Final – Adopted June 30, 2021

Hi-Desert Water District
2020 Urban Water Management Plan

Prepared by:

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Comprehensive Water Planning

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This 2020 Urban Water Management Plan was prepared under the direction of a California licensed civil engineer.

Executive Summary Layperson's Description

After the devastating drought in the late 1970s, the California Legislature declared California's water supplies a limited resource, subject to ever-increasing demands and that the long-term, reliable supply of water is essential to protect California's businesses, communities, agricultural production, and environment. To strengthen local and regional water management and drought planning, the Urban Water Management Planning Act (UWMPA) was signed into law in 1983.[1] Since then, the Legislature has amended the UWMPA to require additional detail in UWMPs, including addressing resilience to drought and climate change.

The UWMPA requires urban water suppliers serving over 3,000 customers or supplying at least 3,000 acre-feet of water annually to prepare and adopt an Urban Water Management Plan (UWMP) every five years,[2] and demonstrate water supply reliability in a normal year, single dry year, and droughts lasting at least five years over a twenty-year planning horizon.[3] The UWMPA also requires each urban water supplier to prepare a drought risk assessment and water shortage contingency plan.[4]

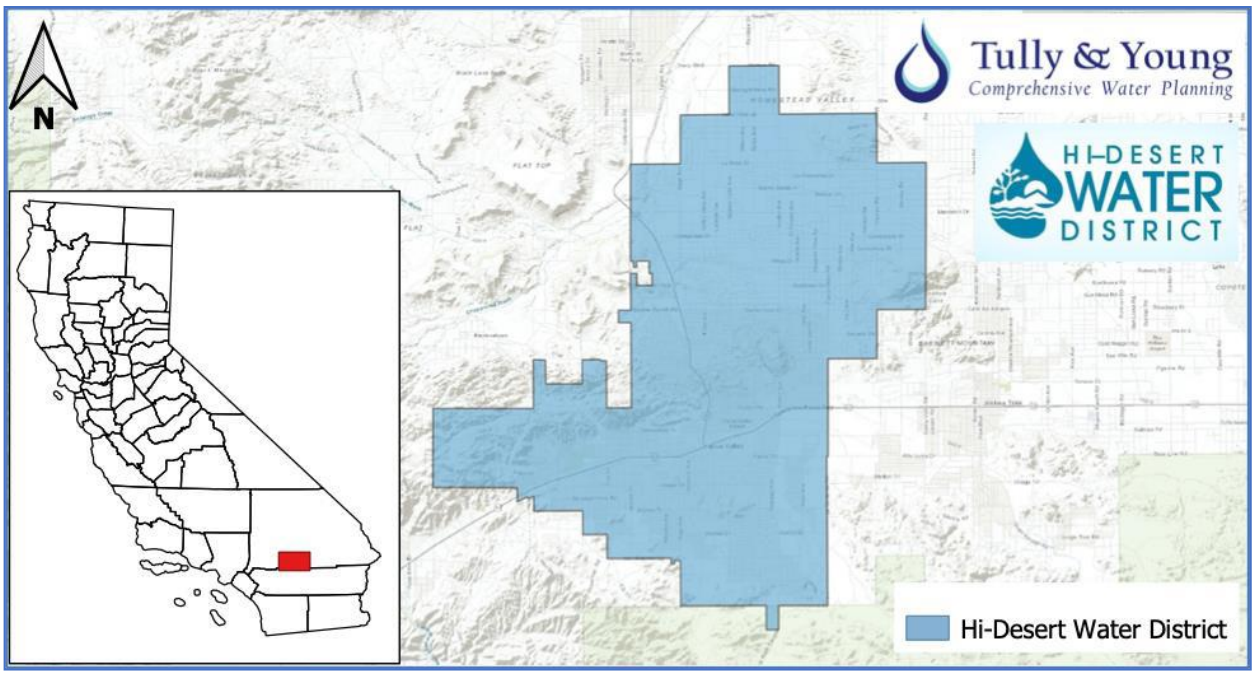
At a practical level, the UWMP provides the water management planning foundation for urban water suppliers throughout California. A well-constructed UWMP will provide the supplier's elected officials, management, staff, and customers with an understanding of the agency's past and current, as well as projected future, water supply and demand conditions. The UWMP integrates local and regional land use planning, regional water supply, infrastructure, and demand management projects, and also identifies challenges that may result from climate change and evolving regulations. Thoughtful urban water management planning provides an opportunity for the supplier to evaluate supplies and demands using a balanced and methodical planning platform that addresses short-term and long-term planning conditions. In brief, the UWMP gathers, characterizes, and synthesizes water supply related information from numerous sources to inform the agency's planning, while also providing interested local, regional, and statewide stakeholders with access to the same information.

[1] California Water Code Section 10610 *et seq*. (Chapter 1 added by Stats. 1983, Ch. 1009, Sec. 1).
[2] California Water Code Section 10610 *et seq*.
[3] California Water Code Sections 10631-10635
[4] California Water Code Sections 10632

ES-1 Hi-Desert Water District

The Hi-Desert Water District provides water service to retail customers throughout its service area in the Mojave Basin Area. The District was established in 1962 and steadily grew into its current service area boundary through acquisitions of local water companies and water suppliers in the region. The District covers approximately 57 square miles and traverses three groundwater basins, but only two of them are used to supply the District's customers. Both the Warren Valley Basin, in the southern portion of the District, and the Ames Basin, in the northern part of the District, provide water to the District's customers. Both of the groundwater basins are subject to management arrangements that impact native groundwater supplies, imported water supplies, and groundwater storage. Figure ES-1 depicts the District's service area.

Figure ES-1: High-Desert Water District Service Area



In the 1950s, the urban populations in the Mojave Basin Area rapidly grew and groundwater extractions necessarily increased to meet growing demands. By the 1970s, the groundwater extractions greatly exceeded the groundwater basin recharge rates and lawsuits were filed to stop the detrimental actions. The primary outcomes of the Warren Valley Judgment were to (a) stipulate that imported water supplies were necessary to replenish the overdrafted basin; and (b) construct the Morongo Basin Pipeline to deliver imported supplies to supplement native supplies and return flow. In the nearly fifty years since the Warren Valley Judgment was rendered, the Warren Valley Basin has recovered making water supplies available to Hi-Desert Water District well into the future

The Ames Valley Basin also has a unique history. In the 1980s, the District sought to acquire groundwater from the Ames Valley Basin for use in its service area. The Bighorn-Desert View Water Agency initially opposed the idea, but eventually entered the Ames-Reche Groundwater Storage and Recovery Program and Management Agreement with several other water users. This Agreement

established mechanisms for Ames Valley Basin management, including balancing supplies and demands, and established the groundwater storage and production rights of the parties. The parties to the Agreement continue to seek opportunities to replenish the Ames Valley Basin with imported supplies for artificial recharge.

The District continues to improve its utility and recently constructed a Wastewater Treatment Facility and wastewater collection system to service the Town of Yucca Valley and portions of the unincorporated area of San Bernardino County. This facility began discharging clean water into its three percolation ponds in February of 2020. The facility's planned operation includes treatment and replenishment of a small portion of the Warren Valley Basin, storage of the water in the ground for a minimum of five years, then extraction and respreading in basins for broader groundwater replenishment objectives.

Taken together, the District's progressive water management actions have created a reliable water management system and the continued improvements to this system recognize the inherent scarcity and value of water resources in the growing desert region.

ES-2 Water Service Reliability

As noted above, the District derives its water supplies from groundwater resources in the Warren Valley Basin and Ames Valley Basin pursuant to the applicable water management activities in each area. The Warren Valley Basin adjudication identified native supplies available for the District and created supply augmentation actions to support sustainable groundwater management objectives. The Ames-Reche Groundwater Storage and Recovery Program Agreement limited supplies available to the District from the Ames Valley Basin and created opportunities to augment supplies in the Ames Valley Basin in coordination with neighboring water agencies.

The adjudicated supplies available to the District from the Warren Valley Basin (1,622 acre-feet per year) and the Ames Valley Basin (703 acre-feet per year) are merely the starting point for the District's water supply reliability assessment. These fundamental supplies make up the majority of the supplies used to meet District's demands. By 2045, demands are predicted to be 3,354 acre-feet per year requiring the District to augment its local supplies with just over 1,000 acre-feet of water. The District's management actions have far exceeded this planning objective by (a) acquiring imported supplies through the Morongo Basin Pipeline Agreement; and (b) storing and banking surplus supplies in excess of 100,000 acre-feet – which is enough water for over 25 years of supply for the District's customers without use of the adjudicated groundwater supplies. This extraordinary water management achievement continues to evolve with the District developing additional recycled water supplies and improving groundwater storage capabilities in the Ames Valley Basin in order to further extend its water planning horizon.

The District, in collaboration with Mojave Water Agency and other local agencies, has established opportunities to optimally manage water supplies in the Warren Valley Basin and Ames Valley Basin through innovative actions. These actions have created a robust water supply for the District that demonstrates there is sufficient water supply to meet the District's growing demands through the 2045 planning horizon contemplated in this Urban Water Management Plan.

Chapter 1
Introduction

Hi-Desert Water District (HDWD or District) was formed in 1962 and is one of the oldest water suppliers in California's Mojave Desert area. The District lies in the Little San Bernardino Mountains at an elevation of about 3,300 feet above sea level. It provides a safe and reliable water supply for the Town of Yucca Valley and the surrounding unincorporated areas. The District developed and operates a centralized sewer system and wastewater treatment reclamation facility to protect groundwater supplies and serve its customers.

The HDWD service area is governed by five publicly elected board members. The Board uses a committee format to inform decisions and receive recommendations on substantive matters. These committees generally meet once a month and include: Public Advisory, Engineering, Finance/Audit, Human Resources, Legislative, Public Information, 2+2+2 Joshua Basin Water District, ACWA/JPIA, Morongo Basin Pipeline, and Warren Valley Basin Watermaster. The eight-member Watermaster Board of Directors consists of the five members of the District Board of Directors and one non-voting representative each from Hawks Landing at Blue Skies, the Institute of Mentalphysics, and the group of 16 minimal producers.

Water supply for the District service area is sourced almost entirely from pumped groundwater from the Warren Valley and Ames Basins. Groundwater is recharged by natural storm water flows, irrigation and wastewater return flow, and State Water Project imports to recharge the Warren Valley Basin via water deliveries from the Morongo Basin Pipeline to percolation ponds in Yucca Valley. The Morongo Basin Pipeline was completed in 1995 and supplies over 60,000 people in Morongo Basin, including the entire HDWD service area. Pipeline turnouts exist to serve other areas in the Morongo Basin in addition to HDWD.

Ensuring an adequate supply of water is available to serve the existing and future needs for the HDWD's customers is a critical component of successful operations. This Urban Water Management Plan (UWMP) draws on a diverse array of local, regional and statewide sources to synthesize information into a reliable water management action plan designed to be referred to as management and Board level decisions arise and conditions change.

1.1 Background and Purpose

The District has prepared this 2020 UWMP to comply with the Urban Water Management Planning Act (UWMPA) requirements for urban water suppliers.[5] This 2020 UWMP addresses the District's water

[5] California Water Code sections 10610 through 10657.

management planning efforts to assure adequate water supplies to meet forecast demands over the next 25 years. As required by the UWMPA, the District's 2020 UWMP specifically assesses the availability of its supplies to meet forecast water uses during average, single-dry and five consecutive drought years through 2045. Verification that future demands will not exceed supplies and assuring the availability of supplies in dry-year conditions are critical outcomes of this 2020 UWMP.

The 2020 UWMP is an update to the District's 2015 UWMP and presents new data and analysis as required by the California Department of Water Resources (DWR) and the California Water Code (CWC) since 2015. The 2020 UWMP is also a comprehensive water planning document that describes existing and future supply reliability, forecasts future water uses, presents demand management progress, and identifies local and regional cooperative efforts to meet projected water use.

The UWMP is designed to be a valuable water management and planning tool to guide and inform the District's managers, customers, wholesale agency (Mojave Water Agency), and the State of California about the District's water management practices. It reflects the District's planning assumptions and goals and should be used in combination with other planning resources and documents over the UWMP planning horizon.

The State of California's drought vulnerability and the additional pressures of climate change and population growth stress the importance of thoughtful planning to meet water demands with potentially at-risk water supplies. This comprehensive planning is an important outcome of the District's 2020 UWMP.

1.2 Basis for Plan Preparation

HDWD operates a Public Water System as described in California Health and Safety Code 116275. The District qualifies as a Retail Urban Water Supplier as described in Water Code Section 10617, providing water for municipal purposes to more than 3,000 customers or 3,000 acre/feet of water per year. These qualifications require the preparation of an Urban Water Management plan every five years. The District's Public Water System details are listed in Table 1-1.

Table 1-1: Public Water System Information

Public Water System Number	Public Water System Name	Number of Municipal Connections 2020
CA3610073	Hi-Desert Water District	10,672

The State Legislature passed numerous new requirements since the 2015 UMWP cycle which are detailed throughout this 2020 UWMP[6]. Major updates to the requirements are listed below along with a reference to the corresponding section where they are addressed in this document.

- **Five Consecutive Dry-Year Water Reliability Assessment:** The Legislature modified the dry-year water reliability planning from a "multiyear" time period to a "drought lasting five consecutive

[6] California Water Code Section 10608 to 10608.44; Section 10609 to 10609.38; Section 10610 to 10657

water years" designation. This statutory change requires a Supplier to analyze the reliability of its water supplies to meet its water use over an extended drought period. This new requirement is addressed in Chapter 3—Water Supply, Chapter 4–Water Use, and Chapter 5—Water Service Reliability Assessment.

- **Drought Risk Assessment (DRA):** Due to the prolonged California droughts and the variability associated with climate change predictions, the California Legislature created the DRA requirement for UWMPs. The DRA requires assessment over a five-year period from 2021 to 2025 that examines water supplies, water uses, and the resulting water supply reliability for five consecutive dry years. The DRA is addressed in Chapter 5— Water Service Reliability Assessment and Chapter 6—Water Shortage Contingency Plans.
- **Seismic Risk:** The Water Code requires urban purveyors to evaluate seismic risk to water system infrastructure and facilities and have a mitigation plan to address vulnerabilities. Incorporating the water system into regional or county hazard mitigation planning is an important aspect of this new statue. Seismic risk is addressed in Chapter 6.
- **Water Shortage Contingency Plan:** In 2018, the Legislature modified the UWMPA to require a Water Shortage Contingency Plan (WSCP) with six water shortage stages and other specific elements. The WSCP is a document that provides a Supplier with an action plan for a drought or catastrophic water supply shortage. The WSCP is in Chapter 6 of this UWMP.
- **Groundwater Supplies Coordination:** 2020 UWMPs are required to be consistent with Groundwater Sustainability Plans following the 2014 Legislature enactment of the 2014 Sustainable Groundwater Management Act (SGMA). The relationships between the SGMA and groundwater supplies are described in Chapter 3—Water Supply.
- **Lay Description:** A brief and easy-to-read synopsis of the fundamental determinations of the UWMP is a new statutory requirement in 2020. This section of the is intended for new staff, new governing members, customers, and the media, and it can ensure a consistent representation of the UWMP's detailed analysis.

1.3 Coordination and Outreach

As required by the Urban Water Management Planning Act (UWMPA) the District has coordinated with nearby agencies while developing this UWMP in order to ensure consistency with other related planning efforts such as General Plans, Water Master Plans (WMP), and Groundwater Sustainability Plans (GSP). This requirement includes coordination and outreach with (a) water suppliers that share a common water source, (b) relevant water management agencies that affect the District's water asset portfolio, and (c) relevant public agencies that may have land use or other regulatory relationships with the District. The District has prepared this 2020 UWMP in coordination with regional water purveyors, including the Mojave Water Agency, and has appropriately notified and coordinated with other local government agencies as listed in Table 1-2.

As stipulated in Water Code Section 10621(b), every urban water supplier shall conduct a public hearing in order to encourage active involvement from diverse elements of the community. The District sought public participation with a public hearing and appropriate notices as required by law. These coordination efforts and Statutory Requirements for Notice are also included in Table 1-2.

Table 1-2: Public and District Coordination

Coordinating Agencies	Coordinate Regarding Demands	Sent Copy of Draft UWMP	Sent 60-Day Notice	Notice of Public Hearing
Cities, Counties, Customers and Interested Parties				
City of Adelanto			X	
Liberty Utilities (Apple Valley Ranchos Water Corp)			X	
California DWR			X	
County Service Area (CSA) 64			X	
CSA 70J			X	
Golden State Water Company (City of Barstow)			X	
Hesperia Water District			X	
Joshua Basin Water District			X	
Local Agency Formation Commission (LAFCO) for San Bernardino County			X	
Mojave Water Agency	X	X	X	X
Phelan Piñon Hills CSD			X	
San Bernardino County Planning Department			X	X
Town of Apple Valley			X	
Victorville Water District			X	
General Public			X	X

The District engages in numerous regional water supplier organizations. The District is located within the Mojave Integrated Regional Water Management (IRWM) Region and was a project proponent to the IRMW Plan (IRWMP) prepared by Mojave Water Agency (MWA). The IRWMP was adopted in July 2014.

1.3.1 Water Supplier Information Exchange

Water Code Section 10631 requires wholesale and retail water agencies to provide each other with information regarding water supply and demand. Since the District receives water from the Mojave Water Agency for groundwater management, it has coordinated with MWA to provide supply and demand information. This includes, as required by UWMPA, projected water demand in five-year increments for a minimum of 20 years into the future.

1.4 UWMP Adoption

The District held a public hearing regarding its 2020 UWMP on June 30, 2021. Before the hearing, the District made a draft of the 2020 UWMP available for public inspection at the District's administration building and on its website. Pursuant to CWC Section 10642, general notice of the public hearing was provided through publication of the hearing date and time in the local press as required by the UWMPA.

The District's elected body adopted this 2020 UWMP on June 30,2021. A copy of the adopted 2020 UWMP will be submitted to DWR, provided to San Bernardino County and the California State Library, and posted on the District's website.

The District plans to submit all required documentation related to the UWMPA through the DWR submittal website soon after adoption, including the on-line submittal of information associated with the following DWR Excel workbooks:

- "FINAL Submittal 2020 UWMP Tables 05.10.2021.xls"
- "FINAL SBX7-7 Compliance Form 04.02.2021.xls"
- "FINAL Energy Use Tables 04.01.21.xls"

1.5 Document Organization

The remaining chapters of this UWMP are organized as follows:

- Chapter 2 provides a description of the District's service area, demographic characteristics and climate, and describes the future population anticipated needing to serve.
- Chapter 3 describes the District's current and future water supplies and the availability of the supplies through 2045.
- Chapter 4 details the customer uses, including the past and future estimated uses, and describes the District's past and on-going demand management measures.
- Chapter 5 presents the District's water system service reliability into the future, including an assessment of reliability if a drought occurred over the next five consecutive years.
- Chapter 6 is the District's stand-alone water shortage contingency plan, incorporated as a chapter in this UWMP, but also available to be shared and utilized separate from the UWMP.

NOTE TO DWR:

Hi-Desert Water District has written this Urban Water Management Plan (UWMP) primarily as a water resources planning tool to more effectively manage water supply, reliability and demand. This UWMP satisfies all the requirements of the Urban Water Management Planning Act (UWMPA).

The body of the document provides narratives, analysis and data that DWR requests in its 2020 UWMP Guidebook, including addressing changes to the California Water Code since 2015. Efforts have also been made to include enhancements to this document wherever possible as recommended in the 2020 UWMP Guidebook.

To facilitate review by DWR for compliance with the UWMPA, data from the body of the document has been transferred into required DWR submittal tables consistent with the organization of the tables in Appendix E of the 2020 UWMP Guidebook. These tables have been separately uploaded to DWR's web portal. This UWMP has been reviewed for adequacy according to the UWMP Checklist as contained in Appendix F in the 2020 UWMP Guidebook.

Chapter 2
Water Service and System Description

The Hi-Desert Water District service area encompasses approximately 57 square miles in subarea of the Mojave Basin Area in San Bernardino County, California. The area includes Morongo Basin and the Johnson Valley Area. The District also operates in the adjacent Ames Valley Basin. This region, in the southeastern part of the state, is a portion of the larger Mojave Desert which ranges into Nevada with small areas that extend into Utah and Arizona. The Mojave is the driest desert in North America, and while it is sparsely populated compared to its total area, it does support large communities with significant water demands in California. The Mojave Region is a closed topographic basin with virtually no hydrological outlets.

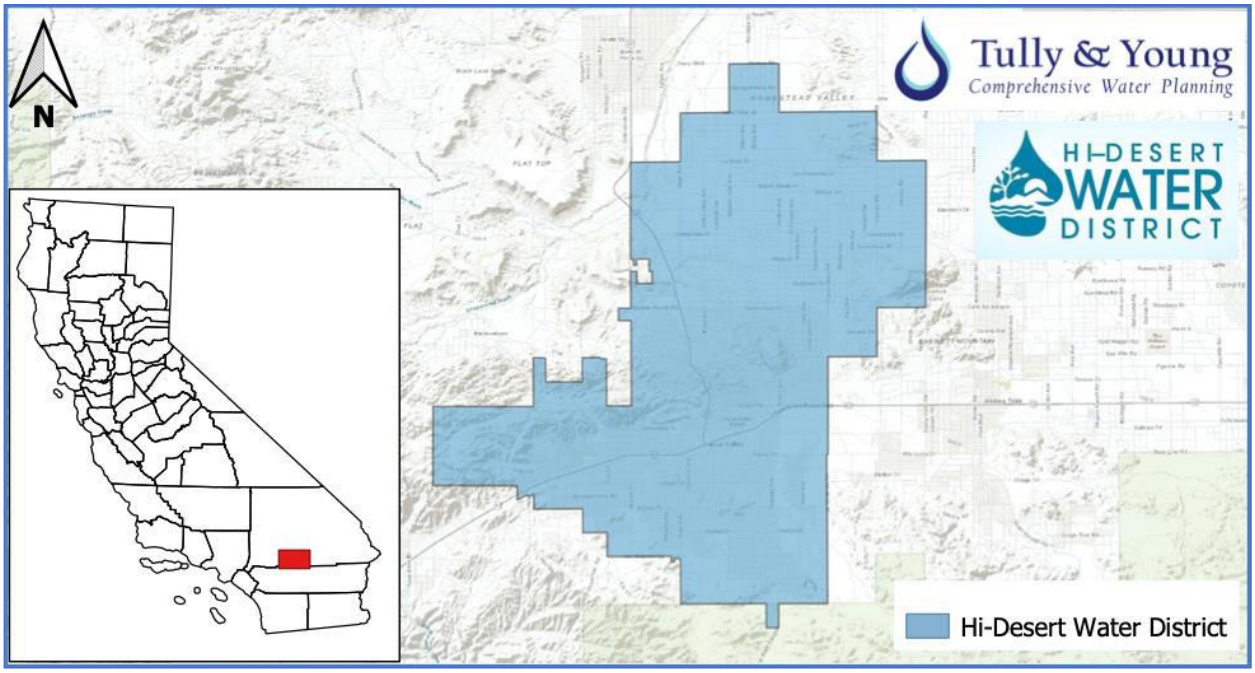
Groundwater is central to the history and settlement in the region. The earliest inhabitants of the Morongo Basin were the Serrano indigenous people who set up camps at a series of springs which provided a dependable water source. Those camps were eventually used by cattlemen who used the springs as they made their way from Southern California into Arizona. In 1945 Yucca Valley Water Company, Ltd. was formed to serve post-war developments. Other developers added wells to serve developments and created different community water companies to serve each development's needs.

The District was formed in in 1962 using the name Yucca Valley County Water District. It subsequently purchased three smaller community water purveyors. The first acquisition was Joshua Forest Water Company, followed by Rancho Ramon Mutual Water Company, and then Mountain Mutual Water Company. The name was changed to Hi-Desert County Water District in 1971, and became Hi-Desert Water District in 1980. HDWD purchased Yucca Valley Water Company, Ltd. in 1990 adding 3,000 service connections. Today the district has more than 10,000 connections and serves the Town of Yucca Valley and portions of unincorporated San Bernardino County with water and wastewater services. Table 2-1 shows the historical and current breakdown of service connections by customer class. Figure 2-1 presents the current District service area.

Table 2-1: Customer Water Service Connections

Customer Class	2015	2016	2017	2018	2019	2020
Single Family Residential	8,584	9,736	9,714	9,734	9,750	9,832
Multi-Family Residential	308	273	272	276	286	284
Commercial/Institutional	543	449	450	537	522	543
Industrial	87	0	0	0	0	0
Landscape Irrigation	304	106	108	118	114	107
Other	14	0	0	0	0	0
Total	9,840	10,564	10,544	10,665	10,672	10,766

Figure 2-1: Water Service Area Map



The District recently constructed a Wastewater Treatment Facility and wastewater collection system to service the Town of Yucca Valley and portions of the unincorporated area of San Bernardino County. This was in response to the Regional Water Quality Board identifying the town as a top priority for eliminating the use of septic systems in order to maintain the quality of the groundwater basins. The sewer system is being installed in ten stages. Work began in November 2019 and the project is expected to be completed in January 2022.

2.1 Hi-Desert Water District Service Area Adjudication Overview

The District derives all of its water supplies from groundwater pumped from local basins that are subject to management actions through an adjudication and stipulation. The following provides a brief overview, with additional details provided in Chapter 3.

Warren Valley Basin

Groundwater within the Morongo Basin and Johnson Valley Area supplies the Town of Yucca Valley and surrounding areas. This is known as the Warren Valley Basin and, after extractions began exceeding supplies in the 1950s, the area was adjudicated in 1977 in a decision known as the Warren Valley Judgement. Hi-Desert Water District was appointed Watermaster in the Judgement and was ordered to help develop solutions to halting overdraft. A comprehensive approach was development by the Watermaster Board which included adopting a Basin Management Plan that called for imported water deliveries from Mojave Water Agency (MWA) through the Morongo Basin Pipeline to improve groundwater basin conditions.

Ames Valley Basin

In 2014 the Ames/Reche Groundwater Storage and Recovery Program and Management Agreement replaced and superseded the original 1991 adjudication called Ames Valley Basin Water Agreement between the District and Bighorn-Desert View Water Agency (BDVWA). The Agreement was created for the construction and operation of the District's Mainstream Well located in the Ames Valley Basin. The 2014 Agreement was established by BDVWA, the District, and the County of San Bernardino, with administrative support provided by MWA, and the Stipulation and Amended and Restated Judgement was finalized by the Superior Court of California, County of Riverside in September 2014. The Ames/Reche Management Area includes 95 square miles encompassing the communities of Flamingo Heights, Landers, Pioneertown, and Yucca Mesa.

2.2 Integrated Regional Water Management Plan

The District is a retail water supplier of the Mojave Water Agency. In 2004 MWA and its regional partners adopted the first Integrated Regional Water Management Plan (IRWM) to establish a collaborative, stakeholder driven effort to manage water resources in the region. The latest IRWM plan was approved in 2014 with an amendment finalized in May 2018 after the IRWM Plan Standards were updated with Proposition 1's 2016 IRWM Guidelines.[7] The IRWM covers objectives, resources management strategies, localized water and land use planning, and other DWR requirements. The Regional Water Management Group (RWMG) includes: Mojave Water Agency, Victor Valley Wastewater Reclamation Authority, a Technical Advisory Committee, Mojave Desert Resource Conservation District, and Morongo Basin Pipeline Commission. The District is a beneficiary of the Morongo Basin Pipeline imported supplies. The planning efforts identified in this program address necessary supply and infrastructure improvements with regional benefits to further long-term supply reliability.

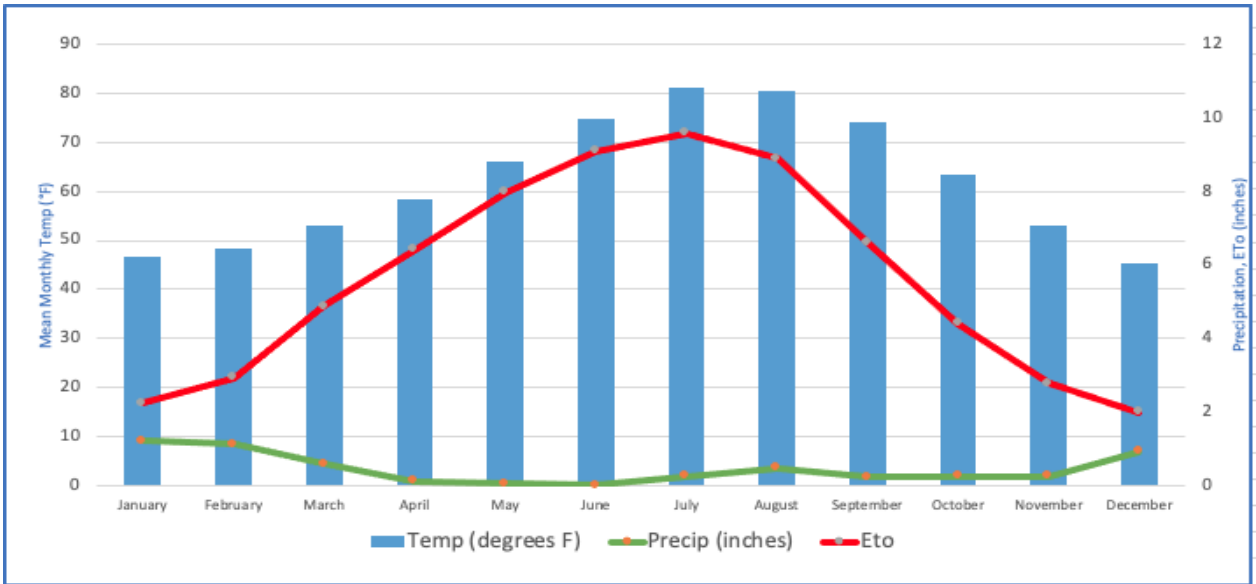
2.3 Service Area Climate

Located in the High Desert of San Bernardino County, the District's service area climate is more extreme than the neighboring lowland areas of Southern California. Typical of the surrounding Mojave Desert, the area is very arid because of the rain shadow effect of the nearby mountains. Summers are extremely hot and dry with occasional monsoonal thunderstorms that can bring flash flooding and hail. Most precipitation occurs in winter, with snowfall common anytime the snow level drops below 4,000 feet. December through February are the coldest months; July and August are the hottest. Yucca Valley, the largest settlement in the service area, has an average elevation above 3,000 feet. The wet season is from December to March with a 30-year annual average rainfall of 5.66 inches. The annual mean temperature is 61 degrees, but the high desert climate leads to extreme temperature ranges with highs during the summer months regularly hitting over 100 degrees and lows in winter dropping to the mid 30s. Other climate characteristics include monsoonal moisture in the later summer, which can cause thunderstorms but only provide a fraction of the total annual precipitation. Light snowfall in the winter occurs almost each year due to the high elevation of the area and tends to melt much more

[7] HDWD IRMW 2018 Amendment Text: https://www.mywaterplan.com/files/HDWD-IRWM-2018-Addendum_Final-Draft.pdf

quickly than in nearby mountain communities. Very warm and dry conditions continue well into the autumn and temperatures become cooler by November with the onset of the rainy season. Winter conditions usually appear by late November. Springs are usually warm during the days although lows are still quite cool. Rainfall usually ends by April of each year. Figure 2-2 shows historical average Temperature, Precipitation, and Evapotranspiration averages. Figure 2-3 provides a representation of the variability in annual precipitation.

Figure 2-2: Average Climate Conditions[8]



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temp	46.5	48.3	53.1	58.5	65.9	74.8	80.9	80.4	74.1	63.3	53.1	45.3
Precip	1.22	1.14	0.59	0.14	0.06	0.03	0.26	0.48	0.24	0.27	0.28	0.94
ETo	2.24	2.94	4.87	6.42	7.97	9.09	9.57	8.88	6.60	4.41	2.78	2.00

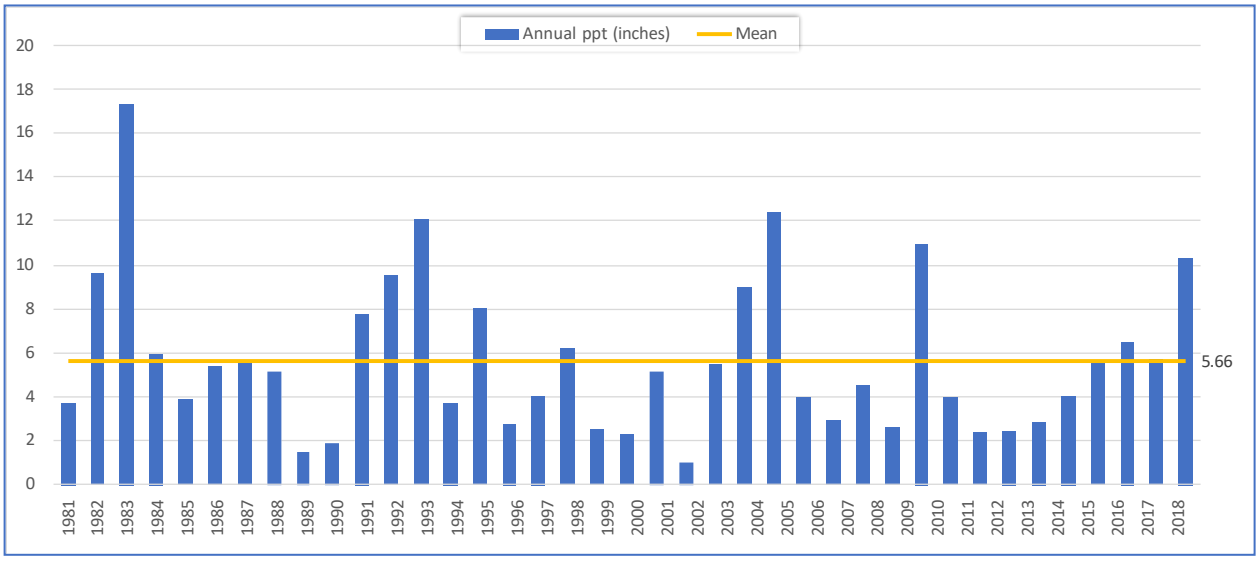
2.3.1 Climate Change

While the California Water Code does not prescribe specific climate change planning and management measures for water suppliers, it does emphasize that climate change is appropriate to consider when assessing drought risk assessment, water conservation and use efficiency, and demand management and supply—both in a historical and projected context.

The District relies on local groundwater sources that are supplemented from water imported from Northern California and the Sacramento Delta through the Mojave Water Agency water acquisitions. Any effect from climate change that impacts water flows from the Sierra Nevada snowpack into these regions will have a serious impact on any contractor dependent on imported water deliveries. Lower imported supplies could force the District to rely more heavily on its local groundwater sources, which may lead to potential aquifer depletion.

[8] Temperature and rainfall data represents annual averages from 1981-2019 from the PRISM Climate Group https://prism.oregonstate.edu/ Location: Lat: 34.1238 Lon: -116.4166 Elev: 3369ft; ETo data is from CIMIS Victorville - San Bernardino - Station 117, Mar 1994-Nov 2020.

Figure 2-3: Annual Precipitation Variability (1981 – 2019)



The State Water Project Final Delivery Capability Report compiled by the state Department of Water Resources addresses the capabilities of the SWP to operate during more intense flood and drought cycles predicted to occur as a result of future climate change, including risk management for the Delta against rising sea levels. Further details about long-term SWP reliability are discussed in Chapter 3.

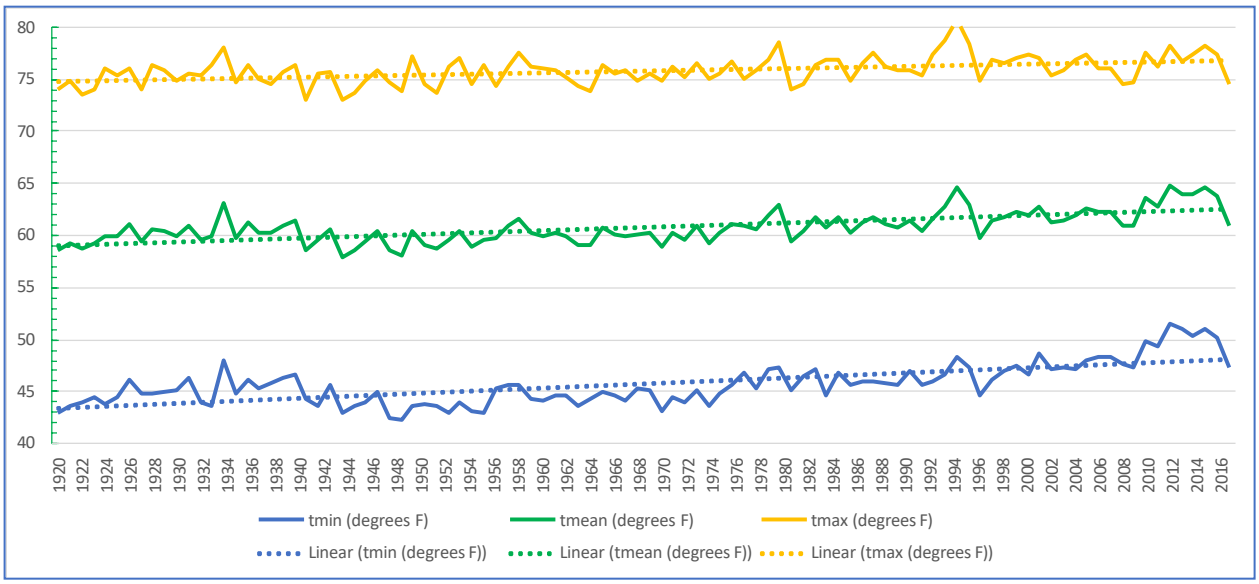
As shown by the trendlines in Figure 2-4, the area has seen gradual warming in average temperatures over the past 100 years. Increasing temperatures locally within the service area can result in higher evapotranspiration, leading to additional water demand from outdoor water use and irrigation even without any population increase.

The IRWM included a climate change assessment that evaluated the vulnerability of the region's surface water supplies, future frequency of flooding, and a complete inventory of greenhouse gas (GHG) emissions from the water sector. The plan offers a roadmap for the District to cooperate with other MWA retail suppliers to meet federal and state requirements for conservation and reducing GHG from operations.

The MWA, which is the primary contract importer of water to the entire region through the SWP, participated in the SWP Delivery Capability Report. Any impact to deliveries of imported water purchased from the SWP will mean deepening reliance by the District on local groundwater and even tighter management of groundwater pumping in the region.

This 2020 UWMP Update includes additional climate change discussion in Chapter 3, Chapter 4, and Chapter 5.

Figure 2-4: Historical Annual Temperature (1920-2019)[9]



2.4 Current and Projected Population, Land Use, Economy, and Demographics

Service area population and land use projections are critical to developing a useful planning framework as population dynamics and growth are a primary influence on water use. These projections directly influence planning measures for system supply, delivery, infrastructure, and demand management. Similarly, understanding the service area's economic, social, and demographic trends give valuable insight to water management and planning. This section of the UWMP addresses these factors to provide a supportable basis for forecasting future water use.

2.4.1 Current Population and Historic Trends

Mojave Water Agency commissioned a population projection from UC Riverside School of Business Center for Economic Forecasting and Development (UCR Center) which was completed in August 2020. The report estimated population for the MWA service area incorporated cities and towns, MWA subareas, and MWA water purveyor service areas. As a water purveyor in the MWA service area, the report provided population projections specific to the District's service area. The UCR Center uses a comprehensive forecasting model for the MWA service area, to include population estimates for the incorporated cities, subareas, and water purveyors. Structured around a long-term forecast of the San Bernardino County economy, the model includes economic indicators such as residential housing stock, home prices, and employment trends. Relying on the underlying fundamentals of each variable, research is applied to identify the relationship between the variables of interest and various moving parts of the economy. Using this methodology, the UCR Center estimates population forecasts based on

[9] Temperature data is from the PRISM Climate Group https://prism.oregonstate.edu/ Location: Lat: 34.1238 Lon: -116.4166 Elev: 3369ft

the incorporated cities in the MWA service area[10]. The District's service area is closely aligned with the municipal boundary for the Town of Yucca Valley, therefore town population growth trends and Department of Finance countywide population estimates were the primary factors of the estimates of population as reported in the UCR Center Forecast. Table 2-2 provides the historic population as estimated by the UCR Center. Growth in the HDWD service area, and the Town of Yucca Valley, has been slower than the rest of the MWA service area and San Bernardino County which saw 25% net growth from 2000 – 2019.

Table 2-2: Population - Historic

2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
23,760	24,145	24,330	24,511	24,536	24,866	25,023	25,236	25,307	25,469

2.4.2 Projected Population

To forecast projected service area population as accurately as possible requires consideration of the past growth rate, local economic predictions, and current and projected land uses. Importantly, one of the recent statutory updates to the UWMP Act states urban water suppliers "shall coordinate with local or regional land use authorities" regarding land uses that may affect water management planning.

Population growth for California has been revised downward repeatedly as birthrates and migration have declined. San Bernardino County is no exception to this trend. From 2007 to 2018, birthrates in San Bernardino County dropped 24.2%. Net migration averaged below zero between 2010 to 2019. However, the incorporated cities of the MWA service area still have some of the most affordable housing in the entire Southern California region which is a main driver why the UC Riverside Report shows MWA population to increase by 39.2% over the next 40 years. Still, the Town of Yucca Valley and the District service area are projected to continue a comparatively slower growth rate. Table 2-3 provides the UCR Center's projected population for the District through 2065.

Table 2-3: Population Forecast and Growth Rate

	2020	2025	2030	2035	2040	2045	2050	2055	2060	2065
Population	25,653	26,600	27,414	28,124	28,751	29,306	29,796	30,231	30,615	30,956
Annual Growth Rate		0.7%	0.6%	0.5%	0.4%	0.4%	0.3%	0.3%	0.3%	0.2%

2.4.3 Current and Projected Land Use

Development in the service area is largely dedicated to residential and commercial zones. This type of land use tracks with its role as a residential community for the locally and regionally employed population. The majority of residential development is low-density, single family housing, though the Town of Yucca Valley also has a number of multi-family residential buildings. Over the past several years, the residential sector accounts for about 70% of total water consumption on average,

[10] UC Riverside School of Business Center for Economic Forecasting and Development, Mojave Water Agency – Population Forecast, 2020 Edition

occasionally reaching close to 85% of delivery in certain months.[11] Water use is discussed in detail in Chapter 4.

Using the Town occupancy rate of 2.51 persons per household[12], along with the previously mentioned population growth, allows for calculation of a projected number of new service connections through 2045. To estimate non-residential growth, the existing mix of residential to non-residential connections can be a proxy for estimating the future mix for the incremental new connections. Residential connections represent about 94% of the District's customers, with non-residential uses representing 6%. With the addition of 1,500 new residential units through 2045, the existing ratio would result in about 90 additional new non-residential customers. The 90 additional connections are conservatively assumed to be have sub-classifications of about 82% Commercial/Institutional and 18% Landscape/Irrigation. Table 2-4 shows the projected cumulative new connections in 5-year increments through 2045.

Table 2-4: Estimated Number of New Connections

Customer Class	2025	2030	2035	2040	2045
Residential	400	700	1,000	1,200	1,500
Non-residential	20	40	60	70	90

In 2007 the Yucca Valley Town Council approved the Old Town Yucca Valley Specific Plan. The land use plan for the Old Town Yucca Valley Specific Plan provides for the development of four planning districts: the Old Town Mixed-use District, Old Town Commercial/Residential District, Old Town Industrial/Commercial District, and the Old Town Highway Commercial District. The Specific Plan[13] provides for build out of 1,116 dwelling units in these districts. With an estimated 2.51 persons per household estimated by the California Department of Finance, realizing Old Town Specific buildout plan would mean the addition of about 2,800 more residents which is within the UCR Report population projections for the planning horizon.

Some of the additional units may be included in the Town planning department's recognized projects listed in Table 2-5, but as the Town is continually processing applications, additional development projects are not limited to this list. These and other unnamed projects which will serve the population projections shown in Table 2-3, and the new connections shown in table 2-4, are factored into water demand forecasts detailed in Chapter 4.

[11] Based upon reporting by the District to the SWRCB as part of monthly conservation reporting requirements. Data is available here (last accessed December 28, 2020): https://www.waterboards.ca.gov/water_issues/programs/conservation_portal/docs/2020dec/uw_supplier_data121620.xlsx

[12] https://censusreporter.org/profiles/16000US0687056-yucca-valley-ca/ ; American Community Survey 2019 1-year estimates

[13] The entire specific plan can be viewed here: https://www.yucca-valley.org/home/showpublisheddocument?id=2492

Table 2-5: Known Land Use Plans

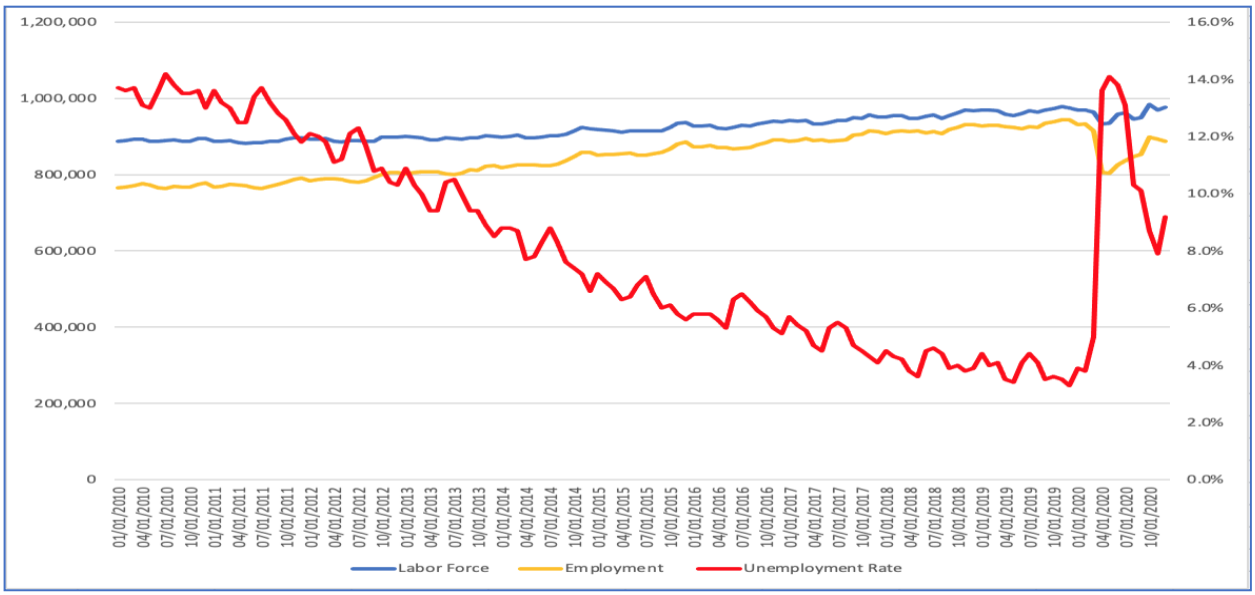
Existing or Planned Project	
Old Town Yucca Valley Specific Plan	McGrew TPM18967
Golestani - TTM 17985	Da Silva - TM16786
Inverno- TPM 18472	Smith- PM18009
Lucas - TTM 18773	Living Space - TM16957
Melby- TPM 18056	Haley- PM17784
Rondel- TTM 16787	Strand- TM17240
Ocegueda- TPM 18321	Phillips- PM17221
Pueblo Mesa -TTM 18418	Marrone -TPM 19392
Holloway- TPM 18759	Rowe- PM18349
Living Space- TPM 17600	Sprecher- PM 17012
McGrew TPM 18818	Cook- PM 17093
Stevens- PM 19288	Zarakov PM 19655
Yucca Valley Estates - TM17328	Hawks Ridge TPM 19685

2.4.4 Economic Trends & Other Social and Demographic Factors

The Inland Empire has seen some of the strongest employment growth in California since the end of the Great Recession, with the third largest workforce of the state's metropolitan areas. As a logistical hub for the region, there has been significant employment increases in the transportation, trade, and warehouse industries. Over the past decade, the employment growth rate for nonfarm labor in the Inland Empire outpaced all other regions in Southern California and sustained less economic impact from the Covid-19 recession than Los Angeles, Orange, or San Diego Counties. A main driver of this explosive growth has been in logistics, which ballooned at a rate of 47.7%, three times the rate of neighboring counties. The town of Yucca Valley has seen significant job growth in recent years, with future job growth predicted to reach 38.7% over the next ten years. The communities in the District's service area also focus on tourism with nearby Joshua Tree National Park serving as a major attraction.

The Covid-19 recession has severely impacted the service sector, especially leisure/hospitality and in-store retail. The healthcare sector has also experienced significant job losses as patients cancel routine and elective procedures due to the mandated lockdowns. The San Bernardino employment rate dropped sharply in the first four months of the pandemic. However, demand for transportation and warehousing increased, driven by a shift to online commerce and direct-to-consumer shopping. Since the middle of 2020, the County has regained some of the jobs but there remains a high level of uncertainty with the pace of economic recovery due to the pandemic.

Figure 2-5: San Bernardino County Employment Data, 2010 - 2020[14]



According to the 2010 US Census, the ethnic makeup of Yucca Valley is 84% White, 17.8% Hispanic/Latino, 2.3% Asian, 3.2% African American, 5.7% other races or mixed race. According to the 2010 Census Yucca Valley had a median household income of $42,962, with 17.0% of the population living below the federal poverty line which gives it a Disadvantaged Community status according to the California Department of Water Resources mapping tool.[15] The designation is based on the median household income being less than 80% of the State's median household income. The mapping context is in order to provide funding pursuant to California Proposition 1 "Water Quality, Supply, and Infrastructure Improvement Act of 2014", Proposition 84, Integrated Regional Water Management (IRWM) Grant Program, and likely other forthcoming state assistance programs.

2.5 Delivery System Details

This subsection focuses specifically on the District's potable water delivery system. The water supplies delivered through this system are described in Section 3, with water uses described in Section 4.

The District supplies its 57 square miles and the communities of Yucca Valley and Yucca Mesa with three existing sources of water: natural groundwater, imported water resources, and return flow from pumped groundwater not consumptively used. Local groundwater supply is naturally recharged by precipitation and surface water. Most of this water enters the area aquifers from the San Bernardino Mountains as rainfall and snowmelt. Local pumped groundwater accounts for nearly all of the water supplied to residential, commercial and agricultural users in the area. Production wells are common throughout the region, ranging from small homeowner wells to the large municipal District-owned wells.

[14] U.S. Bureau of Labor Statistics

[15] https://gis.water.ca.gov/app/dacs/

Because the natural water supply has been in overdraft for decades, the District relies on additional supply provided by MWA to supplement groundwater recharge. The major pipeline linking the MWA supplies to the Hi-Desert Water District area is the Morongo Basin Pipeline which currently delivers water to groundwater recharge sites in Hesperia, Landers, Yucca Valley, and Joshua Tree. It is a 71 mile underground pipeline financed by MWA, the District, the Joshua Basin Water District, the Bighorn-Desert View Water Agency, and the County of San Bernardino which brings recharge water to percolation ponds within the District's service area. The Ames–Reche recharge facility is just north of Yucca Valley in Landers. This turn-out from the main Morongo pipeline was completed in 2014.

The District's delivery system infrastructure includes 13 active wells with a 7,000 gallons per minute total capacity, 16 storage tanks which can hold 12.66 million gallons of water, 10 booster stations, 16 pressure reducing valves, and 296 miles of pipeline.

2.6 Energy Intensity

Among the statutory changes enacted with new requirements for 2020 UMWPs, an urban supplier shall include information it can readily obtain related to the energy use to produce, treat and deliver water.[16] Referred to as "Energy Intensity Reporting" for urban water suppliers, energy Intensity is defined as: total amount of energy expended in kilowatt-hours (kWh) by the urban water supplier on a per acre-foot basis to take water from the location where the urban water supplier acquires the water to its point of delivery.

For purposes of UWMP reporting, the District uses the Total Utility Approach described in DWR's 2020 UWMP Guidebook. This method sums the annual net energy consumed for all water management processes, divided by total volume of water in acre feet. These processes include diversion, conveyance, placement into storage, treatment, and distribution.

The total energy intensity is reported in Table 2-6.

Table 2-6: Energy Intensity – Total Utility Approach

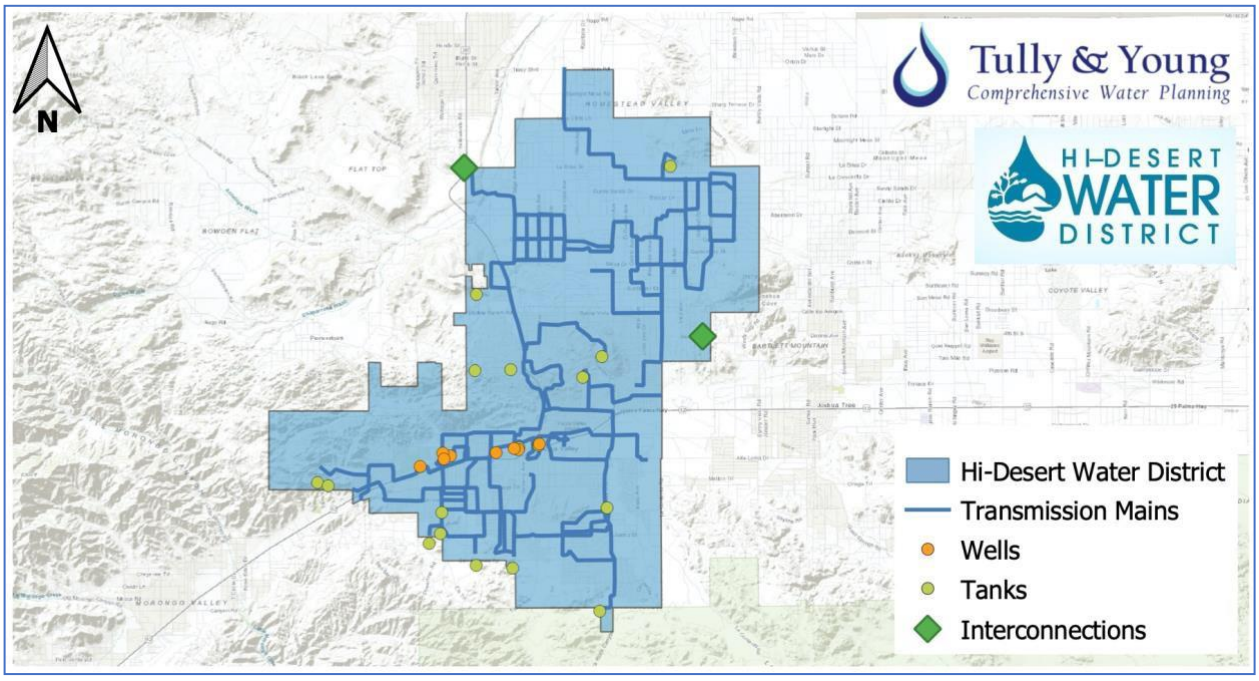
Sum of All Water Management Processes	
Volume of Water Entering Process (acre-feet)	2,947
Energy Consumed (kWh)	3,433,529
Energy Intensity (kWh/acre-foot)	1,165

[16] California Water Code Section 10631.2(a).

Chapter 3
Water Supply

This Section describes and quantifies the current and projected water supplies for Hi-Desert Water District (District). The District has historically relied upon groundwater supplies as its primary source of supply to meet demands within the District boundary. These supplies are derived from both the Warren Valley Basin and the Ames Valley Basin. The District has engaged in management activities in both basins allowing it to store water for current and future uses. The District has also incorporated water supplies from Mojave Water Agency (MWA) as part of its groundwater management activities. Taken together, the District's water supply portfolio and management actions provide a reliable water supply through 2045. Figure 3-1 shows the geography and major physical components of the Hi-Desert Water District water system.

Figure 3-1: Hi-Desert Water District System Graphic



3.1 Groundwater

Groundwater is the primary water supply source for the District. The District pumps groundwater from both the Warren Valley Basin and the Ames Valley Basin. Both of these basins are located in the Colorado River hydrologic region. The District does not extract water from the Copper Mountain Valley area even though it overlies this system. Figure 3-2 shows the geographic extent of groundwater basins in the Mojave area and Table 3-1 lists these basins and the associated California Department of Water Resources numbering.

Figure 3-2: Relevant Hi-Desert Area Groundwater Basins

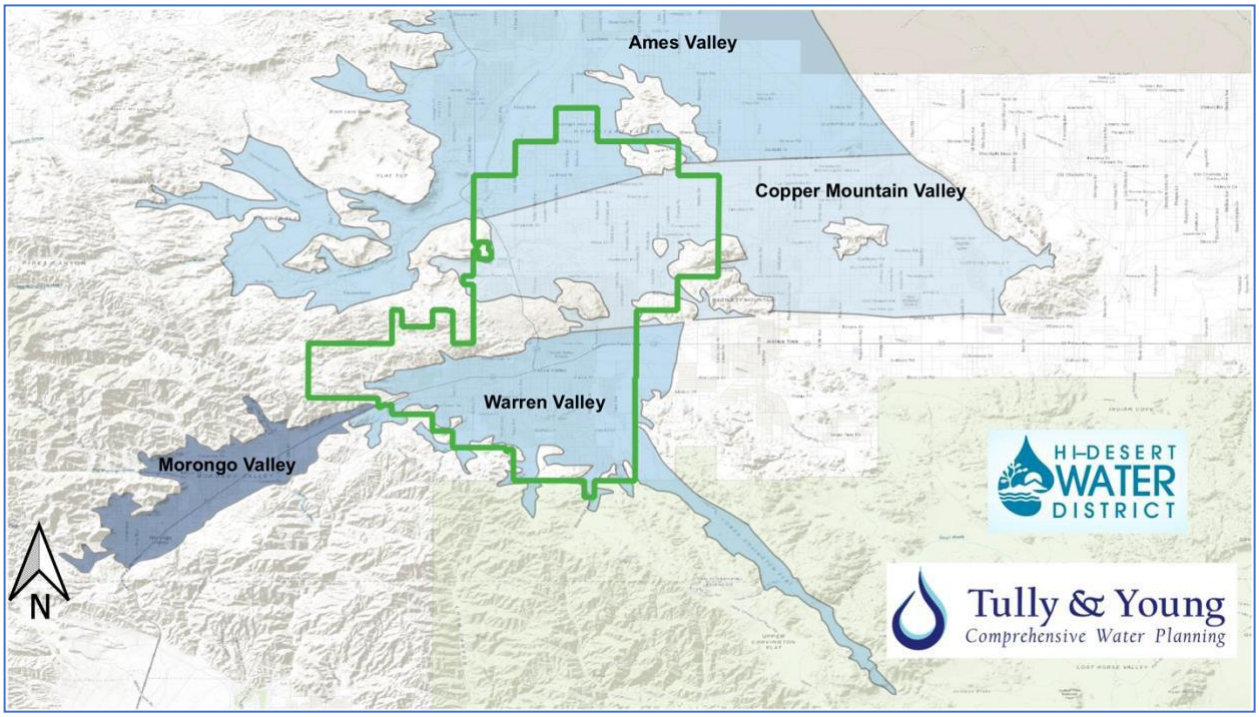


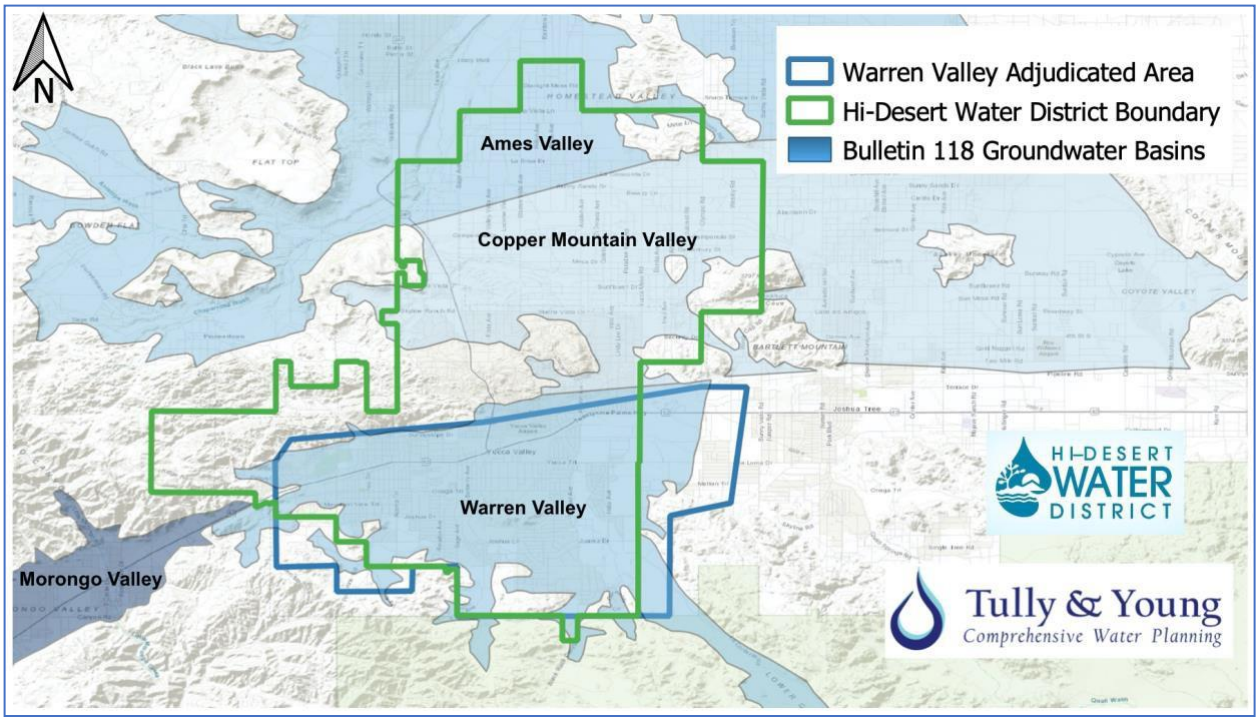
Table 3-1: Colorado River Groundwater Basins Relevant to HDWD

DWR Basin	Groundwater Basin Name
Colorado River Hydrologic Region	
7-11	Copper Mountain Valley
7-12	Warren Valley
7-16	Ames Valley
7-20	Morongo Valley

3.1.1 Warren Valley Groundwater Basin Description

The Warren Valley Basin is a unique groundwater basins underlying the Hi-Desert Water District service area. 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. Figure 3-3 shows the Warren Valley Basin and the Warren Valley Adjudicated Area overlying a portion of the basin.

Figure 3-3: Warren Valley Adjudicated Area



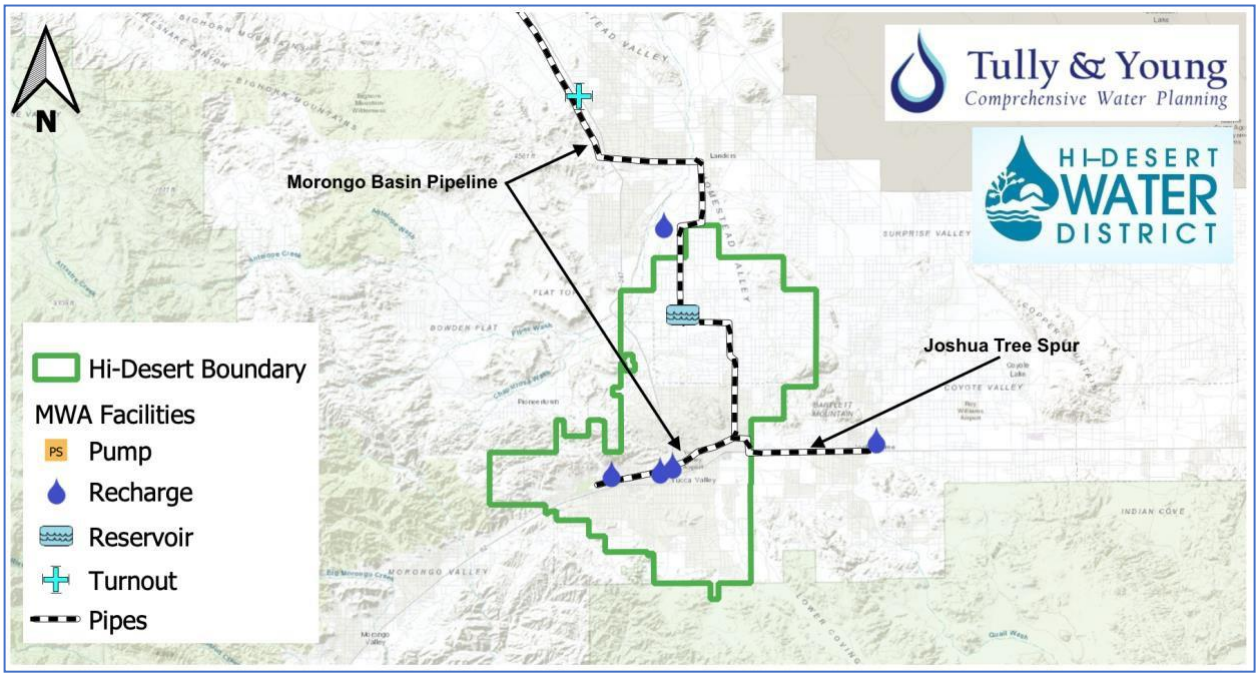
The Warren Valley Basin has an estimated total storage capacity of approximately 568,000 AF, with an estimated usable storage capacity of approximately 160,000 AF. The District owns nineteen (19) wells (12 active, 7 inactive) that can be used to pump groundwater from the Warren Valley Basin.

In 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 accelerated their decline. In 1972, 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 overproduction. Hi-Desert Water District filed a complaint against the Yucca Water Company and other producers in the

Warren Valley Basin which sought to adjudicate the groundwater rights in the Basin.[17] In 1977, a Judgment was rendered in the case identifying rights and obligations in the Warren Valley Groundwater Basin. The Judgment and Management Plan are described later in this section.

In 1983, the Watermaster commissioned a 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.[18] 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. 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 imported supplies to the District. The Morongo Pipeline is shown in Figure 3-4.

Figure 3-4: Morongo Basin Pipeline



Mojave Water Agency (MWA) supplies help replenish the Basin (discussed later in this chapter). The supplies that augment the managed groundwater in the basin serves the existing, planned and future water demands within the District's service area boundary. As a result of the water recharge program and increased natural recharge through conservation and awareness, water levels have recovered by over 250 feet in the Warren Valley Basin. Other 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, and septic and irrigation return flows.

[17] *Hi-Desert County Water District v. Yucca Water Company, Ltd.*, San Bernardino County Superior Court Case No. 172103, 1977.

[18] Hi-Desert Water District 2015 Urban Water Management Plan at 3-8.

3.1.2 Warren Valley Basin Adjudication and Management Plan

The Warren Valley Basin Judgment adjudicated the groundwater rights among overlying and appropriative right holders in the Warren Valley Groundwater Basin. The overlying right holders included a few landowning entities and some minimal pumpers. The District and the Yucca Water Company were the two groundwater appropriators in the case and the District subsequently acquired the Yucca Water Company and its water rights in 1990. In total, the District's adjudicated groundwater rights in the Warren Valley Basin total 1,622 AFY.[19]

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. Moreover, the Judgment ordered the development of a physical solution for the Basin and established several fundamental elements of that solution, including adding supplemental water supplies. For instance, the Judgment states: "In the ultimate development of the lands overlying the Warren Valley Basin, supplemental water supplies will be required." [20] As such, the lands overlying the Basin were included within the Mojave Water Agency boundary.

In 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 facilitated the development of the Morongo Basin Pipeline that delivers supplemental water supply sources to the Warren Valley Basin.

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 program. Natural recharge remains relatively constant but the recharge attributable to return flows continues to increase as growth in the area continues. The septic return flows are estimated at about 40 percent of the groundwater production.[21] The District plans to develop a recycled water system that captures the septic return flows, treats those assets with advanced technologies, and returns them to the groundwater basin. Thus, although we assume for planning purposes that the return flows will likely remain at about the same level of production (although the return flows may increase), the quality of the water returned to the Warren Valley Basin will be improved.

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;

[19] Judgment at section 12 on page 6; Warren Valley Basin Management Plan at 23 (combining HDWD and Yucca Water Company assets).
[20] Judgment at section 17(b) at page 8.
[21] Communications with MWA and WVB watermaster (February 2021).

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.

3.1.3 HDWD Adjudicated Warren Valley Basin Supply

HDWD was allocated a water supply by the Judgment of 1,622 acre-feet per year from the Warren Valley Basin. The District continues to use this supply to serve its customers and will continue using all of this supply into the future. Table 3-2 shows HDWD's last five years of use of the Warren Valley Basin adjudicated water supply.

Table 3-2: Last Five Years of Warren Valley Basin Adjudicated Supply (values in acre-feet)

Year	Warren Valley Adjudicated Supply
2016	1,622
2017	1,622
2018	1,622
2019	1,622
2020	1,622

HDWD will continue to use this supply as a fundamental source of water to serve its customers. The supply is 100% reliable in all year types. Tables 3-3 and 3-4 show the availability of this supply in Normal, Single Dry, and Five Consecutive Dry Years through 2045.

Table 3-3: Warren Valley Basin Available Supply through 2025 (values in acre-feet)

Year		Warren Valley Adjudicated Supply
Normal		1,622
Single Dry		1,622
Multi-Year Drought	2021 (1st year)	1,622
	2022 (2nd year)	1,622
	2023 (3rd year)	1,622
	2024 (4th year)	1,622
	2025 (5th year)	1,622

Table 3-4: Warren Valley Basin Available Supply through 2045 (values in acre-feet)

Total Supply		2025	2030	2035	2040	2045
Normal		1,622	1,622	1,622	1,622	1,622
Single Dry Year		1,622	1,622	1,622	1,622	1,622
Multi-Year Drought	Year 1	1,622	1,622	1,622	1,622	1,622
	Year 2	1,622	1,622	1,622	1,622	1,622
	Year 3	1,622	1,622	1,622	1,622	1,622
	Year 4	1,622	1,622	1,622	1,622	1,622
	Year 5	1,622	1,622	1,622	1,622	1,622

3.1.4 Banked Groundwater in Warren Valley Basin

HDWD has its own conjunctive use program that leverages alternative water supplies to improve groundwater basin conditions. HDWD has three groundwater recharge sites with a total of six groundwater recharge ponds that allow it to store up to 7,000 acre-feet per year of water.[22] In 1991, HDWD entered the Morongo Basin Pipeline Agreement (MBP Agreement) that allows it to access alternative supplies from Mojave Water Agency (MWA) to improve its groundwater banking conditions. The essential terms of this Agreement were extended in 2002 through a memorandum of understanding between the District and MWA. The MBP Agreement was structured for MWA to provide one-seventh of its SWP allotment to the Improvement District Morongo 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%). The MBP Agreement allows water to come into the Warren Valley Basin and be delivered to the groundwater basin for future extraction. Table 3-5 shows the last five years of MBP Agreement supplies provided by MWA.

Table 3-5: 2016-2020 MBP Agreement Supplies (values in acre-feet)

Year	MBP Agreement
2016	2,383
2017	4,138
2018	4,200
2019	2,102
2020	1,602

HDWD has instituted a dedicated groundwater banking program in the Warren Valley Basin to ensure its water supplies remain reliable for current and future growth. This groundwater banking program is directly tied to the MBP Agreement and has resulted in significant water assets that are available for HDWD now and into the future from the Warren Valley Basin. HDWD's groundwater banking has

[22] Communication with HDWD on March 2, 2021.

occurred in both the upper and middle aquifers in the Warren Valley. Table 3-6 shows the HDWD's annual artificial recharge from 2015 through 2020.[23]

Table 3-6: Last Five Years of Warren Valley Basin Annual Banked Groundwater Supply (acre-feet)

Year	Banked Groundwater
2016	2,508
2017	4,274
2018	4,739
2019	2,125
2020	1,479

HDWD continues to build storage reserves through its groundwater banking program. These reserves include sufficient supplies to provide water to meet HDWD demands for at least 27 years.[24] Table 3-7 shows the total cumulative storage in the Upper Aquifer and Middle Aquifer.

Table 3-7: Current Total Cumulative Water Storage in Upper and Middle WVB Aquifers (acre-feet)

Year	Total WVB Storage	Upper Aquifer	Middle Aquifer
2015-2016	97,150	60,710	36,440
2016-2017	99,810	63,370	36,440
2017-2018	102,873	66,433	36,440
2018-2019	103,067	66,627	36,440
2019-2020	102,944	66,504	36,440

HDWD will continue to use this supply as a fundamental source of water to serve its customers and to bank for future uses. Tables 3-8 and 3-9 show the availability of this supply in Normal, Single Dry, and Five Consecutive Dry Years through 2045.

Table 3-8: Warren Valley Basin Additional Banked Groundwater Supply through 2025 (acre-feet)

Year		WVB Banked Increase per year
Normal		+2,500
Single Dry		+1,500
Multi-Year Drought	2021 (1st year)	+1,500
	2022 (2nd year)	+1,500
	2023 (3rd year)	+1,500
	2024 (4th year)	+1,500
	2025 (5th year)	+1,500

[23] Annual Report of the Warren Valley Basin Watermaster for the period October 1, 2019 through September 30, 2020 at Appendix H, p 53 (Hereafter "WVB Watermaster Report")

[24] WVB Watermaster Report at Appendix H, p 53.

Table 3-9: Warren Valley Basin Additional Banked Groundwater Supply through 2045 (acre-feet)

WVB Banked Increase per year		2025	2030	2035	2040	2045
Normal		+2,500	+2,500	+2,500	+2,500	+2,500
Single Dry Year		+1,500	+1,500	+1,500	+1,500	+1,500
Multi-Year Drought	Year 1	+1,500	+1,500	+1,500	+1,500	+1,500
	Year 2	+1,500	+1,500	+1,500	+1,500	+1,500
	Year 3	+1,500	+1,500	+1,500	+1,500	+1,500
	Year 4	+1,500	+1,500	+1,500	+1,500	+1,500
	Year 5	+1,500	+1,500	+1,500	+1,500	+1,500

3.1.5 HDWD Other Warren Valley Supplies

Return flows constitute a significant portion of the water supply available for use in the Warren Valley Groundwater Basin. As noted above, return flows are approximately 40% of the total extraction from the groundwater basin each year. Table 3-10 shows the total extractions from the Warren Valley Basin over the last five years from all users in the Basin. Table 3-11 shows the calculated return flow from those users using the averaged 40% figure.

Table 3-10: Total Warren Valley Basin Groundwater Extractions (acre-feet)

Year	WVB Extraction
2015-2016	2,145
2016-2017	2,153
2017-2018	2,214
2018-2019	2,547
2019-2020	2,221

Table 3-11: Return Flows to the Warren Valley Basin (acre-feet)

Year	WVB Return Flows
2015-2016	858
2016-2017	861
2017-2018	886
2018-2019	1,019
2019-2020	888

3.1.6 HDWD Warren Valley Basin Managed Groundwater Supply

HDWD produces groundwater from the Warren Valley Basin as its main source of water supply. The groundwater used from the Warren Valley Basin consists of various blended water sources – some natural and some artificial – that is better described as "managed groundwater". Table 3-12 shows the last five years of the District's managed groundwater Supply from the Warren Valley Basin.

Table 3-12: HDWD Historical Warren Valley Basin Managed Groundwater Supply (acre-feet)

Year	Warren Valley Managed Groundwater
2015-2016	97,150
2016-2017	99,810
2017-2018	102,873
2018-2019	103,067
2019-2020	102,944

Table 3-13 shows the District's projected Warren Valley Basin managed groundwater supplies available from 2021 through 2025. And Table 3-14 shows the District's projected Warren Valley Basin managed groundwater supplies through 2045.

Table 3-13: Projected Warren Valley Managed Groundwater Supplies from 2021- 2025 (acre-feet)

Year		Warren Valley Managed Groundwater
Normal		112,944
Single Dry		102,794
Multi-Year Drought	2021 (1st year)	102,131
	2022 (2nd year)	103,248
	2023 (3rd year)	104,212
	2024 (4th year)	106,872
	2025 (5th year)	109,935

Table 3-14: Projected Warren Valley Managed Groundwater Supplies through 2045 (acre-feet)

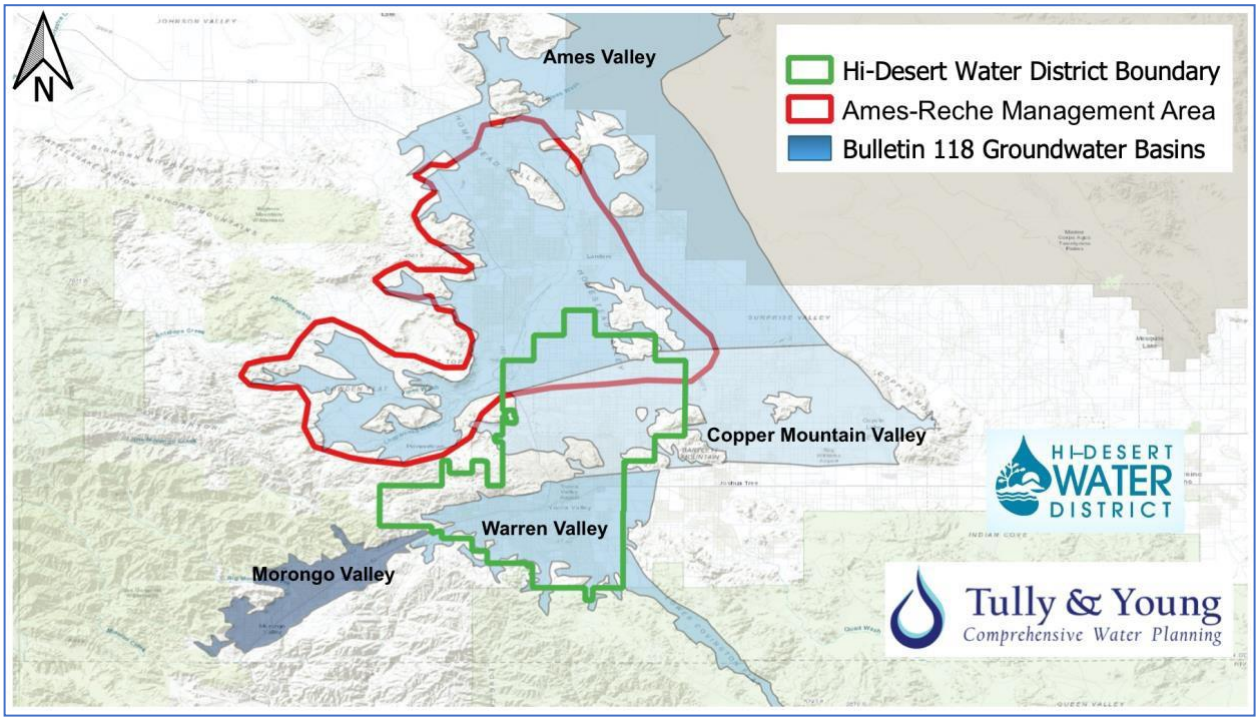
Total Supply		2025	2030	2035	2040	2045
Normal		110,444	117,944	125,444	132,944	140,444
Single Dry Year		110,444	117,944	125,444	132,944	140,444
Multi-Year Drought	Year 1	110,444	117,944	125,444	132,944	140,444
	Year 2	109,631	117,131	124,631	132,131	139,631
	Year 3	110,748	118,248	125,748	133,248	140,748
	Year 4	111,712	119,212	126,712	134,212	141,712
	Year 5	114,372	121,872	129,372	136,872	144,372

3.1.7 Ames-Reche Basin Description

The District's second source of local groundwater is obtained from the Ames Valley Basin (shown in Figure 3-2 above). 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 the 1980's, 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." In September 2014 multiple entities, including HDWD entered into the Ames/Reche Groundwater Storage and Recovery Program and Management Amended Agreement ("Amended Agreement"). The purpose of the Amended Agreement was 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 and rules for extraction, water imports, and carryover. Figure 3-5 shows the Ames-Reche Management Area as it overlies the Ames Valley Basin and the District's service area.

Figure 3-5: Ames-Reche Management Area



3.1.8 Ames-Reche Groundwater Storage and Recovery Program Agreement

The Amended Agreement was finalized in September 2014 between Bighorn Desert View Water Agency, Hi-Desert Water District, County of San Bernardino Service Area 70 W-1, and County of San Bernardino Service Area 70 W-4. The Annual Baseline Amount for groundwater pumping in the Amended Agreement was established at 1,646 acre-feet per year and the total pumping from the basin since 2013 has hovered around 1,200 acre-feet per year.[25] The Mojave Water Agency provides administrative support over monitoring the basin to ensure protection of the basin for the Parties and their end users under the Amended Agreement. In this role, MWA is required to prepare annual monitoring reports. The management activities are working and since 2012, water levels across the Ames-Reche Management Area appear to be relatively stable.[26]

The Amended Agreement is an important mechanism in groundwater management because it provides for a more comprehensive regulation of the groundwater supplies protected in the judgment, including provisions of supplemental water supplies for beneficial use, allocation of water production, storage and transfer rights to all of the public entity water retailers utilizing the subject groundwater supply, and continuing monitoring of water supply quality and quantity, all subject to the Court's continuing jurisdiction.

3.1.9 HDWD Adjudicated Supply in Ames-Reche

HDWD was allocated a water supply by the Judgment of 703 acre-feet per year under the Ames-Reche Amended Agreement. The District continues to use this supply to serve its customers and will continue using or banking all of this supply into the future. Table 3-15 shows HDWD's last five years of use of the Amended Agreement water supply.

Table 3-15: Last Five Years of Ames-Reche Supply (acre-feet)

Year	Ames-Reche Supply
2015-2016	709
2016-2017	702
2017-2018	691
2018-2019	321
2019-2020	TBD

HDWD will continue to use this supply as a fundamental source of water to serve its customers. The supply is 100% reliable in all year types. Tables 3-16 and 3-17 show the availability of this supply in Normal, Single Dry, and Five Consecutive Dry Years through 2045.

[25] Ames-Reche Report at 5.

[26] Ames-Reche Management Area Reporting Update for Years 2018-19, May 2020 at 3 ("Ames-Reche Report").

Table 3-16: Ames-Reche Available Supply through 2025 (acre-feet)

Year		Ames-Reche Supply
Normal		703
Single Dry		703
Multi-Year Drought	2021 (1st year)	703
	2022 (2nd year)	703
	2023 (3rd year)	703
	2024 (4th year)	703
	2025 (5th year)	703

Table 3-17: Ames-Reche Available Supply through 2045 (acre-feet)

Total Supply		2025	2030	2035	2040	2045
Normal		703	703	703	703	703
Single Dry Year		703	703	703	703	703
Multi-Year Drought	Year 1	703	703	703	703	703
	Year 2	703	703	703	703	703
	Year 3	703	703	703	703	703
	Year 4	703	703	703	703	703
	Year 5	703	703	703	703	703

3.1.10. HDWD Stored Groundwater Supply

HDWD has developed instituted a dedicated groundwater storage program under the Amended Agreement. This Amended Agreement is also tied to the MBP Agreement (discussed above) that allows Mojave Water Agency imported water supplies into the region. Table 3-18 shows the HDWD's stored groundwater from 2015 through 2020.[27]

Table 3-18: Last Five Years of Ames-Reche Agreement Stored Groundwater Supply (acre-feet)

Year	Ames-Reche Stored Groundwater
2015-2016	7
2016-2017	19
2017-2018	451
2018-2019	1,154
2019-2020	1,462

HDWD will continue to use this supply as a fundamental source of water to support its customers and to manage for future uses. Tables 3-19 and 3-20 show the availability of this supply in Normal, Single Dry, and Five Consecutive Dry Years through 2045.

[27] Ames-Reche Report at 17.

Table 3-19: Ames-Reche Agreement Available Stored Groundwater Supply through 2025 (acre-feet)

Year		Ames-Reche Stored Groundwater
Normal		1,962
Single Dry		1,962
Multi-Year Drought	2021 (1st year)	1,962
	2022 (2nd year)	2,462
	2023 (3rd year)	2,962
	2024 (4th year)	2,962
	2025 (5th year)	3,462

Table 3-20: Ames-Reche Agreement Available Stored Groundwater Supply through 2045 (acre-feet)

Total Supply		2025	2030	2035	2040	2045
Normal		3,962	6,462	8,962	11,462	13,962
Single Dry Year		3,962	6,462	8,962	11,462	13,962
Multi-Year Drought	Year 1	3,962	6,462	8,962	11,462	13,962
	Year 2	4,462	6,962	9,462	11,962	14,462
	Year 3	4,962	7,462	9,962	12,462	14,962
	Year 4	5,462	7,962	10,462	12,962	15,462
	Year 5	5,462	7,962	10,462	12,962	15,462

3.2 Water Quality

Water Quality is closely monitored in the Morongo Basin. Mojave Water Agency's Salt and Nutrient Management Plan developed in 2015 shows the Total Dissolved Solids and Nitrate concentrations in the Warren Valley and Ames Valley areas. Table 3-21 shows these values as shown in the SNMP document.

The drinking water quality of the Hi Desert System must comply with the Safe Drinking Water Act (SDWA), which is composed of primary and secondary drinking water standards. Compliance with primary drinking water standards is regulated by the U.S. Environmental Protection Agency (EPA). Compliance with both primary and secondary standards is required by the State Water Resources Control Board, Division of Drinking Water (DDW).

Hi Desert continually monitors the water quality within its water system and samples water at the sources as well as within the distribution system to ensure compliance with regulatory standards. Table 3-22 below shows the most recent water quality report issued by Hi Desert demonstrating compliance with water quality regulatory standards.

Table 3-21: Average Existing TDS and Nitrate Concentrations by Subregion

SNMP Analysis Subregion	Average Existing TDS Concentration (mg/L)	Average Existing Nitrate-NO3 Concentration (mg/L)
MORONGO BASIN		
Lucerne Valley (north)	1,716	5.6
Lucerne Valley (south)	472	5.7
Johnson Valley	678	6.2
Ames-Reche Valley	330	5.7
Warren Valley	243	15.4
Copper Mountain-Giant Rock	247	7.5
Joshua Tree	202	14.7

Table 3-22: Hi-Desert Water Quality

Water Quality Standards	Goal Level	Max Level	Range	Average
Primary Standards				
Arsenic (ppb)	0.004	10	ND-2.5	0.63
Chlorine (ppm)	4	4	ND-1.19	0.73
Chromium (ppb)	100	50	ND-2.1	1.05
Fluoride (ppm)	1	2	.22-.27	0.245
Gross Alpha (pCi/L)	0	15	2.21-17.7	6.145
Nitrate (ppm)	10	10	.7-4.9	2.4
Trihalomethanes (ppb)	n/a	80	3-11	7
Uranium (pCi/L)	0.43	20	4.11-11.2	7.65
Lead (ppb)	0.3	1.3	n/a	ND
Copper (ppm)	0.2	15	n/a	.15
Secondary Standards				
Chloride (ppm)	n/a	500	21-77	49
Iron (ppb)	n/a	300	n/a	ND
E.C. (µmho/cm)	n/a	1,600	310-480	395
Sulfate (ppm)	n/a	500	14-43	28.5
Turbidity (NTU)	n/a	5	ND-12	.16
TDS (ppm)	n/a	1,000	120-320	260.26
Federal Unregulated Contaminates				
1,4 Dioxane (ppb)	n/a	n/a	ND-.19	0.014
Bicarbonate (ppm)	n/a	n/a	77-99	88
Bromide (ppb)	n/a	n/a	79-310	183.45
Bromochloroacetic Acid (ppb)	n/a	n/a	.33-1.2	.64
Calcium (ppm)	n/a	n/a	24-45	34.5
Chlorate (ppb)	n/a	n/a	ND-100	33.19
Chlorodibromoacetic Acid (ppb)	n/a	n/a	ND-.37	.17
Hexavalent Chromium (ppb)	n/a	n/a	ND-4.7	1.48
Dibromoacetic Acid (ppb)	n/a	n/a	.35-1.9	.87
Dichloroacetic Acid (ppb)	n/a	n/a	ND-.56	.19
Magnesium (ppm)	n/a	n/a	3.9-6.2	5.05
Manganese (ppb)	n/a	n/a	ND-1.4	.45
Molybdenum (ppb)	n/a	n/a	1.2-24	4.6
Monobromoacetic Acid (ppb)	n/a	n/a	ND-.56	.14
pH (units)	n/a	n/a	7.8-8.2	8.04
Potassium (ppm)	n/a	n/a	1.1-1.1	1.1
Sodium (ppm)	n/a	n/a	31-36	33.5
Strontium (ppb)	n/a	n/a	150-360	280.47
Alkalinity (ppm)	n/a	n/a	77-99	88
Hardness (ppm)	n/a	n/a	77-140	108.5
Vanadium (ppb)	n/a	n/a	1.5-5.6	3.62

3.3 Desalination Opportunities

The California UWMP Act requires a discussion of potential opportunities for use of desalinated water (Water Code Section 10631(i)) In the past, Mojave Basin and Warren Valley Basin regional entities has evaluated potential options for developing desalination projects. Because the District's service area is not in a coastal area, it is neither practical nor economically feasible for the District to implement a seawater desalination program. However, the District could provide financial assistance to other SWP contractors in the construction of their seawater desalination facilities in exchange for SWP supplies. Nevertheless, at this time, none of the opportunities are practical or economically feasible for the District, and the District has no current plans to pursue them. Therefore, desalinated supplies are not included in the supply summaries in this Plan.

3.4 Water Transfers and Exchanges

In addition to groundwater, the District and Mojave Water Agency continue to explore opportunities to purchase water supplies from other water agencies and sources. Transfers, exchanges, and groundwater banking programs are important opportunities to investigate in order to enhance the long-term reliability of the District's current supplies that are available to meet demands and extended droughts. The District has executed several permanent transfers of groundwater. As such, voluntary water transfer programs are an opportunity available to the District to increase water supplies.

3.5 Climate Change

While the California Water Code does not prescribe specific climate change planning and management measures for water suppliers, it does emphasize that climate change is appropriate to consider when assessing drought risk assessment, water conservation and use efficiency, and demand management and supply – both in an historical and future-projection context. The District's primary climate change concern involves its capability of MWA providing imported SWP water for groundwater recharge. MWA uses DWR's Delivery Capability Report (DCR) to assess current and future reliability of SWP Contract Table A supplies.

3.6 Delta Reliance

The District, in concert with Mojave Water Agency and other regional water purveyors, continues to demonstrate reduced reliance on water supplies derived from the Delta and regional self-sufficiency. The reduced reliance and regional self-sufficiency are attributable to significant advances in developing recycled and reusable water supplies combined with an region-wide emphasis on water use efficiency. HDWD's Delta Reliance assessment is included as Appendix A to this UWMP.

3.7 Recycled Water Supplies

The Hi-Desert Water District (District) has constructed a Wastewater Treatment Facility (Facility) and wastewater collection system to service the residents of the Town of Yucca Valley (Town) and unincorporated area of San Bernardino County. The Facility is located at 58950 Sunnyslope Drive in Yucca Valley, California. The project was developed because the District is looking to diversify and supplement its water supply portfolio in light of water quality considerations in the Warren Valley Basin and the scarcity of water supplies throughout the Mojave Desert. In a 2003 study, USGS reported the primary cause of nitrate pollution in the Basin was septic tank effluent from households, commercials, and industrial facilities within (and surrounding) the Town. And, in 2007, the Regional Board adopted a resolution (Resolution R7-2011-0004) identifying the Town as a top priority for eliminating the use of septic systems. Resolution R7-2011-0004 led to an amendment to the Regional Board's Water Quality Control Plan (Basin Plan) which was adopted on May 19, 2011 and imposed a three-phased septic tank prohibition on new and existing septic systems within the Town. In 2014, residents approved Assessment District 2014-1 which funded Clean Water State Revolving Fund (CWSRF) Project No. 5295-10. This Project included construction and implementation of the Facility, installation of approximately 77 miles of sewer collection station, and construction and implementation of three sewer pump stations (Barron, Paxton and Kickapoo stations).

As a primary component of its Wastewater Reclamation Project (Project), the District constructed and implemented a Wastewater Reclamation Facility (Facility) within the Town. The Project was delivered via a progressive design-build method, in which a single Design-Builder was responsible for the development of the design, construction, and startup/commissioning of the Facility. The District issued Notice to Proceed to W.M. Lyles Company and Kennedy Jenks (the Design-Builder) on January 16, 2018 and the facility began discharging clean water into its three (3) percolation ponds on February 18, 2020.

The Facility utilizes a membrane bioreactor (MBR) system as the main process for wastewater treatment. The MBR is a combined biological and filtration process, and serves as the location of denitrification and suspended solids removal. In addition to the MBR, the process treatment facilities also include preliminary treatment, accomplished through both coarse and fine screens and a grit removal chamber, UV disinfection for pathogen inactivation, a solids handling facility, and odor control facilities. To ensure the source control program and Wastewater Reclamation Facility treatment processes are operating efficiently, the District monitors and reports primary and secondary MCLs, wastewater quality, and groundwater quality in accordance with Regional Water Quality Control Board (Regional Board) and Division of Drinking Water (DDW) requirements. The water quality at the Facility will be monitored and reported at specific time intervals, as required by the Regional Board per Board Order R7-2015-0043.

Throughout Phases 1, 2 and 3 of the District's Wastewater Reclamation Project (Project) recycled water will be replenished into an isolated portion of the Warren Valley sub-basin, where it will be retained underground for a minimum of five (5) years. After a minimum of five (5) years, and depending on the rate at which the basin is filling, the District plans to construct an extraction well to withdraw a portion of the water and replenish the drinking water aquifer in the western portion of the sub-basin. The extracted water will be transferred to one or more existing spreading basins in the western portion of

the Warren Valley sub-basin that are located about existing drinking water aquifers, where it will be replenished a second time. These basins currently receive imported State Water Project (SWP) water for replenishing the drinking water aquifers. When extraction begins, the District will monitor the quality of the extracted water as required by the Regional Water Quality Control Board (Regional Board).

3.8 Supply Summary

Table 3-24 summarizes HDWD's water supplies for 2021 through 2025 in normal, single dry, and five consecutive dry years. Table 3-25 summarizes HDWD's water supplies through 2045 in normal, single dry, and five consecutive dry years.

Table 3-23: HDWD's Combined Water Supplies through 2025 (acre-feet)

Year		Combined Supplies
Normal		114,906
Single Dry		104,756
Multi-Year Drought	2021 (1st year)	104,093
	2022 (2nd year)	105,710
	2023 (3rd year)	107,174
	2024 (4th year)	109,834
	2025 (5th year)	113,397

Table 3-24: HDWD's Combined Water Supplies through 2045 (acre-feet)

Total Supply		2025	2030	2035	2040	2045
Normal		114,406	124,406	134,406	144,406	154,406
Single Dry Year		114,406	124,406	134,406	144,406	154,406
Multi-Year Drought	Year 1	114,406	124,406	134,406	144,406	154,406
	Year 2	114,093	124,093	134,093	144,093	154,093
	Year 3	115,710	125,710	135,710	145,710	155,710
	Year 4	117,174	127,174	137,174	147,174	157,174
	Year 5	119,834	129,834	139,834	149,834	159,834

Chapter 4
Water Use

Understanding water use characteristics is essential to enable Hi-Desert Water District to reliably and cost-effectively manage its water supplies to continue to meet customer needs. This chapter characterizes the District's retail customer water needs – current and forecast over the next few decades. Characteristics such as how water uses vary among different land use classifications, throughout the year, and under differing hydrologic conditions, all help with that understanding.

A thorough characterization and analysis provides a realistic prediction of future water use based upon the District's past and current water use, in addition to considerations of anticipated growth, new regulations, changing climate conditions and trends in customer water use behaviors. A thorough analysis examines each water use sector for a variety of factors, then aggregates the information into a comprehensive projection of customer water use that becomes the foundation for integration with the District's water supplies (see Chapter 3) to assess long-term water system reliability (see Chapter 5).

Several legislative changes were enacted since the District completed its 2015 UWMP. The new requirements must be addressed in the District's 2020 UWMP in addition to completing requirements from the prior statutory language. While there have been many changes, the critically important items the District must address are highlighted below:

- Provide quantified distribution system losses for each of the 5 preceding years. [CWC 10631(d)(3)(A) and (C)]
- Include a drought risk assessment (DRA) for a drought period that lasts five consecutive water years, starting from the year following the assessment, which would be 2021 for this round of UWMPs. The DRA requires a comparison of water supplies with total projected water use. Therefore, the District must produce a projected water use for the years 2021 through 2025 as part of the water use projections up to 2045. [CWC 10635(b)]
- Conduct an annual water supply and demand assessment on or before July 1 of each year (following adoption of its 2020 UWMP) where the annual assessment includes current year unconstrained demand. The District will consider "unconstrained demand" as the expected water use in the upcoming year, based on recent water use, before any projected response actions it may trigger under its Water Shortage Contingency Plan (see Chapter 6). [CWC 10632.1]

This section is organized as follows:

- Current Customer Water Use – This subsection presents data reflecting the District's residential and non-residential customers for 2016 through 2019 as well as the actual 2020 water use and presents the District's distribution system losses for this same period.
- Compliance with 2020 Urban Water Use Target – This subsection documents the derivation of the 2020 GPCD value and comparison to the 2020 GPCD target.
- Demand Management Measures – This subsection provides a narrative description of each water demand management measure implemented by the District over the past five years, and describes the District's planned measures for the foreseeable future.
- Forecasting Customer Use – This subsection presents the derivation and results of future water use forecasts for potable and non-potable water within the District's service area, including land-use classifications, unit demand factors, and estimation of distribution system losses. This subsection also estimates the variations in customer water use the District should expect during years with low rainfall as well as discusses longer-term climate change considerations.
- Forecasting Water Use for DRA and Annual Assessment – This subsection focuses on the subset of the customer water use forecast that is necessary for completing the 5-year Drought Risk Assessment (DRA) and defining the "unconstrained demand" for purposes of the District's annual water supply and demand assessment.
- Projecting Disadvantaged Community Water Use – This subsection presents the estimated water use necessary to meet lower income households, pursuant to California Water Code 10631.1.

4.1 Current Customer Water Use

As described in Chapter 2, the District has been serving potable water to nearly 10,700 customer connections for the past several years. Under normal operations, all of the water supplied to its customers is drawn from the District's multiple wells (see Chapter 3) and delivered through an array of pipelines and turnouts (see Figure 2-8). The current customers, their recent and expected water use trends, and the District's on-going demand management efforts targeting these customers provide a foundational basis for this UWMP's water use forecast to 2045.

Furthermore, the actual water use in 2020 is the basis for determining the District's compliance with its 2020 gallons per capita per day (GPCD) target established in its 2015 UWMP. This subsection presents this relevant information.

4.1.1 Customer Water Use: 2016 to 2019

Recent customer water use can help the District understand water use trends, effects of temporary use restrictions imposed during the most recent prolonged drought and recovery from such temporary restrictions, effects of long-term demand management measures, and other pertinent water use factors relevant to its forecast of future water use. Water Code Section 10631(d)(1) also requires the District to quantify past customer water use.[28]

[28] California Water Code Section 10631(d)(1)

Table 4-1 presents the District's past customer potable water use by customer classification for 2016 through 2019. The District records potable water use within four primary categories:

- Single-family residential
- Multi-family residential (including mobile homes)
- Commercial and Institutional
- Landscape Irrigation

Table 4-1: Potable Customer Use: 2016 to 2019 (values in acre-feet)

	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Single-Family Residential	2016	121	100	116	138	125	163	205	184	186	144	128	120	1,730
	2017	116	120	129	133	142	164	204	187	167	148	139	128	1,776
	2018	127	115	117	132	147	170	192	180	186	158	137	116	1,776
	2019	116	114	101	115	125	151	192	180	186	158	137	116	1,690
Multi-Family Residential	2016	18	15	16	19	16	18	23	21	22	17	16	15	217
	2017	15	13	14	15	16	18	22	22	20	18	17	16	206
	2018	16	15	15	15	17	18	20	20	21	19	17	15	208
	2019	15	16	14	15	16	20	22	21	20	18	18	16	209
Commercial Institutional	2016	20	19	20	21	19	24	28	25	27	22	21	18	265
	2017	18	17	20	21	20	23	25	25	25	22	22	20	258
	2018	19	19	20	21	21	24	24	23	25	25	22	19	263
	2019	19	20	18	19	19	23	24	24	24	25	20	18	255
Landscape Irrigation	2016	2	2	4	8	11	6	28	26	26	18	12	8	151
	2017	6	2	3	9	14	19	28	26	23	19	14	9	172
	2018	7	6	6	9	16	22	27	25	28	19	12	9	184
	2019	4	2	2	8	16	23	23	30	29	20	15	7	180
Other	2016	3	0	1	2	1	3	3	4	41	1	1	2	62
	2017	1	1	1	10	9	9	11	11	17	7	9	7	94
	2018	5	4	4	2	5	12	14	11	10	9	9	7	91
	2019	4	5	4	6	9	9	14	16	14	8	12	1	104
Total Metered Deliveries	2016	164	136	157	189	172	214	287	259	303	203	178	163	2,426
	2017	156	155	167	188	200	233	289	271	251	214	201	180	2,506
	2018	173	157	162	180	205	246	277	260	270	231	197	165	2,522
	2019	158	158	139	164	185	226	274	270	273	230	202	159	2,438

The District also records a small quantity of water under "other" which captures a range of small, non-standard uses such as construction, street sweeping, and road maintenance. The District also began a sewer build out project in April 2017, with expected completion in January 2022, which factored into this category of water use with higher than average needs for construction water supplies.

Additionally, the District sells a small amount of water to a Black Rock Campground in Joshua Tree National Park. The 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 campground. Table 4-2 provides the historic monthly deliveries to the campground.

Table 4-2: Black Rock Campground Potable Water Sales (values in acre-feet)

	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Black Rock Campground Potable Water Use	2016	0.21	0.12	0.41	0.29	0.14	0.35	0.15	0.09	0.34	0.18	0.27	0.22	2.78
	2017	0.17	0.27	0.28	0.29	0.37	0.21	0.12	0.20	0.17	0.17	0.22	0.14	2.62
	2018	0.28	0.20	0.22	0.29	0.25	0.21	0.15	0.12	0.11	0.15	0.23	0.17	2.38
	2019	0.13	0.10	0.25	0.25	0.23	0.25	0.08	0.25	0.11	0.18	0.20	0.12	2.16
	2020	0.10	0.25	0.10	0.03	0.05	0.16	0.09	0.12	0.13	0.19	0.25	0.33	1.81

This historic data also provides insight into the relative ratio of differing customer classifications to each other as well as seasonal variations. For instance, commercial demands remain fairly constant month to month and generally year to year. In contrast, landscape irrigation is higher in the summer months compared to the winter, when cooler temperatures result in lower water needs and the limited rainfall provides additional benefits for the water needs of large landscapes (e.g., parks and play fields. Generally, water demand is higher across customer classes in the summer and early fall months due to the service area's desert environment and extreme summer heat.

The single-family residential classification illustrates two important characteristics of the District's water service: (1) it represents about 70% of the District's annual demand, and (2) it has summer demands that are 35-40% more the monthly volume needed in winter months. Combined with the multi-family residential use, overall residential use represents almost 78% of the District's potable water service.

The potable use seasonal variations provides the District with additional insight necessary for assessing the seasonal reliability of its water supplies and developing and quantifying successful water management approaches and water shortage contingency response actions.

4.1.2 Customer Use in 2020

Customers served by the District are metered at their connection to the District's potable water distribution system. These metered values are collected periodically for each customer account and summarized into the District's annual reporting to the SWRCB Division of Drinking Water and to DWR.[29] The 2020 actual customer use presented in Table 4-3 represents the summarized delivery to all the District's potable customers. It does not, however, include the distribution system losses inherent in a pressurized water delivery system that occur during the District's efforts to treat, store and route the water throughout the extensive distribution system to each customer's connection.

[29] The annual SWRCB report is referred to as the 'electronic Annual Report' or eAR, and the annual DWR report is known as the Public Water System Statistics report.

Further, comparing to the total values in Table 4-1, the 2020 annual single-family residential customer use is about 10% higher than the 2016 through 2019 average use, while multi-family residential customer use increase about 5%. The higher-than-average use is likely due to the pandemic that dominated 2020 and the multiple advisories and even government-imposed restrictions that resulted in many people working from, learning from, or simply staying at home.

Table 4-3: Potable Customer Water Use: 2020 Actual Use (values in acre-feet)

Use Category	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Single-family Residential	109	114	110	116	157	182	199	211	222	183	158	140	1,900
Multi-family Residential	15	16	14	16	18	20	21	22	22	20	18	16	218
Commercial/Institutional	18	23	19	13	17	20	22	23	23	23	23	18	241
Landscape Irrigation	3	4	5	7	13	17	23	31	23	19	16	8	169
Other	1	1	1	1	1	1	1	7	3	2	1	1	20
Subtotal	146	158	149	152	207	241	266	293	293	246	215	183	2,549

4.1.3 Existing Distribution System Losses

Distribution system water losses (also known as "apparent or real losses") are the physical water losses from the District's water distribution system up to the point of delivery to the customer's system (e.g. up to the residential water meter).

Since 2016, the District has been required to quantify its distribution system losses using the American Water Works Association Method (AWWA) (Title 23 California Code of Regulations Section 638.1 et seq.). An electronic copy of the audit in Excel format is to be submitted to the Department by October 1 of each year for the prior year's estimated system losses, using DWR's online submittal tool pursuant to Code of Regulations Section 638.5. The District's system loss for the last 5 years are shown in Table 4-4, with the 2016 through 2019 values reflecting reported data to DWR consistent with the AWWA method and the 2020 value based on reported deliveries and system production.

Table 4-4: Distribution System Loss: 2016 through 2020

2016	2017	2018	2019	2020
16.3%	11.3%	15.2%	11.9%	13.5%

As can be anticipated given the dynamic functions of a pressurized potable water distribution system, the estimated annual distribution system loss as a percentage of water entering the system will vary year-to-year and month to month.

4.2 Compliance with 2020 Urban Water Use Target

Pursuant to California Water Code Section 10608.24(b),[30] the District must demonstrate its 2020 water use met the GPCD target adopted in its 2015 UWMP. As set forth in the 2015 UWMP, the District's 2020 GPCD target was established as 128 GPCD, derived as the "gross water use" divided by the population

[30] 10608.24. (b) Each urban retail water supplier shall meet its urban water use target by December 31, 2020.

during a defined baseline period, and reduced pursuant to one of four methods defined under California Water Code Section 10608.20(b). The District's 2020 actual GPCD must use the same methodology to derive "gross water use" for 2020, then divide by the estimated 2020 population presented in Chapter 2.

As presented in the District's 2015 UWMP, gross water was determined to be the total water production as measured and reported based upon well production records, which was recorded as 2,947 acre-feet. As shown in Table 2-4, the District's population in 2020 was estimated to be 25,653. This results in a calculated 2020 compliance value of 128 GPCD, which is less than the District's established target. Thus, the District is in compliance with CWC Section 10608.24(b). The important compliance calculation parameters are summarized in Table 4-5.

Table 4-5: Demonstration of Compliance with 2020 GPCD Target

2020 Volume into Distribution System =	2,947 acre-feet
Allowable Adjustments	0 acre-feet
2020 Gross Water Use =	2,947 acre-feet
2020 Population =	25,653 people
2020 Actual GPCD =	103
2020 Target GPCD =	128
Compliance Achieved?	Yes

4.3 Demand Management Measures

Pursuant to California Water Code Section 10631(e), the District needs to provide a narrative discussion of the water demand management measures it has implemented, is currently implementing, and plans to implement. The historic and on-going measures can help the District understand the effectiveness on managing existing customer uses to help guide refinements, emphasis or augmentation that will help position the District to best meet its to-be-established water use objective.[31]

To date, the District's overall water management efforts have resulted in significant and long-term water conservation savings. During the 2013 to 2015 drought, the District's residents showed tremendous ability to temporarily reduce water usage and many of the efforts have had long-term viability, providing on-going savings well into the future. The District is also a member of the CUWCC successor organization, California Water Efficiency Partnership (CalWEP).

The District's demand management measures are highlighted in this subsection.

[31] Beginning in 2023, all urban water suppliers will be required to begin reporting their use compared to a "Water Use Objective" that is being established pursuant to the recently enacted California Water Code Section 10609.20.

4.3.1 Foundational Demand Management Measures

This subsection describes the foundational demand management measures (DMMs) that underpin the District's operations and customer deliveries. These particular DMMs represent adopted ordinances, policies, and long-standing budgeted conservation programs.

Water Waste Prevention Ordinances

Wasteful water is prohibited in the District's service area as originally recognized by Ordinance 68 in 1992 in response to water conditions in the Warren Valley Basin. Hi-Desert Water District Municipal Code Chapter 5.70 details water use restrictions. Emergency orders, such as restrictions put in place by the governor in 2017, work in conjunction with, or supersede parts of the municipal code. However, the fundamental water waste prohibitions of Ordinance 68 align with state-mandated requirements.

Metering

All water service connections in the District's service area are metered. Multi-family customers are typically served by a single master meter; however, individual water meters are required for any new multi-family structures. The District has also been replacing old meters with Advanced Metering Infrastructure (AMI) 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.

Conservation Pricing

The District's water rate structure is set to generate the necessary funds to efficiently operate the District's water system and maintain reliable water supplies. The District uses a variable base rate which is different for customer depending on the size of pipe, water meter, peak use or other factors. It also uses a 3-tier variable usage rate for both single-family and multi-family customers which increases as water use increases. The fee structure will continue to help customers manage their water use in an efficient manner. Under normal water supply conditions, this rate structure has effectively reduced customer water use.

Public Education and Outreach

The District regularly engages its customer base with a number of conservation and demand management outreach programs. Promoting water wise activities, watering schedules, and educational programs are part of the District's regular outreach efforts, which include a conservation web page providing resources to the community for conserving water. The District provides a variety of grade-appropriate curriculum and tours, participates in educational events and supplies materials to teachers of all grade levels. The District is also an active participant with the MWA and the Alliance for Water

Awareness and Conservation (AWAC)[32]. AWAC is a collaborative group of over twenty agencies committed to achieving water conservation goals within the 4,900 square mile MWA service area.

Programs to Assess and Manage Distribution System Real Loss

The District's water loss assessment and management program includes annual water audits and an ongoing leak detection and repair. This includes an ongoing meter calibration and replacement program for all production and distribution meters. The District's activities include:

- Annual water audit and water balance
- Well production meter data collection and validation
- Proactive leak identification and repair in the District's distribution system
- Water meter replacement program to help detect system loss
- Free water audits that includes checking for leaks

Conservation Program Coordination and Staffing Support

The District has one part-time water conservation program staff assigned as needed with an annual budget of $10,000. Additionally, other staff from various departments provide technical and administrative support, as well as serve as speakers at a variety of events. The conservation budget is used to fund various rebate and conservation and education programs. The Conservation Coordinator works with customers, neighboring water suppliers and the MWA to promote conservation through public education, water audits, landscape studies to affect water conservation, and monitoring conservation efforts.

4.3.2 Recent DMM Activities

The District has continued to aggressively promote and implement water conservation actions with great success. Since prior to the 2013 to 2015 drought, the District reached remarkable on-going conservation levels through the attentive actions of its citizens. Highlights of the District's recent actions and conservation measures include:

- 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

4.3.3 Planned DMM Activities

In addition to ongoing water conservation commitments, the District will continue to evaluate the need for additional programs and actions necessary to achieve water use objectives in compliance with

[32] http://www.hdawac.org/

California Water Code Section 10609.20. Resources will be dedicated in the District's budget for demand management activities which will help comply with these future water use objectives. Special consideration will be taken regarding changing urban water use patterns in the service area as well as the configuration of anticipated new residential customers to assure use remains efficient.

4.4 Forecasting Customer Use

Forecasting future water demands begins with understanding existing customer demands and trends, recognizing the additional customers expected through growth, and considering the factors that will influence the water use of both existing and new customer well into the future – especially factors that directly affect the efficiency of water use.

Pursuant to California Water Code 10610.4(c), an urban water supplier "*shall be required to develop water management plans to actively pursue the efficient use of available supplies*." One challenge from this directive is reflecting how the pursuit of efficient use is best represented in the forecast water uses that are the cornerstone of good planning. As required by the Act, the future water uses of both existing customers and those added over the 25-year planning horizon should reflect the "efficient use" of water.

There are several factors that affect the forecast of future water use for existing and new District customers, ranging from State and local landscape regulations, building code requirements, and other water-use mandates, to changes in the types of housing products being offered. These factors are incorporated into determining appropriate per-capita water use values for use in forecasting future water needs in the District. Relevant characteristics of the factors include:

- California Model Water Efficient Landscape Ordinance
- Green Building Standards Code (hereafter the "CAL Green Code")
- Per-capita urban water conservation objectives

As described in Chapter 2, the District is expected to experience on-going population growth, consistent with other urban retail suppliers in this part of San Bernardino County. Forecasting the needs of these future customers is dependent upon the growth assumptions and the unique water use characteristics of existing customers in the District's service area.

As detailed in Table 2-3, the MWA-commissioned population forecast provided estimated population growth to add about 3,700 residents by 2045. This growth will include a range of new residential and non-residential connections as detailed in Table 2-4 depending on the varied development proposals. Residential customers will include both single-family dwelling units built under a variety of densities and multi-family residential dwelling units. Non-residential uses are expected to include a blend of commercial, institutional, and active landscapes such as parks, in ratios similar to the current residential-to-non-residential connections.

For purposes of this UWMP, the forecasted future demand will reflect the needs of existing customers and future new customers. The methodology to forecast existing customer use and new customer use

varies slightly but is primarily based upon multiplying the population of each by a gallons-per-capita-per-day water factor as described below.

4.4.1 Existing Customer Future Use

District monthly water use data submitted to the State Water Resources Control Board (SWRCB) to satisfy reporting regulations was obtained to establish the recent and current water use characteristics. This included total water produced for each month for 2020. The total annual production (see Table 4-5) was divided by the existing population, generating a gallons-per-capita-per-day (gpcd) value that is representative of the District's total gpcd when considering all residential and non-residential users. This information established a "current" gpcd for the population that was used to create a representative gpcd for future customers as discussed below. As shown in Table 4-5, the District's existing value is 103 gpcd.

To be conservative and assure the analysis of water system reliability is adequate (see Chapter 5), the District is maintaining the annual "current" retail customer potable water use as shown in Table 4-5, a total delivered quantity of about 2,550 acre-feet, with a total production need of about 2,950 acre-feet when considering system losses.

While these existing customers may undertake a variety of conservation measures – actively through decisions to modify a behavior or a water use, or passively through the purchase of appliances and fixtures that simply use less water – they may also maintain their use as-is. Holding the current use as a constant for all existing customers into the future will provide a conservative number that can be re-evaluated prior to the 2025 UWMP and the compliance with forthcoming water use objectives.[33]

4.4.2 New Customer Future Use

In addition to the District-reported information to the SWRCB is information regarding the percentage of total monthly use the District driven by residential customers, a key value for the SWRCB's determination of the "residential gallons-per-capita-per-day" water use – or "r-gpcd." Using the total r-gpcd value as well as the winter time r-gpcd values, which often were slightly lower than during summer months, an estimate of the (1) residential versus non-residential per-capita use and (2) the residential indoor versus outdoor per-capita water use factor was derived. For the District, these values were as follows:

- Total Residential use = 74 gpcd
- Indoor Residential use = 53 gpcd
- Outdoor Residential use = 21 gpcd (this may include services including evaporative coolers that cause higher summertime gpcd rates)
- Total non-residential use = 29 gpcd

[33] Per California Water Code Section 10609.20, urban water suppliers shall calculate a water use objective composed of, among other factors, aggregated efficient indoor water use based upon standards of no more than 55 gpcd.

These estimated gpcd values were then used to create an anticipated gpcd value for each new customer. The new gpcd values for each large retail suppliers were created using the following steps:

1. As stipulated by the Water Code, each new residential user should have an indoor factor of 55 gpcd, dropping to 50 gpcd in the future.[34] For purposes of this forecast, 55 gpcd is used for all new customers until 2030, then 50 gpcd is used for growth through 2065.

2. Using the residential indoor versus outdoor gpcd estimate from the existing customer data, an outdoor gpcd value was determined (as the difference between total r-gpcd and the estimated indoor r-gpcd). This outdoor value was added to the indoor value of 55 gpcd or 50 gpcd to generate a total residential gpcd value for future customers.

3. The different between the residential gpcd and the total gpcd created a representative non-residential gpcd value unique to each large retail supplier. This non-residential gpcd was added to the residential gpcd to create an expected total gpcd for each new customer.

4. The new gpcd value was multiplied by the incremental additional population anticipated during each five-year increment through 2045.

Using this methodology provided a reasonable forecast of the District's future needs. Based upon the estimated water use of the existing and new customers, the District anticipates a minor increase in potable water use over the planning horizon to accommodate the anticipated growth. Table 4-6 presents the resulting customer water use forecast. This characterization is important when evaluating the District's water service reliability as detailed in Chapter 5.

Table 4-6: Forecast Future Water Use (values in acre-feet per year)

2020	2025	2030	2035	2040	2045
2,947	3,060	3,150	3,220	3,290	3,350

4.4.4 Adjusting Water Use Forecasts for Single-Dry and Multiple Dry Conditions

The water use forecast represents expected water needs under normal climatic conditions. Often, to reflect lower rainfall conditions which may trigger water users to begin irrigating sooner, adjustments to this forecast should be made. However, in the high desert climate of the Mojave and Morongo areas, water users are generally not managing landscape or agricultural irrigation systems based upon any variance from "normal." In other words, rainfall to meet landscape or crop water needs is not relied upon, thus the lack of it does not change behavior as it may in climates with higher rainfall.

[34] The assumed per-person rate of 55 gallons per day is derived from California Water Code Section 10609.4(a)(3), which states a value of 55 gallons per capita (i.e., per person) per day ("gpcd") be used for estimating indoor residential use targets. Water Code Section 10609.4(a) establishes the indoor residential water use 'standard' to be 52.5 gpcd beginning in 2025 and as low as 50 gpcd by 2030, though the Water Code also provides provisions for the water use target to revert above 50 gpcd. For purposes of this UWMP, the higher value of 55 gpcd is assumed.

As a result, the forecast presented in Table 4-6 is not adjusted for single dry or multiple dry years. The forecast represents the "unconstrained demand" that would be expected in all year types.[35]

4.4.5 Climate Change Considerations

Including climate change analysis into a water use analysis will assist the District in understanding the potential effects on long-term reliability, which in turn, allows the District to proactively begin planning appropriate responses. For example, hotter and drier weather may lead to an increased demand in landscape irrigation, especially during spring and fall months, increasing the pressure on water supplies that may have availability restrictions during these periods.

However, as indicated previously, the High Desert climate already has low rainfall and extreme temperatures. Thus, adjustments for the near-term planning horizon are not warranted.

Long-term effects of climate change may increase the evapotranspiration rates of landscapes. But such effects will be nominal when compared to the existing rates already occurring in the high desert climate. The District will continue to assess the potential effect of climate change in future UWMPs.

4.5 Forecasting Water Use for the DRA and Annual Assessment

The California Legislature created two new UWMP requirements to help suppliers prepare for drought conditions: The Drought Risk Assessment,[36] and the Annual Water Supply and Demand Assessment.[37] These new planning requirements were established in part because of the significant duration of recent California droughts and the predictions about hydrological variability attributable to climate change.

The Drought Risk Assessment (DRA) requires assessing water supply reliability over a five-year period from 2021 to 2025 that examines water supplies, water uses, and the resulting water supply reliability under a reasonable prediction for five consecutive dry years.

As a slight variant, the Annual Water Supply and Demand Assessment (Annual Assessment) undertakes a similar analytical exercise as the DRA but is to focus on actual, and not hypothetical, conditions anticipated for the upcoming water year. The previously presented water use forecasts facilitate both of these planning exercises as described in the following subsections.

4.5.1 Projecting Water Use for 5-year Drought Risk Assessment

A critical component of new statutory language for the 2020 UWMP cycle is the requirement to prepare a five-year DRA using a supplier-defined hypothetical drought conditions expected to occur from 2021

[35] California Water Code Section 10632(a)(2) states water suppliers should use "unconstrained demand" when performing their annual water supply and demand assessment. This reflects the expected demand prior to implementing shortage response actions as detailed in a Water Shortage Contingency Plan.
[36] California Water Code Section 10635(b)
[37] California Water Code Section 10632.1

through 2025. This drought condition is meant to allow suppliers to test the resiliency of their water supply portfolio and their Water Shortage Contingency Plan actions to meet severe conditions.

DWR recommends that suppliers first estimate expected water use for the next five years without drought conditions (also known as unconstrained demand). In other words, unconstrained demand is water demand absent any water supply restrictions and prior to implementing any short-term WSCP demand reduction actions. If normal water use includes water conservation programs, either currently implemented or planned for implementation, estimated water use values would incorporate the effect of those conservation programs when reporting projected water use during this period.

Total water use for 2021, for example, is developed by modifying the water use representation for "current" conditions (see Table 4-3) taking into consideration the anticipated factors affecting water use, with each subsequent year further adjusted, as appropriate. Adjustments year-to-year reflect several factors the District anticipates may occur, including increases from growth. To make these adjustments, the difference in annual water use between the "current" condition and the forecast potable use in 2025 is prorated equally across each of the years 2021 through 2025, so that the same 2025 forecast water use is matched.

With an initial annual estimate, each year is further adjusted to reflect anticipated increases in the "unconstrained demand" during a single dry year. The resulting unconstrained demand during a dry year for 2021 through 2025 are shown in Table 4-7.

Table 4-7: Forecast DRA Water Use for 2021 through 2025 (acre-feet per year)

2021	2022	2023	2024	2025
2,969	2,990	3,012	3,034	3,056

4.5.2 Projecting Water Use for Annual Assessments

The District will need to perform an Annual Assessment and submit the findings to DWR beginning in 2022. To evaluate the plausible water service reliability conditions under current "normal" and "single-dry" conditions, as further described in Chapter 5, it is recommended that the District use the 2020 gross water use shown in Table 4-5.

4.6 Projecting Disadvantaged Community Water Use

Pursuant to CWC Section 10631.1, retail suppliers are required to include the projected water use for lower income households in 2020 UWMPs. Per California Health and Safety Code Section 50079.5, a lower income household has an income below 80 percent of area median income, adjusted for family size. For purposes of this UWMP, annual median income is assumed to be about $43,000 for the District (see Chapter 2.4.4), with the entire service area recognized by the state as a qualified Disadvantage Community. Because of this designation, the forecast water use presented in Table 4-6 is fully inclusive of disadvantaged community use.

Chapter 5
Water System Reliability

This chapter provides the Hi-Desert Water District's water system reliability findings as required under Water Code Section 10635 and provides reliability information that the District may use in completing an annual supply and demand assessment pursuant to Water Code Section 10632.1.

Assessing water service reliability is the fundamental purpose for the District in preparing its 2020 UWMP. Water service reliability reflects the District's ability to meet the water needs of its customers under varying conditions. The District's 2020 UWMP considers the reliability of meeting customer water use by analyzing plausible hydrological variability, regulatory variability, climate conditions, and other factors that impact the District's water supply and its customers' water uses. The reliability assessment looks beyond past experience and considers what could be reasonably foreseen in the future. This chapter synthesizes the details imbedded in the Chapters 3 and 4 and provides a rational basis for future decision-making related to supply management, demand management, and project development. This chapter presents three system reliability findings:

- Five Year Drought Risk Assessment: The 2021 through 2025 Drought Risk Assessment (DRA) for the District's service area.
- Long-Term Service Reliability: The reliability findings for a Normal Year, Single Dry Year, and Five Consecutive Drought Years in five-year increments through 2045.
- Annual Reliability Assessment: The reliability findings for an existing condition for both a Normal Year and Single Dry Year that can inform an annual supply and demand assessment for 2021 or 2022.

In summary, the District has reliable water supplies available for its service area through 2045.

5.1 Five Year Drought Risk Assessment

The Drought Risk Assessment is a new requirement for the 2020 UWMP cycle. The DRA requires a methodical assessment of water supplies and water uses under an assumed drought period that lasts five consecutive years. The District has prepared an assessment of the water supplies and demands for its system. The District is in a unique position to have ample water supplies to meet current and growing customer demand. Specifically, with the buffering capacity over time of the groundwater basin, stored groundwater, and its relationship as an MWA retailer (see Chapter 3), the District is not susceptible to drought conditions. Nevertheless, the District continues to encourage its customers to use water efficiently (see Chapter 4). Although the District has sufficient supplies to meet its five consecutive dry year demands, other regulatory constraints, like the declaration of a drought emergency by the Governor of the State of California, may require the District to reduce its water services.

Because the District has discretion over how much groundwater it pumps and how much water it receives from MWA, supplies and demands are congruent in all scenarios examined in this chapter. Table 5-1 below shows the District's DRA that integrates its supplies for 2021 through 2025 as described in Chapter 3 and reflects the dry year unconstrained water uses described in Chapter 4. As the table shows, the District has sufficient water assets available in all years.

Table 5-1: Five Year Drought Risk Assessment

	2021	2022	2023	2024	2025
Supply	2,969	2,990	3,012	3,034	3,056
Demand	2,969	2,990	3,012	3,034	3,056
Difference	0	0	0	0	0

5.2 Long Term Service Reliability

The Urban Water Management Planning Act directs urban water purveyors to analyze water supply reliability in a normal, single dry, and five consecutive dry years over a 20-year planning horizon. The 2020 UWMP Guidebook recommends extending that period to twenty-five (25) years to provide a guiding document for future land use and water supply planning through the next UWMP cycle.

5.2.1 Long Term Service Reliability

The District's long term service reliability reflects the recommended 25-year planning horizon anticipating a normal, single dry, and five consecutive dry years from 2020 through 2045.

Normal and Single Dry Conditions 2025-2045

The District's future water supplies in normal and single dry conditions reflect the same conditions described for the DRA and as detailed in Chapter 3. Specifically, the District has sufficient and reliable water supplies to meet forecast customer water needs through 2045 considering water use forecasts for both normal and dry condition. All of this information is detailed in Chapter 4 and reflected in the numbers shown in the tables below. Table 5-2 shows the normal year supplies and demands on an annual timestep from 2025 through 2045.

Table 5-2: Normal and Single Dry Year Water Supply and Demand through 2045

Normal Year	2025	2030	2035	2040	2045
Supply	3,056	3,149	3,222	3,292	3,354
Demand	3,056	3,149	3,222	3,292	3,354
Surplus Supply	0	0	0	0	0

Single Dry Year	2025	2030	2035	2040	2045
Supply	3,056	3,149	3,222	3,292	3,354
Demand	3,056	3,149	3,222	3,292	3,354
Surplus Supply	0	0	0	0	0

Five Consecutive Dry Years 2025 – 2045

The District defines a drought condition lasting five consecutive years as one that requires the District to reduce water service to its customers. The Districts groundwater supplies coupled with its supplies from MWA result in limited constraints in dry years and the District's overall water supplies are considered reliable. However, although the District has sufficient supplies to meet its five consecutive dry year demands, other regulatory constraints, like the declaration of a drought emergency by the Governor of the State of California, may require the District to reduce its water service to its customers. Nevertheless, the District assumes that these conditions that would require less water supply deliveries to the District's customers do not manifest in assessing the supply availability in the future.

The District also assumes that dry year demand conditions would remain unconstrained during the dry conditions causing a slight increase in the actual demand from District's customers. This characterization of water demands provides a conservative estimation of demand conditions in a five-year drought scenario. Together, the supply availability as paired against the slightly increased demand conditions demonstrate that the District has sufficient supplies to meet five consecutive dry year conditions through 2045. Table 5-3 below shows the annual water supply and demand conditions in five consecutive dry years from 2025 through 2045.

Table 5-3: Five Consecutive Dry Years Water Supply and Demand through 2045

		2025	2030	2035	2040	2045
Year 1	Supply	3,056	3,149	3,222	3,292	3,354
	Demand	3,056	3,149	3,222	3,292	3,354
	Surplus Supply	0	0	0	0	0
Year 2	Supply	3,074	3,164	3,236	3,304	3,365
	Demand	3,074	3,164	3,236	3,304	3,365
	Surplus Supply	0	0	0	0	0
Year 3	Supply	3,093	3,178	3,250	3,317	3,375
	Demand	3,093	3,178	3,250	3,317	3,375
	Surplus Supply	0	0	0	0	0
Year 4	Supply	3,112	3,193	3,264	3,329	3,386
	Demand	3,112	3,193	3,264	3,329	3,386
	Surplus Supply	0	0	0	0	0
Year 5	Supply	3,130	3,207	3,278	3,341	3,397
	Demand	3,130	3,207	3,278	3,341	3,397
	Surplus Supply	0	0	0	0	0

5.3 Annual Reliability Assessment

The District may consider current supply and demand conditions and perform an annual water supply and demand assessment (Annual Assessment) pursuant to Water Code Section 10632.1 to evaluate real-time or near-term circumstances that are different than the DRA scenario. This assessment would evaluate actual current water supply and use conditions. For purposes of this UWMP, the "current" water use conditions as described in Chapter 4 are compared to the availability of the District's existing water supplies as described in Chapter 3. Two scenarios are illustrated:

- Normal Year condition: reflecting the availability of supplies under normal conditions and the "current" water uses.
- Single-Dry Year condition: reflecting the availability of supplies under a severe, single-dry year and elevated "current" water uses reflecting increased demands expected in a single dry year.

5.3.1 Normal Year Supply and Current Water Use

The District's current normal year water supply and demand conditions represent the expected water supply and demand conditions that would likely occur based upon a reasonable assessment of regional and statewide hydrology and limited regulatory constraints. Under these conditions, the District anticipates that its access to its groundwater supplies would be fully available.

The District's characterization of current water use conditions represent an historical assessment of water use within the District as well as reasonable characterizations of growth and potential customer use patterns. The combination of these considerations present a normal water year use assessment that is incorporated into this reliability determination. The demands also account for reasonable water conservation measures derived from improved efficiencies in indoor fixtures, improved management of outdoor landscape irrigation, and a general awareness of the value of long-term water conservation at the consumer level. These demand conditions are described in significant detail in Chapter 4 and reflected in the monthly demand assessments shown below.

Table 5-4 below shows the normal year water supply and demand conditions for the District's service area.

Table 5-4: Normal Year Water Supply and Demand

Normal Year	Current
Supply	2,947
Demand	2,947
Surplus Supply	0

5.3.2 Single Dry Year Supply and Dry-Year Current Demand

The District defines a single dry year condition as one that may require reduced water deliveries to customers caused by regulatory decrees, as noted in 5.2.1. Nevertheless, the District's water supplies are reliable in single dry year conditions based upon the groundwater basin as described in Chapter 3.

Single dry year demands include the anticipated demands based upon historical trends in water usage in drought conditions by the District's customers. As described in Chapter 4, demands in dry conditions in the District remain stable because of the climatological conditions.

Table 5-5 below shows the single dry year water supply and demand conditions.

Table 5-5: Single Dry Year Water Supply and Demand

Single Dry Year	Current
Supply	2,947
Demand	2,947
Surplus Supply	0

5.4 Water Supply Reliability Summary

The District's water supply portfolio is capable of meeting the water uses in its service area in normal, single dry, and five consecutive dry years from 2020 through 2045.

Chapter 6
Water Shortage Contingency Plan

This Water Shortage Contingency Plan (WSCP) addresses the requirements in Water Code Section 10632 of the Urban Water Management Planning Act (The Act). The WSCP is incorporated into the 2020 Urban Water Management Plan (UWMP) and is used by the Hi-Desert Water District (HDWD or "the District") to respond to water shortage contingencies as they may arise. The WSCP addresses possible conditions in which the water supply available to customers of the District is insufficient to meet the normally expected customer water use at a given point in time due to drought, regulatory action constraints, and natural and man-made disasters. This WSCP describes the District's strategy for allocating water during such water supply shortages, while assuring customers that at all times it will meet the minimum health and safety requirements of a drinking water purveyor.

This WSCP consists of the following required elements:

1. An analysis of water supply reliability.
2. Procedures for conducting an annual water supply and demand assessment.
3. Six standard water shortage levels corresponding to progressive ranges of up to 10, 20, 30, 40, and 50 percent shortages and greater than 50 percent shortage.
4. Shortage response actions that align with the defined shortage levels.
5. Communication protocols and procedures.
6. Customer compliance, enforcement, appeal, and exemption procedures.
7. A description of legal authorities.
8. A description of financial consequences.
9. Monitoring and reporting requirements.
10. Reevaluation and improvement procedures.
11. Special Water Feature Distinction.
12. Plan Adoption, Submittal, and Availability.

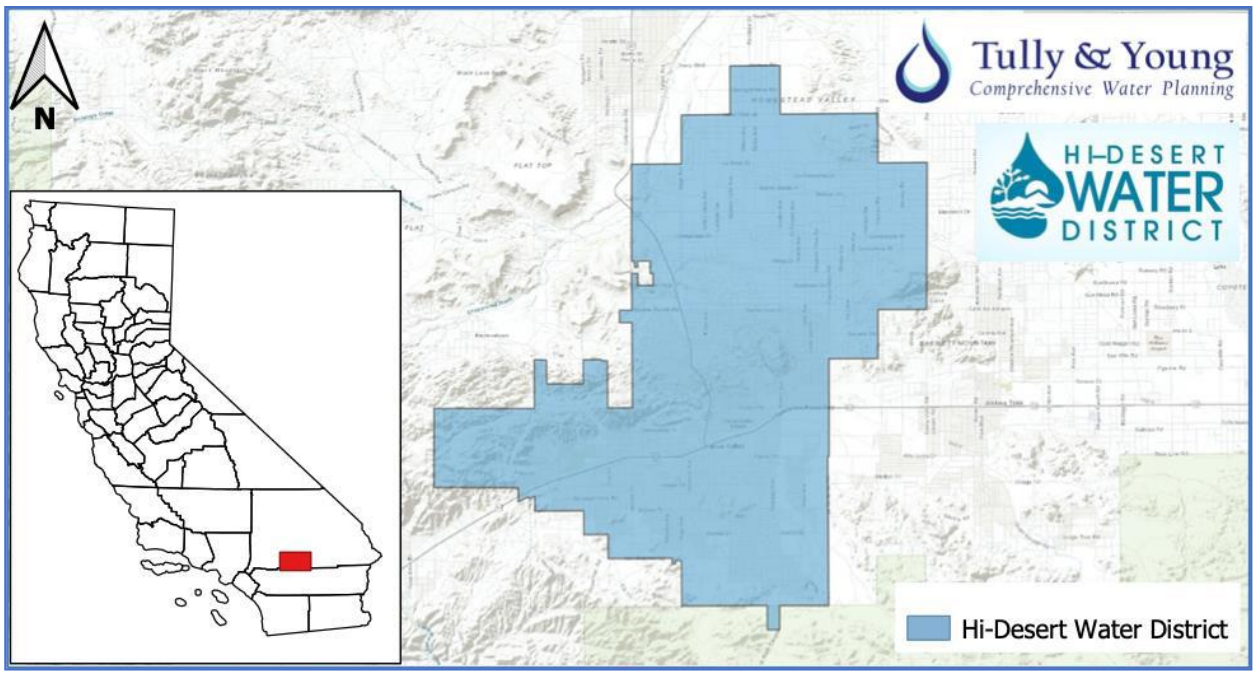
The Act contains specific requirements for each of these elements.[38] As required by Water Code Section 10632 this WSCP is incorporated into the UWMP, yet it is also a stand-alone plan that is adopted independently from the UWMP and may be amended or refined and readopted over coming months and years as needed (see subsection 6.12 Plan Adoption, Submittal, and Availability, below).

The District has enacted Chapter 5.70 Water Use Restrictions Ordinance to address water shortages.[39] These local rules were developed to help manage water shortage conditions in the event of drought, catastrophic outage, or regulatory mandate requiring statewide reduction in water use.

6.1 Water Supply Reliability Analysis

HDWD delivers quality, reliable water and sewer service to about 24,000 people (over 10,500 active water service connections) within a 57-square mile service area that includes the Town of Yucca Valley and unincorporated areas within the County of San Bernardino. The service area for HDWD is shown on Figure 6-1.

Figure 6-1: High-Desert Water District Service Area



HDWD primarily relies on three sources of water: Warren Valley Groundwater Basin, Ames/Reche Valley Groundwater Basin, and imported water which it receives from Mojave Water Agency (MWA), the wholesale water supplier of this area. Imported water is used to recharge the Warren Valley Groundwater Basin. Groundwater sources are subject to management in compliance with the applicable adjudications.

[38] California Water Code Section 10632, available at: (https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=WAT&sectionNum=10632)

[39] Hi-Desert Water District Municipal Code Chapter 5.70 Water Use Restrictions Ordinance

The District's water supply sources may be impacted by climate factors, catastrophic events, and regulatory measures – all of which are considered in the supply analysis in Chapter 3 and the reliability assessment in Chapter 5. The District regularly evaluates its overall water supply reliability through its Urban Water Management Plan and through regional planning efforts in coordination with MWA and other neighboring water purveyors, including Joshua Basin Water District, Bighorn-Desert View Water Agency, and Twentynine Palms Water District.

As described in Chapter 5 of this UWMP, the District has a reliable water supply in normal, single dry and five consecutive dry years through 2045.

Although the District has a secure water supply, this WSCP serves as a roadmap to help the District meet the challenges that may arise from future droughts, regulatory actions, and unforeseen man-made and natural disasters.

6.2 Annual Water Supply and Demand Assessment Procedures

The WSCP describes the District's procedural methodology for managing shortages and conducting its required Annual Water Supply and Demand Assessment (Annual Assessment). The Annual Assessment is to be submitted to California Department of Water Resources (DWR) by July 1 each year with the first Annual Assessment due July 1, 2022. The Annual Assessment examines the District's anticipated water reliability for the current year and one additional dry year. The Annual Assessment will be prepared at the beginning of each calendar year to evaluate near-term water supply reliability and determine what, if any, water shortages stages may be triggered during the required period. The Annual Assessment will be used by HDWD decision-makers to prepare for and initiate implementation of any needed response actions, as well as to inform customers, the general public, interested parties, and local, regional, and state governmental entities to prepare for such required actions.

6.2.1 Analytical and Decision-making Processes

HDWD plans to conduct its Annual Assessment according to the following timeline and process:

By February 1	Initial data collection and analysis
By March 1	Preliminary Draft Annual Assessment internal review and revisions
By April 1	Draft Annual Assessment and results briefing for HDWD decision-makers
By May 1	Public Notification and Release of Draft Annual Assessment
By June 1	Approval of Annual Assessment by HDWD Decision-makers
By June 15	Submit Annual Assessment to DWR in advance of July 1 deadline

The District will prepare its Annual Assessment using the following key data and analytical procedures (which may be modified as needed):

- Prepare supply estimates for each water source on a monthly basis for the analysis period.
- Update unconstrained customer demand and estimate anticipated actual water use on a monthly basis for the analysis period.
- Update infrastructure assessment, including estimated water supply production capability on a monthly basis for the analysis period.
- Identify and quantify any locally applicable factors that may influence or disrupt supplies during the analysis period.
- Refine the definition of "dry year" as relevant to dry conditions like water year 2015 and 2021.
- Identify any shortfall between projected supply and anticipated demand.
- Identify and incorporate any applicable constraints (infrastructure, regulatory, etc.).
- Develop, analyze, and propose water resource management strategies to address any shortfall between projected supply and anticipated demand with reference to the water shortage stages identified in this WSCP.
- Present the Annual Assessment (and resulting water shortage stage declaration, if applicable) to the District decision-makers.

If the results of the Annual Assessment indicate the need for any alternative water shortage response actions which may be addition to those specified in Section 6.4, below, the alternative response actions will be described and submitted in the Annual Assessment, as specified in CWC 10632.2.

6.2.2 Submittal Procedure

The District will submit its Annual Assessment to the DWR via email by June 15 each year, but in no case later than July 1 each year. At the time of DWR submittal, HDWD will also notify the Town of Yucca Valley, MWA, Joshua Basin Water District, Bighorn-Desert View Water Agency, Twentynine Palms Water District, San Bernardino County, the public, and other stakeholders concerning the results of the Annual Assessment and where it is available for review.

6.3 Six Standard Water Shortage Stages and Triggers

New state requirements for the WSCP require water suppliers to adopt six water shortage stages, which correspond to progressively severe water shortage conditions (up to 10%, 20%, 30%, 40%, 50%, and greater than 50% percent shortage), as compared to the normal service reliability condition. The District has adopted the six standard water shortage stages as shown in Tables 6-1 through 6-6 and which are included in Section 5.70.010 of Municipal Code Chapter 5.70 Water Use Restrictions Ordinance. Each stage corresponds to a range of reduction in anticipated water supply availability and is aligned with shortage response actions which can reduce water demand as needed to address the water shortage. Reduction of available water supply by the indicated percentages will trigger an appropriate water shortage stage and the District will implement the response actions identified in Tables 6-1 through 6-6.

6.4 Shortage Response Actions

The WSCP is required to identify locally appropriate shortage response actions that align with the defined shortage stages and include demand reduction actions, supply augmentation actions, system operational changes, and mandatory prohibitions against specific water use practices that are in addition to state-mandated prohibitions and appropriate to the local conditions. For each response action the WSCP is to provide an estimate of the extent to which the gap between supplies and demand will be reduced by implementation of the action. The estimated water savings for each action is identified in terms of a percentage in Tables 6-1 through 6-6.

6.4.1 Stages of Shortage Response Actions

The District has identified shortage response actions to be implemented during each of the six sequential stages and corresponding water shortage conditions. These actions are based on specific hydrological and regulatory conditions and the fundamental need to meet water service requirements within the District's service area. Moreover, the shortage response actions provide the District with some flexibility to address water dynamic water shortage conditions while protecting the District against extreme conditions where supplies are drastically reduced beyond 50%. The following is an overview of the staged response actions the District could follow during a given water shortage condition based on shortage severity, relative supply conditions for each stage, and percent shortage reduction levels. A water shortage declaration would be made by resolution of the HDWD Board of Directors, with administrative discretion delegated to the General Manager.

The shortage response actions derived from Chapter 5.70, Section 5.70.010 of Municipal Code that may be implemented in each stage include, but are not limited to, the following:

Stage 1 (up to 10 percent shortage) "Water Alert" – If water supplies are threatened with constraint, the Plan calls for an introductory Stage 1 drought response, during which customers are informed of possible shortages and asked to voluntarily conserve 10 percent. In addition, customers are prohibited from wasting water or unreasonably using water for beneficial purposes. For example, prohibited water uses under this stage include: allowing water to run off unused into a gutter, ditch, or drain; failing to repair a controllable leak; washing sidewalks, driveways, parking areas, tennis courts, patios, or other paved or areas; utilizing a hand-held hose without an automatic shut-off nozzle; and irrigating during a precipitation event. Additional prohibitions will apply to new developments, including prohibiting single pass-through cooling water systems, commercial car washes and laundries without recirculating water systems, and decorative fountains without recirculating water systems.

This stage includes performing public outreach and education about the shortage and methods individuals can implement to reduce their water use. The District will inform the public and neighboring governmental bodies of the potential shortage condition and will coordinate with customers to implement the actions consistent with this Stage.

Stage 2 (11 - 20 percent shortage) "Moderate Water Shortage" – In the event Stage 2 is implemented the District will continue to encourage community-oriented voluntary conservation measures, enforce conservation measures, and implement mandatory water use reduction measures to decrease demand by up to 20 percent. Stage 2 activities include a continuation of activities described under Stage 1, as

well as greater conservation and water use restrictions. These additional restrictions include beyond those identified in Stage 1, limiting outdoor irrigation only between the hours of 7:00 PM and 10:00 AM and vehicle washing must be done using a bucket or hand-held hose with an automatic shut-off nozzle, or take place at a commercial car wash. Customer baseline water use will be monitored and addressed with excess use above the shortage percentage subject to financial penalties under Section 5.70.020 of the Municipal Code.

The District will also continue to engage in public outreach and education as it applies to the water shortage conditions and the actions necessary to achieve up to 20% reduction in use.

Stage 3 (21 - 30 percent shortage) "Severe Water Shortage" – Stage 3 includes all response actions taken in Stages 1 and 2 and is focused on continuing to encourage customers to voluntarily reduce water use regarding turf watering, fillings pools, etc., mandatory-watering restrictions will be implemented following additional shortage actions described in Stage 2. Increased monitoring related to prescribed water conservation actions will occur under this stage. Customer baseline water use will be monitored and addressed with excess use above the shortage percentage subject to financial penalties under Chapter 5.70 of the Municipal Code.

The District will also continue to engage in public outreach and education as it applies to the water shortage conditions and the actions necessary to achieve up to 30% reduction in use.

Stage 4 (31 - 40 percent shortage) "Critical Water Shortage" – Stage 4 includes all response actions taken in prior stages regarding mandatory conservation and intensifies their implementation and enforcement. Stage 4 restrictions will be implemented if the Stage 3 demand reduction and other response actions are deemed insufficient to achieve reductions due to water supply shortages. All Stage 3 response actions will be intensified, and water production will be monitored daily by HDWD for compliance with necessary reductions. Customer baseline water use will be monitored and addressed with excess use above the shortage percentage subject to financial penalties under Chapter 5.70 of the Municipal Code.

The District will also continue to engage in public outreach and education as it applies to the water shortage conditions and the actions necessary to achieve up to 40% reduction in use.

Stage 5 (41 - 50 percent shortage) "Water Shortage Crisis" – Stage 5 includes all response actions taken in prior stages regarding mandatory conservation. The primary focus of Stage 5 is to ensure the protection of the water supply for all public health and safety purposes. This Stage will require reductions in water demand by up to 50 percent and will follow all voluntary and mandatory actions described in Stages 1-4. Customer baseline water use will be monitored and addressed with excess use above the shortage percentage subject to financial penalties under Chapter 5.70 of the Municipal Code.

The District will also continue to engage in public outreach and education as it applies to the water shortage conditions and the actions necessary to achieve up to 50% reduction in use.

Stage 6 (greater than 50 percent shortage) "Emergency Water Shortage" – Stage 6 includes all response actions taken in prior stages focused on reducing water demands by more than a fifty percent in response to greater than 50 percent water shortages. This stage requires only use of water for human health and safety purposes. No additional water uses are permitted, including any outdoor

irrigation for anything other than maintenance of legacy vegetation. Customer baseline water use will be monitored and addressed with excess use above the shortage percentage subject to financial penalties under Chapter 5.70 of the Municipal Code.

The District will also continue to engage in public outreach and education as it applies to the water shortage conditions and the actions necessary to achieve greater than 50% reduction in use.

Tables 6-1 through 6-6 show a summary of the staged response actions.

Table 6-1. Stage 1 – Water Alert

Stage 1 Water Alert: Savings up to 10%
1. Waste and unreasonable use of water prohibited and voluntary conservation encouraged (up to 10%). 2. Water shortage situation and possible subsequent water shortage stages explained to the public and governmental bodies (up to 10%) 3. Establish customer use baselines. 4. Identify customers with high per capita water usage to achieve proportionally greater reduction than those with low use. 5. Actions may include, but are not limited to: • Public information campaign consisting of distribution of literature, speaking engagements, website updates, bill inserts, and conversation messages printed in local newspapers. • Educational programs in area schools. • Water Conservation Kits (combined up to 10%). 6. Consumption Reduction Methods, including: • Encourage customers to fix leaks or faulty sprinklers promptly (0-1%). • Decorative water features (water fountains, etc.) to recirculate water and be leak proof (0-1%). • Direct customers to irrigate landscapes during cooler morning and evening hours to reduce evaporation and minimize landscape runoff (0-5%). • Landscape watering shall be confined to a user's property and shall not runoff onto adjacent properties, roadsides or gutters (0-5%). • No landscape watering shall occur while it is raining (0-5%). • Use a shutoff nozzle on hoses (0-1%). • Washing down impervious surfaces such as driveways and sidewalks is prohibited unless for public health and safety purposes (0-1%). • Unauthorized use of hydrants is prohibited. Authorization for use must be obtained from water supplier (0-1%). • Commercial, industrial, institutional equipment must be properly maintained and in full working order (0-1%). • Encourage customers to wash only full loads when washing dishes or clothes (0-1%). • Encourage customers to use pool covers to minimize evaporation (0-1%). • Encourage restaurants to only serve water to customers on request (0-1%).

Table 6-2. Stage 2 – Moderate Water Shortage

Stage 2 Moderate Shortage: Savings up to 20%
1. All measures implemented in Stage 1 2. Voluntary conservation usage reductions (up to 20%) 3. Mandatory conservation rules and restrictions and some prohibitions on end uses (10-20%). 4. Water Use Penalties under 5.70.020 available. 5. All consumption reduction methods from Stage 1 and intensified as needed; additionally: • Voluntary outdoor irrigation restrictions including limiting number of watering to 3 days per week, and time when irrigation can occur (e.g., between 7:00 pm and 10:00 am). Plant containers, trees, shrubs and vegetable gardens may be watered additional days using only drip irrigation or hand watering (5-10%). • Fix leaks or faulty sprinklers within 7 days (0-1%). • Restaurants serve water only upon customer request (up to 1%). • Pool covers required (up to 5%) • Non-essential potable water uses strongly discouraged (up to 20%) • No restrictions on landscape watering with non-potable water. • Assess customer usage against baseline (up to 20%)

Table 6-3. Stage 3 – Severe Water Shortage

Stage 3 Severe Shortage: Savings up to 30%
1. All measures implemented in Stages 1 and 2 2. Some or all of the following: • Adherence to customer baselines and actual water use reductions water allocations and mandatory conservation rules (20-30%) • Customer water usage in excess of baseline to be monitored and recorded • Water use prohibitions can include restrictions of days and daytime hours for watering, excessive watering resulting in gutter flooding, using a hose without a positive shutoff device, use of decorative fountains with non-recirculating pumps, washing down sidewalks or patios, not repairing leaks in a timely manner, etc. (up to 30%) 3. All activities are intensified and production is monitored daily for compliance with necessary reductions from customer baseline. (up to 30%) 4. Water Use Penalties under 5.70.020 available 5. All Consumption Reduction Methods from Stage 2 and intensified as needed; additionally: • Fix leaks or faulty sprinklers within 3 days (0-1%). • Decorative water features that use potable water must be drained and kept dry (0-1%). • Car washing is only permitted using a commercial carwash that recirculates water or by high pressure/low volume wash systems (0-1%). • Require a construction water use plan be submitted to the water supplier that addresses how impacts to existing water users will be mitigated (such as dust control) (0-1%). • With the exception of landscapes watered with non-potable water, limit the installation of new landscaping to drought tolerant trees, shrubs and groundcover. Prohibit installation of new turf or hydroseed. Customers may apply for a waiver to irrigate during an establishment period for the installation of new turf or hydroseed. (0-1%) • During Warm/Dry Season: Up to two days per week turf watering when using potable water (5-20%). Cool/Wet Season: Turf shall not be watered unless utilizing non-potable water during extended dry spells (1-5%). • Mandatory rationing (up to 30%)

Table 6.4. Stage 4 – Critical Water Shortage

Stage 4 Critical Shortage: Savings up to 40%
1. All measures implemented in Stages 1-3 2. All activities are intensified and production is monitored daily for compliance with necessary reductions from customer baseline. (up to 40%) 3. All Consumption Reduction Methods from Stage 3 and intensified as needed; additionally: • Fix leaks or faulty sprinklers within 1 day (0-1%). • Existing pools shall not be emptied and refilled using potable water unless required for public health and safety purposes (0-1%). • Water use for new landscape installations or renovations is not authorized (0-1%). • Previous waivers for watering during an establishment period will be revoked (0-1%). • Warm/Dry Season outdoor irrigation: Up to one day per week turf watering when using potable water (10-30%). Cool/Wet Season: Turf shall not be watered unless utilizing non-potable water during extended dry spells (1-5%). 4. Water use penalties under 5.70.020 available.

Table 6-5. Stage 5 – Water Shortage Crisis

Stage 5 Shortage Crisis: Savings up to 50%
1. All measures implemented in Stages 1-4 2. Source of supply for the System is severely curtailed to the level that requires each customer to restrict their water use for only human health and safety purposes (up to 50%) 3. All activities are intensified and production is monitored daily for compliance with necessary reductions from customer baseline (up to 50%). 4. All Consumption Reduction Methods from previous stages and intensified as needed 5. Update current water shortage condition response measures based on Board approvals and direction, state policy directives, emergency conditions, or to improve customer response 6. Water use penalties under 5.70.020 available. 7. Catastrophic Event (Supply reduction up to 50%): Implement Applicable Actions for Catastrophic Events (such as boil water order)

Table 6-6. Stage 6 – Emergency Water Shortage

Stage 6 Emergency Shortage: Savings greater than 50%
1. All measures implemented in Stages 1-5 2. Source of supply for the System is severely curtailed to the level that requires each customer to restrict their water use for only human health and safety purposes. Customer rationing may be implemented. (>50%) 3. All activities are intensified and production is monitored continually for compliance with necessary reductions from customer baseline (more than 50%). 4. All Consumption Reduction Methods from previous stages and intensified as needed 5. Update current water shortage condition response measures based on Board approvals and direction, state policy directives, emergency conditions, or to improve customer response 6. Catastrophic Event (Supply reduction greater than 50%): Implement Applicable Actions for Catastrophic Events.

6.4.2 Demand Reduction Actions

The District has identified a range of available and feasible customer demand reduction actions that can be used adaptively and implemented with progressively greater intensity to meet the supply shortage challenges faced under each water shortage condition. These demand reduction actions are identified by the associated water shortage stage in which they may be implemented. Other response actions not specified in this Plan may also be identified by the District to implement the essential purposes of this Plan or the UWMP (see CWC 10632.2).

Tables 6-1 through 6-6 summarizes HDWD Demand Reduction Actions associated with each water shortage stage and shortage level, provides an estimate of the action's effectiveness as related to that stage.

6.4.3 Mandatory Prohibitions

This section is required to identify any mandatory prohibitions against specific water use practices that are in addition to state-mandated prohibitions and appropriate to the local conditions. HDWD has revised Municipal Code Chapter 5.70 Water Use Restrictions Ordinance to adopt state mandated stages and incorporate mandatory prohibitions. Section 5.70.010 Water Shortage Stages and Water Use Restrictions prohibits intentional or unintentional water waste and unreasonable uses of water and encourages beneficial water use. Certain prohibited activities are also listed among the demand reduction actions on Tables 6-1 through 6-6, which are also included in revised Section 5.70.010.

6.4.4 Emergency Operations Plan for Catastrophic Water Shortages

This section identifies actions to be undertaken by HDWD to prepare for, and implement during, a catastrophic interruption of water supplies. In addition to climate, other events that can cause water supply shortages are earthquakes, chemical spills, dam failures, canal breaks, waterline ruptures, and energy outages at treatment and pumping facilities, which could cause a water shortage severe enough to trigger a Stage 1-6 water supply shortage condition.

The District has an adopted an Emergency Operations Plan, which provides procedures and guidance to District personnel in responding to emergency situations including catastrophic events, both natural and manmade. The plan provides procedures for preparing, mobilizing, and employing District resources and coordinating outside resources during an emergency. The District provides periodic training, including simulated events and responses to keep District personnel fully trained on implementation of emergency procedures. Mobilization is consistent with Standardized Emergency Management and the Incident Command System.

In addition to specific actions to be undertaken during a catastrophic event, HDWD performs maintenance activities, such as annual inspections for earthquake safety, and budgets for emergency items, such as auxiliary generators, to prepare for potential catastrophic events.

Table 6-7 is a summary of actions cross-referenced against specific catastrophes for three of the most common possible catastrophic events: regional power outage (such as Public Safety Power Shutoff or "PSPS" events), natural disasters (such as earthquake, flood or storm damage, or fire), and malevolent acts.

Table 6-7: Summary of Actions for Catastrophic Events

Possible Catastrophe	Summary of Potential Actions
Regional Power Outage	1. Isolate areas that will take the longest to repair and/or present a public health threat. Arrange to provide emergency water. 2. Establish water distribution points and ration water if necessary. 3. If water service is restricted, attempt to provide potable water tankers or bottled water to the area. 4. Make arrangements to conduct bacteriological tests, in order to determine possible contamination. 5. Utilize backup power supply to operate pumps in conjunction with elevated storage.
Natural Disaster	1. Assess the condition of the water supply system. 2. Complete the damage assessment checklist for reservoirs, water treatment plants, system transmission and distribution. 3. Coordinate with Governor's Office of Emergency Services utilities group or fire District to identify immediate firefighting needs. 4. Isolate areas that will take the longest to repair and/or present a public health threat. Arrange to provide emergency water. 5. Prepare report of findings, report assessed damages, advise as to materials of immediate need and identify priorities including hospitals, schools and other emergency operation centers. 6. Take actions to preserve storage. 7. Determine any health hazard of the water supply and issue any "Boil Water Order" or "Unsafe Water Alert" notification to the customers. 8. Cancel the order or alert information after completing comprehensive water quality testing. 9. Make arrangements to conduct bacteriological tests, in order to determine possible contamination.
Malevolent acts	1. Assess threat or actual intentional contamination of the water system. 2. Notify local law enforcement to investigate the validity of the threat. 3. Get notification from public health officials if potential water contamination 4. Determine any health hazard of the water supply and issue any "Boil Water Order" or "Unsafe Water Alert" notification to the customers, if necessary. 5. Assess any structural damage from an intentional act. 6. Isolate areas that will take the longest to repair and or present a public health threat. 7. Arrange to provide emergency water.

6.4.5 Seismic Risk Assessment and Mitigation Plan

Beginning January 2020, CWC Section 10632.5 mandates urban water suppliers include in their UWMP a seismic risk assessment and mitigation plan to assess the vulnerability of each of the various facilities of a water system and mitigate those vulnerabilities. This requirement can be met by submittal of a copy of the most recent adopted local hazard mitigation plan or multi-hazard mitigation plan under the federal Disaster Mitigation Act of 2000 (Public Law 106-390) if the local hazard mitigation plan or multi-hazard mitigation plan addresses seismic risk.

HDWD intends to submit a copy of the San Bernardino County Multi-Jurisdictional Hazard Mitigation Plan, approved by the Federal Emergency Management Agency (FEMA) on July 13, 2017 (HMP). This Hazard Mitigation Plan is currently under review and may have updates before the next Urban Water Management Plan cycle in 2025.

The fundamental hazards identified in this plan include, Earthquake, Wildfire, Flood, Drought, Terrorism and Climate Change. The HMP addresses the vulnerabilities associated with these items, the other plans and financial issues that impact implementation of the HMP, as well as a comprehensive mitigation strategy. Accordingly, the HMP is incorporated by reference into HDWD's WSCP.

6.5. Communication Protocols

The District maintains an established and effective communications program to inform its customers, neighbors, and other stakeholders of water service issues, updates, and policies. Implementation of the WSCP will utilize the existing communication program structure to inform customers and others of the declared shortage stage and respective actions and restrictions in place.

The District Board of Directors meetings addressing the Annual Assessment and any potential water shortage declaration will be noticed using normal District Board meeting public notification procedures. The meeting will also be announced through regular press release protocols.

Once a shortage stage as been declared by the District Board, the District will notify its customers and others through a range of efforts. The stage and restrictions will be identified in a press release, customer billing statements, and posted on the District's website. Specifically, the District's website will be updated to feature the shortage declaration, restrictions, and resources available to customers from the District and other entities to help meet the restrictions. Subsequent District Board meetings will include a review of the shortage condition, customer response results, and discussion and recommendations for potential modifications. The District will also coordinate with the neighboring public agencies to declare a local emergency with respect to anticipated water supplies and demands in the event conditions necessitate.

The District's communications protocols may include, but are not limited to, some or all of the following locally relevant actions. These communications protocols will be used at the discretion of District staff based on then-current and anticipated water shortage conditions:

- Publishing information on HDWD's website.
- Staffing a telephone hotline.
- Providing bill inserts and direct mailings above and beyond those legally required.

- Directly calling and/or emailing customers.
- Developing materials for non-English speaking customers.
- Preparing social media posts to communicate HDWD actions.
- Advertising actions on other local audio and video media.
- Coordinating voluntary and mandatory water conservation activities with other local and regional governing bodies.

HDWD is a member of the regional Alliance for Water Awareness and Conservation (AWAC), a collaborative group of over twenty agencies committed to achieving water conservation goals within the 4,900 square mile service area of the Mojave Water Agency. HDWD will collaborate AWAC to promote a consistent regional water conservation message and use AWAC materials and resources to communicate with the public regarding water conservation actions to address water shortages, as appropriate.

6.6. Compliance and Enforcement

Chapter 5.70 of the Municipal Code provides significant compliance and enforcement actions for the District in implementing its water shortage planning. Financial penalties, flow restrictors, and disconnected water service are among the options available to the District to ensure compliance with the required water shortage actions. Appeals processes are also available for those that are subject to the enforcement provisions of the Municipal Code.

6.7. Legal Authorities

The District is empowered to implement and enforce its WSCP by means of Municipal Code Chapter 5.70 Water Use Restrictions Ordinance.

In addition, the District is able to exercise general powers granted to water distributors in CWC §§350-359. CWC §350 authorizes the governing body of a distributor of a public water supply to declare a water shortage emergency whenever it finds and determines that the ordinary demands and requirements of water consumers cannot be satisfied without depleting the water supply of the distributor to the extent there would be insufficient water for human consumption, sanitation, and fire protection. Upon a finding of such an emergency condition, the distributor can adopt such regulations and restrictions on the delivery and consumption of water as will conserve the water supply for the greatest public benefit, with particular regard to domestic use, sanitation, and fire protection (CWC §353). The regulations and restrictions remain in force and effect until the supply of water available for distribution within such area has been replenished or augmented, and restrictions may include the right to deny new service connections and discontinue service for willful violations (CWC §355 and §356). The District also coordinates with the Town of Yucca Valley and San Bernardino County within which it provides water supply services for the possible proclamation of a “local emergency” under California Government Code, California Emergency Services Act (Article 2, Section 8558).

6.8. Financial Consequences of WSCP

The Act requires an analysis of the impacts of implementation of this WSCP and likely financial consequences to the District. This section addresses aspects of revenue reduction, expense increases, and additional costs that may arise, and identifies financial response actions.

6.8.1 Revenue and Expenditure Impacts

HDWD has established water rates that support its on-going operation and maintenance activities, as well as the capital projects required to provide a safe and reliable water supply to its customers. Water rates are tied to HDWD's customers' normal water consumption activities, which will be reduced through voluntary or mandatory water conservation by customers. Thus, in times of shortage, there will be revenue reductions to HDWD. In addition to the revenue reductions, HDWD will also experience an increase in expenses resulting from augmented communication actions, increased enforcement activities, and the administration of water shortage management actions identified in the WSCP.

When a drought or water shortage occurs, the District's costs increase due to the additional activities and duties of instituting a stage of action. Not only will there be costs for materials, and time from permanent staff, but additional staff may need to be hired to assist in implementing the Water Shortage Contingency Plan. Staff will regularly report the identified and anticipated revenue and expenditure impacts and recommend appropriate responses to the District Council. 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 reevaluate consumption rates during the yearly rate review.

6.8.2 Drought Rate Structures and Surcharges

HDWD does not currently have drought rate structures or surcharges. As water rate structures are subject to the yearly rate review, the District may choose to consider adopting drought rate structures or surcharges to address the financial consequences of longer-term water shortages. Should the District decide to proceed, such rate changes would be adopted in compliance with then current legal requirements.

6.9. Monitoring and Reporting

The District will conduct regular monitoring and reporting to ensure WSCP implementation is effective and responsive to conditions as they unfold. The District will then use this information to restore and maintain the water supply and demand balance. Similar to the supply and demand projections used to establish a shortage condition, the District will monitor the same data to determine effectiveness and efficacy.

Monitoring activity is expected to include, but not be limited to:

- Gathering monthly or bi-weekly customer water use data.
- Preparing technical assessments of customer water use and identifying deficiencies.
- Analyzing trends in water supply availability, including meteorological events, regional water supply coordination actions, and statewide regulatory trends.
- Assessing water conservation activities and the effectiveness of enforcement actions as applicable to achieving conservation objectives.

District staff will report to decision makers at least quarterly on status and results. Data reporting will include preparation of written reports and presentations, as necessary, for HDWD management meetings and other public meetings summarizing key information and data, including but not limited to:

- Actual water demands compared to projected demands by customer class and in total.
- Actual supply availability and utilized compared to projected availability for each supply source.
- Projected supply availability for next 12 months for each supply source.
- Monthly reporting of water production and conservation, as required by the State Water Resources Control Board.

These and other data will be regularly evaluated by staff to assess the effectiveness of response measures and to identify the need for any changes or modifications to the declared water shortage stage or actions based on the results. With regard to monitoring and reporting, District staff may determine the need for additional monitoring and reporting measures, or the need to develop or amend ordinances, or update the WSCP as a whole. Any WSCP update or modification will be conducted through the District Board meeting process, unless specific conditions require otherwise.

6.10. Re-evaluation and Improvement Procedures

HDWD will continually review and assess its procedures for implementing the WSCP. Specifically, HDWD will use the monitoring and reporting protocols identified above as a quality assurance and quality control measure to understand the effectiveness of water conservation activities. These re-evaluation and improvement procedures will include developing reports, memoranda, and presentations that assess the effectiveness of water conservation actions and the WSCP. These materials will be provided to HDWD's customers and decision-makers for consideration. Public comments on the published materials and management considerations should be incorporated into the development and implementation of future actions. These protocols will be continually assessed and updated by HDWD management staff.

6.11. Special Water Feature Distinction

For purposes of water shortage contingency planning and implementation, the District defines as "special water features" those that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains. Such special water features are considered distinct from swimming pools and spas (as defined in subdivision (a) of Section 115921 of the Health and Safety Code).

Water shortage response actions will focus on health and safety issues and balancing continuation of these uses with the severity of the water shortage condition. The relative total water use from these sources is a consideration for how special water features and swimming pool uses could be curtailed during specific water shortage conditions. For instance, when swimming pool filling and refilling would exceed a customer's use allocation under the various drought stages in the Municipal Code, then these actions are prohibited and can be subject to drought penalties and other District enforcement actions. HDWD determined that special water features are a relatively small discretionary use but may be restricted under all identified water shortage condition.

6.12. Plan Adoption, Submittal, and Availability

The WSCP has been adopted, submitted, and is available as required by the Urban Water Management Planning Act. As a stand-alone document, the WSCP is also subject to the following separate adoption, submittal, and availability processes, and whenever it is separately amended or revised in the future. HDWD may refine or amend this WSCP as necessary and in compliance with the normal public notice and adoption. HDWD has followed all applicable law in adopting the WSCPs. The current adopted WSCP shall be available to District customers and to the Town of Yucca Valley, MWA, Joshua Basin Water District, Bighorn-Desert View Water Agency, Twentynine Palms Water District, and San Bernardino County within 30 days of its adoption. A copy of the current WSCP is available for public inspection during business hours at the Hi-Desert Water District Office, 55439 29 Palms Highway, Yucca Valley (subject to current COVID 19 restrictions). The current WSCP is posted and available for download here https://www.hdwd.com/228/Reports-Plans.

Appendix A
Delta Reliance Analysis

This Appendix provides the Delta Reliance assessment for Hi-Desert Water District (HDWD or District). The Mojave Water Agency (MWA) service area boundary includes the following retail water service agencies: Liberty Utilities – Apple Valley Water Company, Bighorn-Desert View Water Agency, City of Adelanto Water District, San Bernardino County Service Area 64, San Bernardino County Service Area 70J, Golden State Water Company – Barstow System, Helendale Community Services District, Hesperia Water District, Hi-Desert Water District, Joshua Basin Water District, Phelan Pinon Hills Community Services District, and Victorville Water District. These retail agencies are subject to the minimum threshold requirements of the Urban Water Management Planning Act (UWMP Act) and work with MWA on managing regional water supplies. Additional entities that are not currently subject to the UWMP Act but may be subject to the UWMP Act in the future and that rely upon water supplies derived from MWA's and the retail agencies' management are also considered in this assessment. This assessment is consistent with all applicable water management activities within the MWA service area boundary including the Mojave Basin Area Adjudication, the Warren Valley Basin Judgment, and the Ames/Reche Groundwater Storage and Recovery Program Management Agreement.

A.1 Delta Reform Act and Certification of Consistency

The Delta Reform Act of 2009 required state and local agencies to prepare a written certification of consistency with Delta Plan policies before initiating a covered action in the Delta.[40] The written certification of consistency must be submitted to the Delta Stewardship Council and include detailed findings as to whether the covered action is consistent with applicable Delta Plan policies.[41] The submitted certification of consistency may be appealed by any person and the Delta Stewardship Council may grant the appeal to address contested issues.[42] In short, water suppliers that anticipate participating in a proposed covered action must comply with the requirements of the Delta Reform Act. For more detail on the specific provisions of the Delta Reform Act covered by this Delta Reliance Analysis, see Mojave Water Agency's 2020 Urban Water Management Plan, Appendix A.

[40] California Water Code section 85057.5.
[41] California Water Code section 85225.
[42] California Water Code section 85225.10-85225.25.

A.2 Expected Outcomes for Reduced Delta Reliance and Regional Self Reliance

The expected outcomes for this Delta reliance and improved regional self-reliance assessment were developed using guidance described in Appendix C of DWR's Urban Water Management Plan Guidebook 2020 issued in March 2021 (Guidebook 2020). The data used in this assessment represent the total regional efforts of MWA and the retail agencies and were developed as part of a region-wide coordination process. Table A-1 shows MWA's expected outcomes for reduced Delta reliance.

Table A-1: Expected Outcomes for Reduced Reliance on the Delta

Year	2010	2015	2020	2025	2030	2035	2040	2045
Total Water Supplies from the Delta Watershed	34.2%	34.2%	31.9%	28.7%	26.2%	24.4%	22.9%	22.2%
Change in Water Supplies from the Delta Watershed		-0.1%	-2.4%	-5.6%	-8.0%	-9.8%	-11.4%	-12.1%

Table A-2 shows the expected outcomes for supplies contributing to regional self-reliance.

Table A-2: Supplies Contributing to Regional Self-Reliance

The data presented in this section demonstrate the expected outcomes for reduced Delta reliance and regional self-sufficiency. The information contained in this Appendix is also intended to be an addendum to the District's 2015 UWMP consistent with WR P1 subsection (c)(1)(C). The information has been noticed and presented in accordance with applicable law. Further information related to these determination may be found in Mojave Water Agency's 2020 Urban Water Management Plan, Appendix A.