Methods

In addition to the prohibitions on end uses HDWD will reduce demand by controlling new demand (see below), education and outreach, and requesting customers reduce water use.

7.4.1 Controlling New Demand

As indicated above, District Reserve Policy No. 26-04 provides that water meters issued shall be in accordance with the following staged conditions which shall be reviewed and updated every fiscal year:

- Stage 1 Condition. A two percent growth limitation would be implemented in the event water reserves in the Warren Valley Basin are equal to or fall below five years (500 percent) of water demand for that particular year.
- Stage 2 Condition. A one percent growth limitation would be implemented in the event water reserves in the Warren Valley Basin are equal to or fall below four years (400 percent) of water demand for that particular year.
- Stage 3 Condition. A zero percent growth rate would be implemented in the event water reserves in the Warren Valley Basin are equal to or fall below three years (300 percent) of water demand for that particular year.

7.4.2 Education and Outreach

HDWD will notify its customers during shortage conditions as well as a description of how the shortages will affect them (restrictions, enforcement provisions, etc.). HDWD will also provide practical consumer information that will help water users reduce usage. HDWD will contact its customers using the following methods:

- Billing inserts
- Electronic newsletter to customers, stakeholders, elected officials, business, civic and community groups
- TV and radio interviews/appearances
- Presentations at local government or organization meetings, public outreach events, homeowner associations and more
- Targeted media placements such as ad space in major dailies and/or inserts in the locals papers
- Online presence that includes specific information on drought, current restrictions, fact sheet/FAQs, reporting waste violations, etc.

7.5 Penalties, Charges, Other Enforcement of Prohibitions

During any time, including declared water shortage emergencies, a customer who violates the mandatory prohibitions and restrictions on the use of water set forth in Ordinance No. 68 is subject to the following penalties:

- **First Violation – Written Notice.** The district shall provide the person responsible for a violation of any provision of HDWDC 5.70.010 with a written notice of the violation. Such notice may include, for example and not by way of limitation, the following information: (1) the water conservation stage and restrictions that are in effect; (2) actions required for compliance in order to prevent future violations; and (3) penalties and enforcement actions which may be imposed for future violations.
- **Second Violation –** A fine will be imposed in the amount of \$25.00 which will be added to the customer's water service bill. In addition, the District may provide a written warning of the installation of a flow restriction device or possible shutoff upon a third violation. Further, upon a commercial or multifamily service receiving the subject second violation, the District may install an irrigation meter and, within 20 days of such installation, the commercial or multifamily service must have undertaken to install all the necessary connections to the irrigation meter.
- **Third Violation –** A fine will be imposed in the amount of \$50.00 which will be added to the customer's water service bill. In addition, the general manager or his/her designee may direct the installation of a flow restriction device or shutoff of service for a period of no less than 48 hours.

- Fourth Violation and Any Subsequent Violation- A fine will be imposed in the amount of \$100.00 which will be added to the customer's water service bill.

7.6 Determining Water Shortage Reductions

Resolution No. 90-3 outlines the restrictions to be implemented in the event of a short-term water production shortage. This resolution serves as the District's water shortage contingency plan. The monitoring procedure is accomplished by production reports that are generated on a daily basis. The report provides a breakdown of each production well along with the quantity produced for the previous day. Based on these production readings, the District is able to determine whether reductions in consumption are occurring per the water shortage restrictions outlined in Resolution 90-3.

7.7 Revenue and Expenditure Impacts

Currently, the District has a reserve fund allocated for the purchase of supplemental water. The availability of these funds creates flexibility for purchasing water other than SWP water, especially during times when SWP water is unavailable due to drought or other factors beyond the District's control. Should this be the case, revenues and expenditures of the District would remain unchanged. However, in the event the District experiences temporary system inadequacies, e.g., loss of production capacity, emergency measures would be implemented mandating an immediate reduction of water use by the customers. Depending on duration of the emergency, revenues could ultimately be impacted during this scenario. In this case, the District may be required to utilize discretionary reserve funds to supplement the shortfall and re-evaluate consumption rates during the yearly rate review.

7.8 Resolution or Ordinance

The following Board Resolutions and Ordinances in comprise the HDWD Water Shortage Contingency Plan:

- Reserve Policy No. 26-4: "Issuing "Will Serve" Commitment Letters and the Installation of New Water Services".
- Resolution 90-3: "A Resolution of the Hi-Desert Water District Established as an Emergency and Drought Measure That Is Responsive To District Production Capabilities in Order to Maintain the Ability to Provide for Basic Domestic, Health and Fire Protection Needs."
- Ordinance 68: "An Ordinance of the Board of Directors of the High-Desert Water District, San Bernardino California, Establishing Prohibitions and Restrictions On The Use of Water"

7.9 Catastrophic Supply Interruption

7.9.1 General

The groundwater basins in the District's area are the limiting factor in groundwater production, but are expected to continue to produce reliable supplies even in a catastrophe.

HDWD is also a member of the Emergency Response Network of the Inland Empire (ERNIE). ERNIE facilitates public agency preparedness for, response to, and recovery from local and regional disasters to ensure the delivery of critical public services through mutual aid and communications. ERNIE meets monthly and provides regular training for utilities in emergency response and long-term emergency planning. Through the ERNIE network HDWD can receive mutual aid from other local water districts including Joshua Basin Water District and Bighorn Desert View. HDWD may also provide mutual aid to its sister agencies if resources are not needed within the District itself. HDWD maintains emergency interties with Joshua Basin Water District and Bighorn-Desert View Water Agency.

If a disaster overwhelms the local resources, HDWD will coordinate with the California Water/Wastewater Agency Response Network (CalWARN) system for statewide mutual aid. JBWD will immediately contact the State Water Resources Control Board Division of Drinking Water, San Bernardino County Fire, Operations of Emergency Services, and the California Utilities Emergency Association to coordinate mutual aid and assistance. If local resources are overwhelmed by the disaster, the County of San Bernardino Fire Operations of Emergency Services will contact the State of California Governor's Office of Emergency Services for assistance.

7.9.2 Regional Power Outage Scenarios

For a major emergency such as an earthquake, Southern California Edison (Edison) has declared that in the event of an outage, power would be restored within a 24 hour period. Following the Northridge earthquake, Edison was able to restore power within 19 hours. Edison experienced extensive damage to several key power stations, yet was still able to recover within a 24 hour timeframe.

HDWD is committed to providing regular service and meeting the needs of the community during any emergency situation. HDWD is obligated to respond to emergencies by using all available resources in the most effective way possible. The District maintains a "General Emergency Plan", which outlines procedures that can be used to maintain operations during emergency situations.

To specifically address the concerns of water outages due to a regional power outage, HDWD has three 350 kilowatt (kW) generators capable of operating its groundwater wells and booster facilities. In addition, the District has two emergency diesel-powered pumps that are capable of delivering 250 gallons per minute (GPM) and 500 GPM, respectively.

Because of the concerns of water outages due to power loss, the District has equipped many of its priority water production sites with generator receptacles for easy installation of its generator fleet. The addition of the 500 GPM Godwin pump was added to the District's emergency

equipment fleet in 2009 to accommodate the need to boost water at multiple sites during an outage. A 30 kW propane powered generator was also installed to supply the building that houses the District's SCADA system. This generator is installed with an automatic transfer switch to provide seamless operation of the District's SCADA system, if a power outage were to occur.

To fuel its generators, the District maintains a 1,000 gallon diesel fuel supply that is set up on a routine delivery schedule to ensure that reserves remain at satisfactory levels in the event of an emergency. In addition to the diesel storage facility, the District has three 100-gallon diesel fuel tanks mounted to service trucks to move fuel to emergency equipment.

7.10 Minimum Supply Next Three Years

The minimum water supply available during the next three years would occur during a three-year multiple-dry year event between the years 2016 and 2018. As shown in Table 7-3, the total supplies range from approximately 37,243 AF to 33,729 AF during the next three years. All water produced by the District is groundwater, so the water supply availability is not immediately impacted by annual variations in hydrologic conditions. Therefore, it is assumed that the total water demand is remaining the same as during normal years. When comparing these supplies to the demand projections provided in Chapter 2 of this Plan, if HDWD pumping exceeds the amount of recharge water available, then the Reserves/Banked Groundwater would be drawn down. This situation would not be sustainable over the long-term, but the groundwater basins would not be affected by three years of withdrawing from the Reserves/Banked Groundwater accounts and that is the purpose of such accounts.

**TABLE 7-3
ESTIMATE OF MINIMUM SUPPLY FOR THE NEXT THREE YEARS (AF)**

Water Supply Source	2016	2017	2018
<i>Existing Supplies</i>			
Imported Water from MWA ^a	214	214	214
Groundwater - Warren Valley Basin ^b	1,622	1,622	1,622
Groundwater - Warren Valley Basin ^c	908	908	908
Groundwater - Warren Valley Basin ^d	11,824	12,292	12,757
Groundwater - Ames Valley Basin ^e	703	703	703
<i>Subtotal Existing Supplies</i>	15,271	15,740	16,204
<i>Planned Supplies</i>			
Groundwater - Warren Valley Basin ^f	0	0	0
Total Existing and Planned Supplies	15,271	15,740	16,204

a See Section 3.2.

b Adjudicated groundwater allocation. See Section 3.3.1.1.

c Groundwater made available from septic tank return flow. See Section 3.3.2.

d Section 3.5.2. Projections based on average annual amount of water banked 1999-2014. Assumes amount of water banked will go down as demand increases. Assumes demand increases ~ 1% annually 2015 to 2040.

e Section 3.3.2

f Groundwater supply from recharge of reclaimed water. See Section 3.3.2.

Section 8: References

Beacon Economics. 2015. Mojave Water Agency Population Forecast. December.

California Department of Water Resources (DWR). 2015. The State Water Project Final Delivery Capability Report 2015. July.

_____. 2004. California's Groundwater Bulletin 118. Last Updated 2/27/2004

California Irrigation Management Information System (CIMIS) data provided from Station No. 233 and 221, San Bernardino region, December 2011 to October 2015 and November 2010 to March 2016 respectively. Available at: <http://www.cimis.water.ca.gov/cimis/welcome.jsp>. - done

Hi-Desert Water District. 2016. 2014 Water System Master Plan. March.

_____. 2014a. Annual Report of the Warren Valley Basin Watermaster for the Period October 9, 2013 through September 30, 2014.

_____. 2014b. Annual Water Quality Report.

_____. 2009a. Hi-Desert Water District Sewer Master Plan. January.

_____. 2009b. Initial Study/Environmental Assessment Hi-Desert Water District Water Reclamation Facility, Wastewater Treatment Plant, and Sewer Collection System. June.

Kennedy/Jenks Consultants, June 2014. Mojave Region Integrated Regional Water Management Plan.

Nishikawa et al. 2003. "Evaluation of the Source and Transport of High Nitrate Concentrations in Groundwater, Warren Subbasin, California". Water-Resources Investigations Report 03-4009. 2003.

Warren Valley Basin Watermaster, April 1995. Rules and Regulations of the Warren Valley Basin Watermaster.



HI-DESERT
WATER
DISTRICT

