CITY OF HEALDSBURG

RESOLUTION NO. 122-2021

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF HEALDSBURG ADOPTING THE CITY OF HEALDSBURG'S 2020 URBAN WATER MANAGEMENT PLAN AND WATER SHORTAGE CONTINGENCY PLAN

WHEREAS, California's Urban Water Management Planning Act requires urban water suppliers with more than 3,000 customers to prepare and submit an Urban Water Management Plan ("UWMP") every five years; and

WHEREAS, the general purpose of the UWMP is to demonstrate that the urban water supplier has adequate water supplies to meet future water demands; and

WHEREAS, public workshops were held on May 18, 2021, August 23, 2021 and September 22, 2021 to gain public input on forecasted water demands and water supplies; and

WHEREAS, the 2020 UWMP includes discussion of increasing water supplies through aquifer storage and recovery and the need for continued water conservation and demand management measures; and

WHEREAS, under section 15378(b)(2) of the California Environmental Quality Act, continued administrative actions do not qualify as a "Project". Therefore, no further CEQA or environmental review is required.

NOW, THEREFORE BE IT RESOLVED, that the City Council of the City of Healdsburg hereby adopts the City of Healdsburg's 2020 Urban Water Management Plan and Water Shortage Contingency Plan and directs staff to file the plan with the Department of Water Resources.

PASSED, APPROVED AND ADOPTED, this 18th day of October 2021, by the following vote:

AYES:	Councilmembers: (5)	Hagele, Jimenez, Kelley, Palacios and Mayor Mitchell
NOES:	Councilmembers: (0)	None
ABSENT:	Councilmembers: (0)	None
ABSTAINING:	Councilmembers: (0)	None

SO ORDERED:

Evelyn L. Mitchell, Mayor

ATTEST:

Raina Allan, City Clerk

I, RAINA ALLAN, City Clerk of the City of Healdsburg, do hereby certify that the foregoing is a full, true, and correct copy of Resolution No. 122-2021 adopted by the City Council of the City of Healdsburg on the 18th day of October, 2021.

Raina Allan, City Clerk

Errata Sheet for Minor Corrections to
City of Healdsburg 2020 Water Shortage Contingency Plan (UWMP)

This errata sheet logs minor content errors that were identified after final adoption of the City of Healdsburg 2020 WSCP. DWR has determined that these corrections are minor and do not require the UWMP to be amended.

☐ These data errors have been corrected in the Department of Water Resources (DWR) UWMP database at https://wuedata.water.ca.gov/secure/

☐ This errata sheet has been filed with the UWMP in all locations where it is made publicly available, including the California State Library. Errata may be submitted to State Library via email to cslgps@library.ca.gov

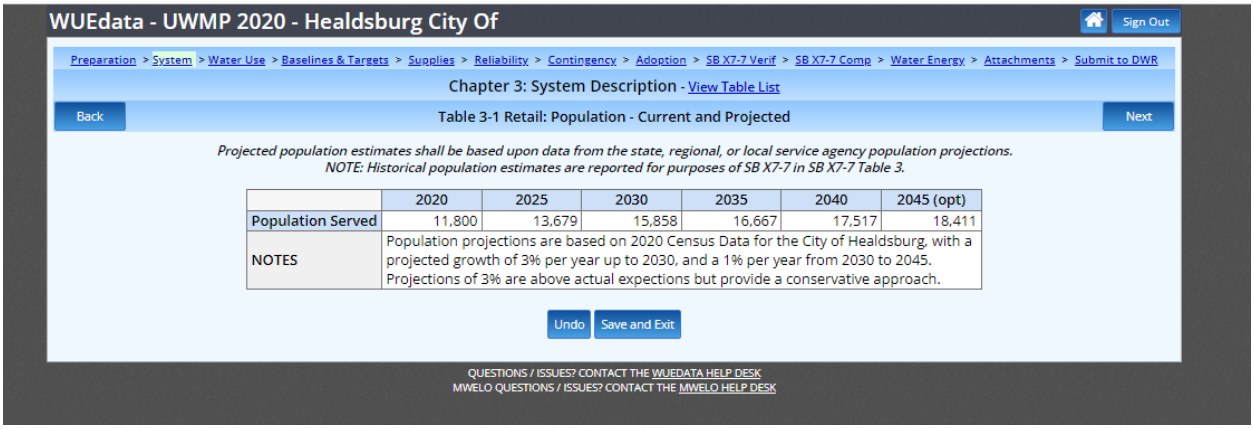
Name and agency of the person filing errata sheet:

Patrick D. Fuss, P.E.
Utility Engineering Manager
Municipal Utility Department
City of Healdsburg

#	Description of Correction	Location	Rationale	Date Error Corrected
1	WUEdata Table 3R was revised to match Table 3-2a in the 2020 UWMP	Page 15	WUEdata Table 3-1 Retail Population incorrectly reported population projections.	October 14, 2022
2	Table 8-3R in WUEdata and Table 8-3 in UWMP have been updated to include an action for each water shortage response level.	Page 69	The table must contain at least one row for each of the six levels.	October 14, 2022
3	Table 7-5 for Wholesale water has uploaded as an attachment with this errata.	Page 59	If a supplier is both a wholesaler and a retailer, it must provide two DRAs by using Table 7-5, one for the retail operation and one for the wholesale operation.	October 20, 2022

Please see following page for screen shots of the corrections .

Correction 1 Screen shot



WUEdata - UWMP 2020 - Healdsburg City Of

Sign Out

Preparation > System > Water Use > Baselines & Targets > Supplies > Reliability > Contingency > Adoption > SB X7-7 Verif > SB X7-7 Comp > Water Energy > Attachments > Submit to DWR

Chapter 3: System Description - View Table List

Back | Table 3-1 Retail: Population - Current and Projected | Next

Projected population estimates shall be based upon data from the state, regional, or local service agency population projections.
NOTE: Historical population estimates are reported for purposes of SB X7-7 in SB X7-7 Table 3.

	2020	2025	2030	2035	2040	2045 (opt)
Population Served	11,800	13,679	15,858	16,667	17,517	18,411
NOTES	Population projections are based on 2020 Census Data for the City of Healdsburg, with a projected growth of 3% per year up to 2030, and a 1% per year from 2030 to 2045. Projections of 3% are above actual expections but provide a conservative approach.					

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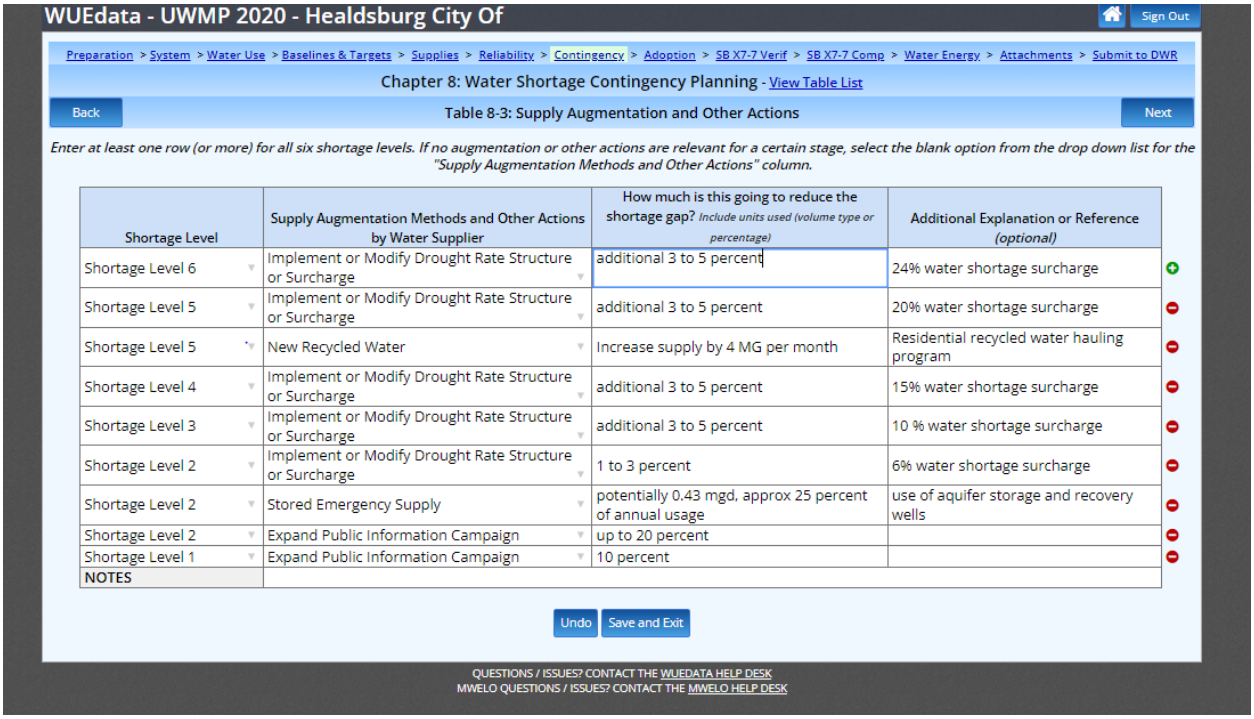
QUESTIONS / ISSUES? CONTACT THE WUEDATA HELP DESK
MWELO QUESTIONS / ISSUES? CONTACT THE MWELO HELP DESK

Correction 2 Screen Shot



WUEdata - UWMP 2020 - Healdsburg City Of

Sign Out

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Chapter 8: Water Shortage Contingency Planning - View Table List

Back | Table 8-3: Supply Augmentation and Other Actions | Next

Enter at least one row (or more) for all six shortage levels. If no augmentation or other actions are relevant for a certain stage, select the blank option from the drop down list for the "Supply Augmentation Methods and Other Actions" column.

Shortage Level	Supply Augmentation Methods and Other Actions by Water Supplier	How much is this going to reduce the shortage gap? *Include units used (volume type or percentage)*	Additional Explanation or Reference *(optional)*
Shortage Level 6	Implement or Modify Drought Rate Structure or Surcharge	additional 3 to 5 percent	24% water shortage surcharge
Shortage Level 5	Implement or Modify Drought Rate Structure or Surcharge	additional 3 to 5 percent	20% water shortage surcharge
Shortage Level 5	New Recycled Water	Increase supply by 4 MG per month	Residential recycled water hauling program
Shortage Level 4	Implement or Modify Drought Rate Structure or Surcharge	additional 3 to 5 percent	15% water shortage surcharge
Shortage Level 3	Implement or Modify Drought Rate Structure or Surcharge	additional 3 to 5 percent	10 % water shortage surcharge
Shortage Level 2	Implement or Modify Drought Rate Structure or Surcharge	1 to 3 percent	6% water shortage surcharge
Shortage Level 2	Stored Emergency Supply	potentially 0.43 mgd, approx 25 percent of annual usage	use of aquifer storage and recovery wells
Shortage Level 2	Expand Public Information Campaign	up to 20 percent	
Shortage Level 1	Expand Public Information Campaign	10 percent	
NOTES			

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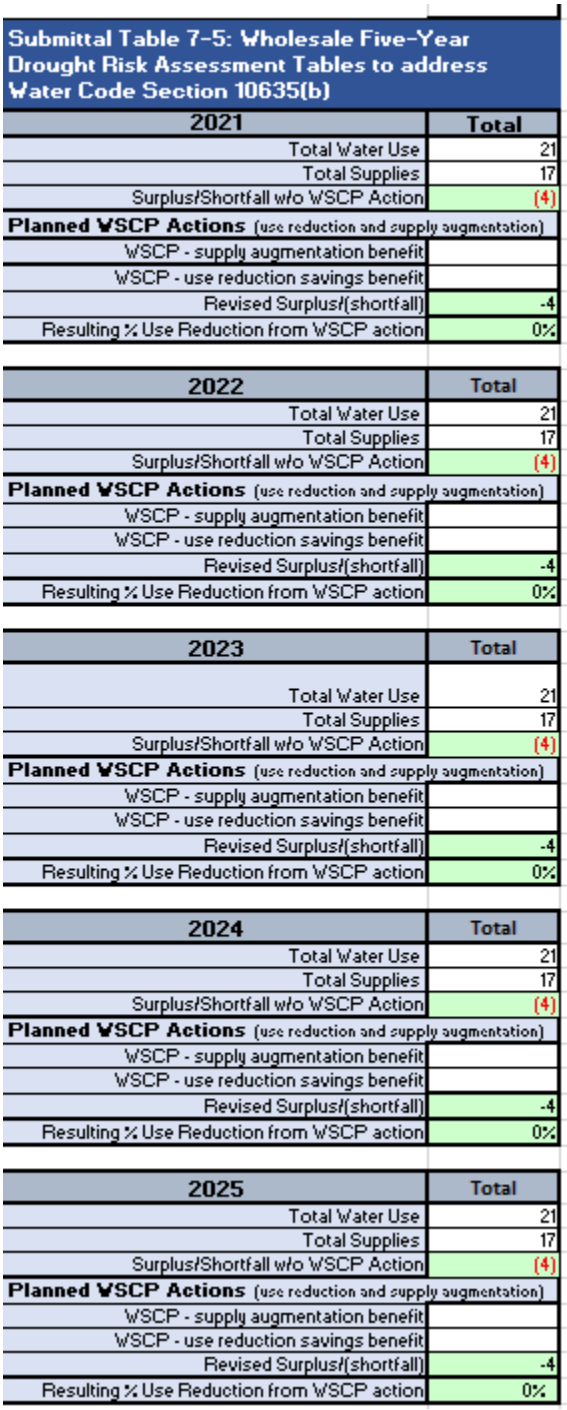
QUESTIONS / ISSUES? CONTACT THE WUEDATA HELP DESK
MWELO QUESTIONS / ISSUES? CONTACT THE MWELO HELP DESK

Correction 3 Screen Shot – Uploaded as an attachment



Submittal Table 7-5: Wholesale Five-Year Drought Risk Assessment Tables to address Water Code Section 10635(b)

2021	Total
Total Water Use	21
Total Supplies	17
Surplus/Shortfall w/o WSCP Action	(4)
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	
Revised Surplus/(shortfall)	-4
Resulting % Use Reduction from WSCP action	0%

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WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	
Revised Surplus/(shortfall)	-4
Resulting % Use Reduction from WSCP action	0%

2024	Total
Total Water Use	21
Total Supplies	17
Surplus/Shortfall w/o WSCP Action	(4)
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	
Revised Surplus/(shortfall)	-4
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Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	
Revised Surplus/(shortfall)	-4
Resulting % Use Reduction from WSCP action	0%

Note: Totals can be entered directly or from the Optional Planning Tool available in a different Excel Workbook, available

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Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
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Resulting % Use Reduction from WSCP action	0%

2020 URBAN WATER MANAGEMENT PLAN UPDATE

City of Healdsburg
Utility Department

October 2021

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Appendices

Acronym List

ABAG	Association of Bay Area Governments
Act	Urban Water Management Planning Act
AF	Acre-foot or acre-feet
AFY	Acre-feet per year
BMP	Best Management Practice
BiOp	Biological Opinion
CDPH	California Department of Health
CII	Commercial, Industrial, and Institutional
Corps	United States Army Corps of Engineers
CSA	County Service Area
CUWCC	California Urban Water Conservation Council
CWC	California Water Code
DDW	State Water Resources Control Board's Division of Drinking Water
DMM	Demand Management Measure
DWR	California Department of Water Resources
EIR	Environmental Impact Report
EOP	Emergency Operations Plan
ETo	Evapo-transpiration
GPCD	Gallons per capita per day
IPR	Indirect Potable Reuse
ITP	Independent Technical Panel
MCL	Maximum Contaminant Level
MPA	Microscopic Particulate Analysis
NAICS	North American Industry Classification System
NMFS	National Marine Fisheries Service
SB X7-7	Water Conservation Act of 2009
SCWA	Sonoma Water formerly Sonoma County Water Agency
SWRCB	State Water Resources Control Board
TPW	County of Sonoma's Department of Transportation and Public Works
UWMP	Urban Water Management Plan
WSCP	Water Shortage Contingency Plan
WSEP	Water Shortage Emergency Plan
WWTP	Wastewater Treatment, Reclamation and Disposal Facility

1. Plan Development and Adoption

1.1 Executive Summary

The City of Healdsburg is located in Sonoma County roughly 70 miles north of San Francisco. The City's water distribution system serves a population of roughly 11,800 through 4,532 water meters; of which 550 are commercial accounts, 36 are industrial accounts, and 3,946 serve residential water customers. The City also provides potable water to roughly 350 residences within the Fitch Mountain Water District (County Service Area 41). The provisioning of water to the Fitch Mountain Water District is allowed through a wholesale water contract with the County of Sonoma.

To provide potable water to Healdsburg and the Fitch Mountain Water District, the City's Utility Department pulls water from both the Russian River and Dry Creek. This diversion of water is allowed through four water-rights: three on the Russian River and one on Dry Creek. The City also contracts with Sonoma Water (formerly Sonoma County Water Agency) for a backup supply of water should the City's water rights become unavailable.

As the City relies on both the Russian River and Dry Creek for its potable water supply, the City's water supply reliability mirrors water storage within both Lake Mendocino and Lake Sonoma. In years of normal, and even slightly below average rainfall, storage within these reservoirs helps to maintain and adequate water supply year-round. In years of extremely low rainfall, storage within these reservoirs can be depleted requiring communities and agricultural users within the Russian River watershed to conserve water.

As detailed within the 2020 UWMP, in normal water years the City has adequate water rights to meet the City's current water demand and forecasted needs over the next 25 years. During dry years, when the City's water supplies are constrained by low flows within the Russian River and Dry Creek, this plan shows a need for mandatory conservation measures. Under a worst-case condition (single dry year) the level of needed mandatory conservation could reach 50%.

To forecast future water demands used in the 2020 UWMP, historical population as well as historical water usage where trended to estimate future demands. To create a conservative approach, the 2020 UWMP assumes a three-percent annual population growth between 2020 and 2030 and a one-percent population growth between 2030 and 2045. While Healdsburg's typical population growth is less than one percent per year, using a three percent growth creates a conservative assessment of the City's water supply versus demand. The same method was used in the 2015 UWMP and resulted in an over forecasting of population and water demand. The 2020 UWMP is again taking this conservative approach to planning the City's water needs and available supply.

To effect meaningful water conservation programs, the City's water department funds a portion of one full-time employee to administer water conservation programs. The City is also a member of the Sonoma-Marin Saving Water Partnership (Partnership). The Partnership represents 12 water utilities in Sonoma and Marin counties who have partnered to provide regional solutions for water use efficiency. In addition to the Partnerships recommendations and implementation of efficient water measures, the City of Healdsburg provides City administered and funded water conservation programs to assist customers in gaining long-term reductions in water use. Through rebates, education and outreach, Healdsburg has been able to reduce water use by incentivizing lawn conversions, clothes washers, and toilet replacements while also providing free low-flow showerheads and faucet aerators. This work helps to reduce the City's overall water usage.

The City of Healdsburg encourages active community participation in its urban water management planning efforts. To allow for community engagement the City held public workshops on May 18, August 23, and September 22, 2021. The workshops helped to gather feedback which was incorporated into the final document. Final approval of the 2020 UWMP is planned for October 18, 2021, during a regularly scheduled City Council meeting.

2. Chapter 2 Plan Preparation

This chapter describes the preparation of the City's 2020 Urban Water Management Plan and Water Shortage Contingency Plan including efforts in coordination and outreach.

2.1 Plan Preparation

This chapter includes the following sections for guidance on preparing a UWMP: basis for preparing a plan, regional planning, individual or regional planning, compliance fiscal or calendar year and units of measure and coordination and outreach.

2.2 Basis for Preparing a Plan

The Urban Water Management Plan (UWMP) Act, as codified in California Water Code (CWC) Sections 10610 through 10656, requires urban water suppliers with 3,000 or more service connections or supplying 3,000 or more acre-feet of water per year are required to prepare an UWMP. The City manages PWS CA491005, which is regulated by the State Water Resources Control Board, Division of Drinking Water. In 2020, the City had 4,352 connections within its service territory and, therefore, meets the threshold for this State requirement.[1] The City's is also defined as a wholesaler since it supplies drinking water to the County of Sonoma's CSA 41

2.2.1 Public Water Systems

Public water systems are the distribution systems that provide drinking water for human consumption. All public water systems are given a unique Public Water System Identification Number (PWSID). These systems are regulated by the State Water Resources Control Board (State Water Board), Division of Drinking Water.

As defined by the CWC, a public water system is a system which provides water for human consumption, through pipes or other constructed conveyances: that has 15 or more service connections; or regularly serves at least 25 individuals daily at least 60 days out of the year. Table 2-1 summarizes the City of Healdsburg's public water system information for the year 2020.

Table 2-1 Retail: Public Water Systems

Submittal Table 2-1 Retail Only: Public Water Systems			
Public Water System Number	Public Water System Name	Number of Municipal Connections 2020	Volume of Water Supplied 2020 *
4910005	City of Healdsburg	4,352	661
TOTAL		**4,532**	**661**

[1] Source: Healdsburg's Utility Billing Department

2.3 Regional Planning

The City regularly meets with Sonoma Water staff to discuss and coordinate regional efforts. In addition, the City has joined the Sonoma Marin Saving Water Partnership to develop and implement water conservation programs throughout the North Bay.

The City also collaborates with Sonoma County's Regional Climate Protection Authority (RCPA), the eight incorporated jurisdictions of Sonoma County, as well as the County of Sonoma itself, to create and implement a Climate Mobilization Strategy (see Section 3.3 for more information about this plan to mitigate climate change).

The City is a member of the Russian River Watershed Association (RRWA); a coalition of ten cities, counties and special districts in the Russian River watershed that coordinate regional programs for clean water, habitat restoration, watershed enhancement, and conservation.

2.4 Individual or Regional Planning and Compliance

The Act allows for the preparation of UWMPs by a group of water suppliers or as an individual water supplier. As illustrated in Table 2-2 below, the City is an individual water supplier and developed this UWMP as an individual UWMP addressing all requirements of the CWC.

Table 2-2. Plan Identification

☑	**Type of Plan: Individual UWMP**

2.5 Fiscal Calendar Year and Units of Measure

2.5.1 Fiscal or Calendar Year

This UWMP reports data on a calendar year basis starting on January 1 and ending December 31. As required for UMWPs for the year 2020, the City has included water use and planning data for the entire calendar year of 2020.

2.5.2 Reporting Complete 2020 Data

This UWMP reports data on a calendar year basis unless otherwise noted. Section 5 discusses baselines and targets in terms of gallons per capita per day (gpcd), compliant with SB X7-7.

2.5.3 Unit of Measure

Water quantities are measured in million gallons (MG), unless otherwise noted. Section 5 discusses baselines and targets in terms of gallons per capita per day (gpcd), compliant with SB X7-7.

Table 2-3. Supplier Identification

☑	Supplier is a wholesaler
☑	Supplier is a retailer
Fiscal or Calendar Year	
☑	UWMP Tables are in calendar years

Units of measure used in UWMP	
Unit	Million Gallons (MG)

2.6 Coordination and Outreach

The City meets regularly with the Sonoma Water, the County of Sonoma, Department of Transportation and Public Works (TPW), and other water rights holders along the northern Russian River, including vineyard owners. Table 2-4 identifies the various agencies and entities that the City is coordinating with during the UWMP preparation process, and/or on an ongoing basis in relation to water supply planning.

Table 2-4a Retail: Water Supplier Information Exchange

The retail Supplier has informed the following wholesale supplier(s) of projected water use in accordance with Water Code Section 10631.
Sonoma Water[1]

[1]*City has a water purchase agreement with Sonoma Water (formerly Sonoma County Water Agency).*

Table 2-4b Wholesale: Water Supplier Information Exchange

☑	Supplier has informed 10 or fewer other water suppliers of water supplies available in accordance with Water Code Section 10631.
Water Supplier Name: Russian River Utility (CSA 41)	

2.6.2 Coordination with Other Agencies and the Community

While the City of Healdsburg primarily relies on its own water rights, Healdsburg does have a backup water supply agreement with Sonoma Water. As Sonoma Water manages in-river flows and reservoir levels along with state and federal agencies. The City coordinates with and provides Sonoma Water with water demand updates.

Urban water suppliers are required by the Act to encourage active involvement of the community within the service area during the preparation of its UWMP. The City held a virtual informational meeting on May 18, 2021 to provide the public with an update on the preliminary results of the 2020 UWMP and encouraged public input. A second informational meeting was hosted by the City Council of the City of Healdsburg on August 23, 2021 to request more feedback and input prior to the public hearing, review and adoption of the 2020 UWMP.

The City will include a public notice in the Healdsburg Tribune on September 9, 2021 and September 16, 2021 notifying the public of the City's intent to update its UWMP and Water Shortage Contingency Plan. The City held the formal public hearing at the City Council Chambers on September 20, 2021. More information about the public hearing and the adoption of the 2020 UWMP is presented in Section 10 of this UWMP.

2.6.3 Notice to City and Counties

The City notified Sonoma Water and the County of Sonoma that the City of Healdsburg's UWMP was being reviewed and updated. Letters were sent on March 10, 2020.

3. System Description

This section describes the physical characteristics of the City's water service area, the current and projected population for the service area, climate, and the social, economic, and demographic factors affecting the City's water management planning.

3.1 General Description

The City of Healdsburg is in the County of Sonoma, approximately 12 miles north of the City of Santa Rosa. Healdsburg is within the nine-county San Francisco Bay Region. The location of Healdsburg in California is shown in Figure 3-1

The City of Healdsburg is in an inland valley between Highway 101 and the Russian River, which flows southward to the east of the City and crosses through the southern portion of the City in a westerly direction. The City's water service area is roughly equivalent to the City Limit. Figure 3-1 shows the City Limit, sphere of influence, and water distribution areas, which includes CSA 41/24 to which the City is a wholesale water supplier.

The Healdsburg City Council is the governing entity of the City. The Council consists of five council members that serve four-year terms and appoint a Mayor once per year. The Council sets policy and adopts a budget for the City bi-annually.

The City has developed and adopted several area planning documents, including:

- Healdsburg 2030 General Plan
- City of Healdsburg Water System Master Plan
- North Entry Area Plan
- Central Healdsburg Avenue Plan
- Saggio Hills Area Plan

These documents provide information to the public and decision-makers regarding the City's goals, policies, and implementation programs including sphere of influence and land use, development opportunities and constraints, and planned and recommended infrastructure improvements.

Historically, the City's economy was supported by agriculture and logging. In more recent years, the City has experienced an increase in urban development and a diversification of the local economy with tourism as a dominant element of the economy.

The City's drinking water system includes the operation of; thirteen water production wells, their water treatment systems and equipment at each of three well fields, the water treatment plant, a single raw water reservoir and seven treated water storage reservoirs, five booster pump stations, and eight pressure reducing stations.

Water treatment at the three production locations, in addition to ultra-filtration at the water treatment plant, consists of: disinfection with on-site generated sodium hypochlorite (bleach), fluoridation for dental benefit, and the addition of blended liquid poly and ortho-phosphates for corrosion control.

There are two major multi-purpose reservoirs in the Russian River watershed. Lake Sonoma on Dry Creek, approximately 15 miles northwesterly of Healdsburg, and Lake Mendocino on the Russian River, approximately 45 miles northerly of Healdsburg, and 3.5 miles northerly of Ukiah, in Mendocino County.

The City has four permits from the California State Department of Water Resources for the diversion of municipal drinking water. Three permits are located on the Russian River and one is located on Dry Creek. Four production wells on the Russian River (Gauntlett Well Field) can be used year-round, as they produce water that is ultra-filtered at the City's Water Treatment Plant. Six production wells (five in service) on the Russian River (Fitch Well Field) are seasonal and are restricted to operation May through October. The City's permit for the use of water from five wells on Dry Creek is limited to use from April 1 to November 1. In a 2006 Decision of the State Water Resources Control Board, the City's Dry Creek well field was added as a point of diversion under the Sonoma County Water Agency's permits.

The City has an Agreement with Sonoma Water, formerly Sonoma County Water Agency, dated November 17, 1992, that allows the City's water diversions to be reported under this agency's water rights permits for the Russian River and Dry Creek, but only if the City is unable to divert water under its own water rights permits or if water diversion exceeds maximum diversion rates. An amended agreement with the agency was made December 2015 and allows a maximum diversion of 425 ac-ft per year from any of the City's well fields.

Improvements to infrastructure to enhance reliability and/or security include: upgraded size and construction of Sunset Reservoir, a new roof on Gauntlett Reservoir, and various well field rehabilitation projects. Feasibility study of a water treatment facility at the Fitch well field, as well as the planned disinfection and treatment improvements at Dry Creek, will further contribute to increased system reliability.

3.2 Service Area Boundaries

The City of Healdsburg serves as the water provider within the municipality's water service area. The service area is approximately four-square miles and serves primarily residential and commercial customers. The City's service area elevation ranges from approximately 97 feet above mean sea level at its low point to the south and rises to approximately 390 feet above mean sea level at the northeast portion of the service area.

The potable water distribution system contains eight pressure zones (Tayman, Panorama, Sunset, Cadoul, Montage, Latimer, Hidden Acres, Iverson) that are each served by one or more of the six storage reservoirs (Iverson, Panorama, Tayman (2), Cadoul, Sunset) named for the zone they serve. Other zones are served by pressure regulating valves (Latimer, Hidden Acres) or a booster pump station (Montage). Figure 3-2 is a map of the City's service area showing the pressure zones in various colors, including the Fitch Mountain Service area (CSA41) to which the City is a wholesaler.

The principal water mains in the distribution system range in size from 4 to 16 inches in diameter. Most of the distribution piping in the older areas of the City range in size from 1-1/2 to 4 inches, while the newer areas are served by pipes 6 to 16 inches in diameter.

The City has a recycled water distribution system outside of the water service area. The recycled water transmission main extends north from the Water Reclamation Facility (WRF) following the West Slough and terminating at a recycled water dispenser on Kinley Drive, southwest of Highway 101. Another segment of recycled water pipe extends south from the WRF to multiple vineyard properties, extending approximately 18,300 feet south of the WRF

Figure 3-3 shows the approximate layout of the distribution system piping, along with the major physical components of the water system including wells, pump stations, reservoirs, and water sampling locations. Figure 6-2 shows the approximate layout of the recycled water distribution system, along with locations of major components of turnouts/connection points. The recycled water distribution system can reach approximately 850 acres.

3.3 Service Area Climate

The City lies within the Russian River watershed and has a Mediterranean climate. The typical weather pattern for this climate is a wet winter, and a dry summer season with little or no rain. Typically, less than 5 percent of the annual rainfall falls during the five months of May through September.

The average annual maximum temperature for this area is 73.5, and the average minimum temperature is 43.5 degrees. The average annual rainfall for the Ukiah-Healdsburg vicinity is 36.9 inches per year based on 1910 to 2020 data, as shown in Table 3-1.

Table 3-1: Monthly Climatic Averages – Ukiah, CA

Month	Total Rainfall[1] 1911-2020 (in)	Total Rainfall 2001-2020 (in)	Total Rainfall 2011-2020 (in)	Average Temp[1] (degrees F)	
				Maximum	Minimum
January	7.6	7.1	7.3	56.5	35.5
February	6.2	6.7	5.9	60.6	37.7
March	4.8	5.8	7.3	64.6	39.0
April	2.5	3.3	3.2	70.1	41.2
May	1.1	1.4	1.6	76.8	45.4
June	0.4	0.5	0.6	84.3	50.3
July	0.0	0.0	0.0	92.7	53.5
August	0.1	0.0	0.0	92.1	52.3
September	0.4	0.3	0.5	87.0	49.0
October	2.0	2.5	2.1	77.0	44.0
November	4.5	4.6	4.6	64.2	39
December	7.2	9.4	7.7	56.5	35.8
Total	**36.9**	**41.8**	**40.82**	**73.5**	**43.5**

[1]Source: CIMIS data for Ukiah station 049122 (period 1/1/1910 to 12/31/2020)

3.3.1. Climate Change

The City of Healdsburg recognizes climate change's effect on weather patterns and water supply, and the importance of accounting for these changes when analyzing our future water security. Whenever possible, historical data has been updated in this UWMP to ensure forecasts are based on more recent conditions which show the impact of climate change. The effects of climate change on water demands, supplies and reliability are detailed below and included in Chapter 4 (Water Use Characterization), Chapter 6 (Water Supply Characterization), and Chapter 7 (Reliability and Drought Risk Assessment).

Vulnerabilities to the City's drinking water system due to climate change include:

Water supply. While the City has relatively secure water rights allowing diversions which are able to meet the needs of the peak season demands, higher temperatures and decreased precipitation in the area can result in changes to water availability. The City has seen curtailments of critical water diversions as recently as the last 8 years and is planning for future curtailments by improving and adding treatment infrastructure, investigating transferability of water right allowances, and educating the public about the significance and impact of water supply curtailments.

As climate change brings more storms with higher intensity and severity, peak flows and flooding during rainy seasons inevitably affect diversions along the Russian River and Dry Creek. Even with dams already in place to absorb and collect much of the periodically severe rainfall, impacts downstream can include loss of production infrastructure and supply interruptions. The City's wells, located on the banks of these supply streams, were designed to accommodate intermittent high river stages. Production equipment, including pumps/motors, piping, raw water storage, and treatment facilities, are located and designed to be operable during these flood events.

Lastly, wildfires continue to threaten water supplies in fire prone regions. Varying climate anomalies, such as invasive pests and tinder dry forests, create ideal conditions for catastrophic wildfires. The City's drinking water infrastructure does have vulnerable components associated with production, treatment, and storage. Electrical supply, communication equipment, and process control instrumentation can all be disabled when directly impacted by wildfire. The City owns both portable and stationary emergency diesel generators specifically for use at water production sites. Replacement/spare instruments and radio equipment are kept on-hand for immediate change-out, and many facilities and water storage tanks are constructed of non-flammable materials.

Water source demand sensitivity. The City's water sources are the Russian River and Dry Creek, flowing from Lake Mendocino and Lake Sonoma. These two water supply reservoirs rely exclusively on rain and diversions from the Eel River through the Potter Valley Project, to recharge available storage. Other forms of precipitation such as snow do not impact the region's watershed.

As droughts are expected to become more frequent and severe, stored water supply in reservoirs is particularly affected by lack of precipitation and carry over from previous years. Between the City and these water sources lie several other water supply demands including other municipal water suppliers and several types of irrigated crops. Climate patterns, such as higher temperatures and low humidity, can affect these agricultural and landscape watering patterns both upstream of and within the City's drinking water sphere of influence. While the City has no control of impacts by upstream water diversions, local measures can be taken such as the use of drought resistant landscaping and enforcing mandatory conservation requirements as dictated by the severity of water supply shortages.

Water source quality sensitivity. As the County progressed through a dry 2020/2021 winter season and concurrently dry spring of 2021, both local water supply reservoirs were seeing historically low levels moving into the summer months. As a result, reservoir operators are unsure how the water quality would respond to such low levels that would inevitably be encountered later in the summer months.

Typical issues related to low reservoir levels include decreased dissolved oxygen concentrations and increased algae growth. Pollutant concentrations from stream inflows may increase as incoming volume decreases or stays the same, yet the pollutant loading increases or remains constant. The City's drinking water wells are characterized as groundwater under the direct influence of surface water (GWUDI). As such, water quality in relation to climate extremes, including fire scar runoff and flooding, can be relatively stable as the riverbank near the wells provides a degree of filtration for the affected water prior to being drawn into the wells and treated to drinking water standards. This filtration, as well as a degree of the cooling effect of the sub-terrain, provides a reliable degree of protection from potential increased warming and/or pollutant loading at the supply reservoirs.

Climate Change Mitigation

The City is committed to reducing greenhouse gas emissions as a climate change mitigation strategy. In collaboration with Sonoma County's Regional Climate Protection Authority (RCPA) the City, along with the other eight incorporated jurisdictions of Sonoma County, as well as the County

of Sonoma itself, have developed the Sonoma County Climate Mobilization Strategy. The objective of this Plan is to reduce greenhouse gas emissions and develop resiliency strategies in light of climate change impacts.

In addition, RCPA developed Climate Ready Sonoma County: Climate Hazards and Vulnerabilities to assess local climate risks. This assessment identifies four climate futures Sonoma County can expect to experience. We can expect to experience the following across all four of the possible climate futures: hotter, drier weather with longer summers (more extreme heat events, longer and more frequent droughts, greater frequency and intensity of wildfires, fewer winter nights that freeze); more variable rain; bigger, more variable floods; and sea level rise (higher sea level and storm surge). Similar assessment findings by Climate Ready North Bay also include forecasted drier soil conditions, increasingly flashy runoff, increased importance of recharge area protection, and higher water demand for agricultural uses.

3.4 Service Area Population and Demographics

California Department of Finance E-1 population estimates were used for the baseline 2020 City of Healdsburg population and projections. These estimates are based on 2020 U.S. Census Bureau data that is updated using annual housing unit change data are supplied by local jurisdictions and the U.S. Census Bureau. Based on these figures, there were an estimated 11,800 residents in the City of Healdsburg in 2020.

Based on California Department of Finance E-1 population estimates, the City of Healdsburg experienced an annual average population growth of 0.7% between April 1, 2010 and January 1, 2020. During the period of 2005 through 2010 the City experienced virtually zero growth in population.

With the economy again expanding, and the City Council focused on increasing the amount of affordable housing within Healdsburg, the annual population growth rate could exceed the historical one percent growth per year in the short-term. To account for this potential growth, and to ensure that projected water conditions can accommodate a large increase in population, this UWMP estimates population will grow by 3 percent between 2020 and 2030, and that it will return to 1 percent per year from 2030 to 2045. Assuming this rate of growth, the population served by the City would reach 18,411 by the year 2045. Population estimates every five years from 2020 through 2045 are presented in Table 3-2 below.

The population projections differ from those outlined in the 2010/2015 UWMP and are based on City staff knowledge of planned developments and City policies intended to increase the amount of affordable housing (Community Housing Committee Action Goals). These forecasted numbers exceed the more moderate historical trend of less than 1 percent per year and provide a conservative approach to planning the City's available water supply versus forecasted demand.

Table 3-2a Retail: Population - Current and Projected

Population Served[1]	2020	2025	2030	2035	2040	2045
	11,800	13,679	15,858	16,667	17,517	18,411

[1]Population projections are based on 2020 Census Data for the City of Healdsburg, with a projected growth of 3% per year up to 2030, and a 1% per year from 2030 to 2045. Projections of 3% are above actual expectations but provide a conservative approach.

Table 3-2b Wholesale: Population - Current and Projected

Population Served[1]	2020	2025	2030	2035	2040	2045
	1,092	1,092	1,092	1,092	1,092	1,092

[1]: Based on RRU data on number of connections. The Fitch Mountain community is limited in geography and significant growth is not anticipated.

3.5 Land Uses within Service Area

Current land use within the existing service area consists mainly of urban residential with limited commercial/industrial and mixed use, with some rural residential and public/quasi-public areas. Conserved open spaces protect the City's eastern backdrop from development and The Sonoma County General Plan's Open Space Element continues to help maintain avoidance of typical corridor-style urbanization by promoting scenic and undeveloped community separator lands.

Projected land use will include those planned developments within the Healdsburg 2030 General Plan, as listed in Section 3.1, as well as other projects meeting zoning and ordinance requirements. Projected land use is predicted to remain consistent with that of the existing service areas, while incorporation of water conservation planning and practices within the scope of these developments will continue to improve.

Goals, Policies, and Implementation Measures within the 2030 General Plan lay out the studies and planning required for establishing boundaries on future urban service and growth areas, neighborhood and downtown preservation, and appropriate land use in transit areas and on river frontage property.

Figure 3-1 Healdsburg City and Service Territory Boundaries

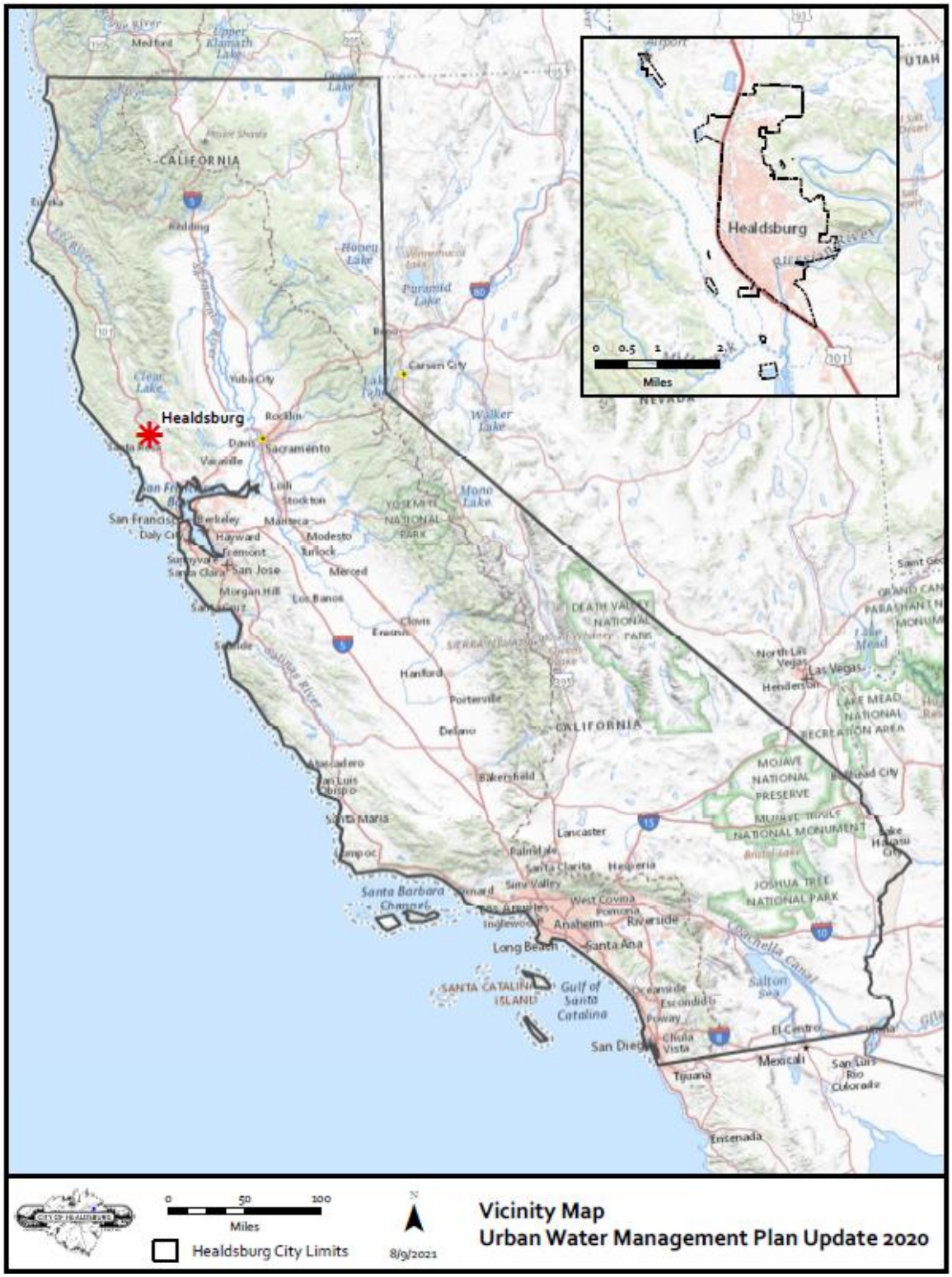


Figure 3-2 Healdsburg Water Service Area and Pressure Zones

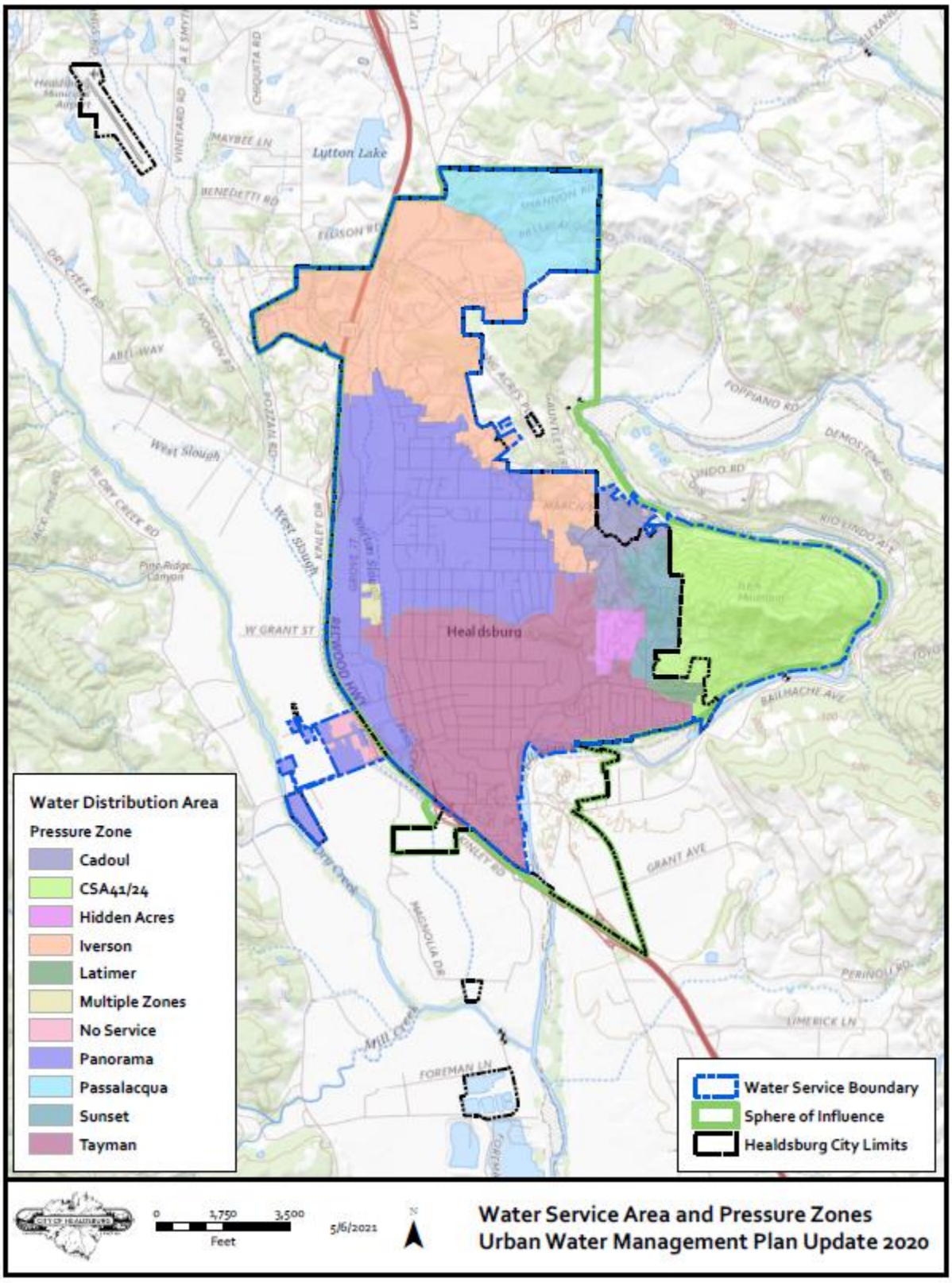
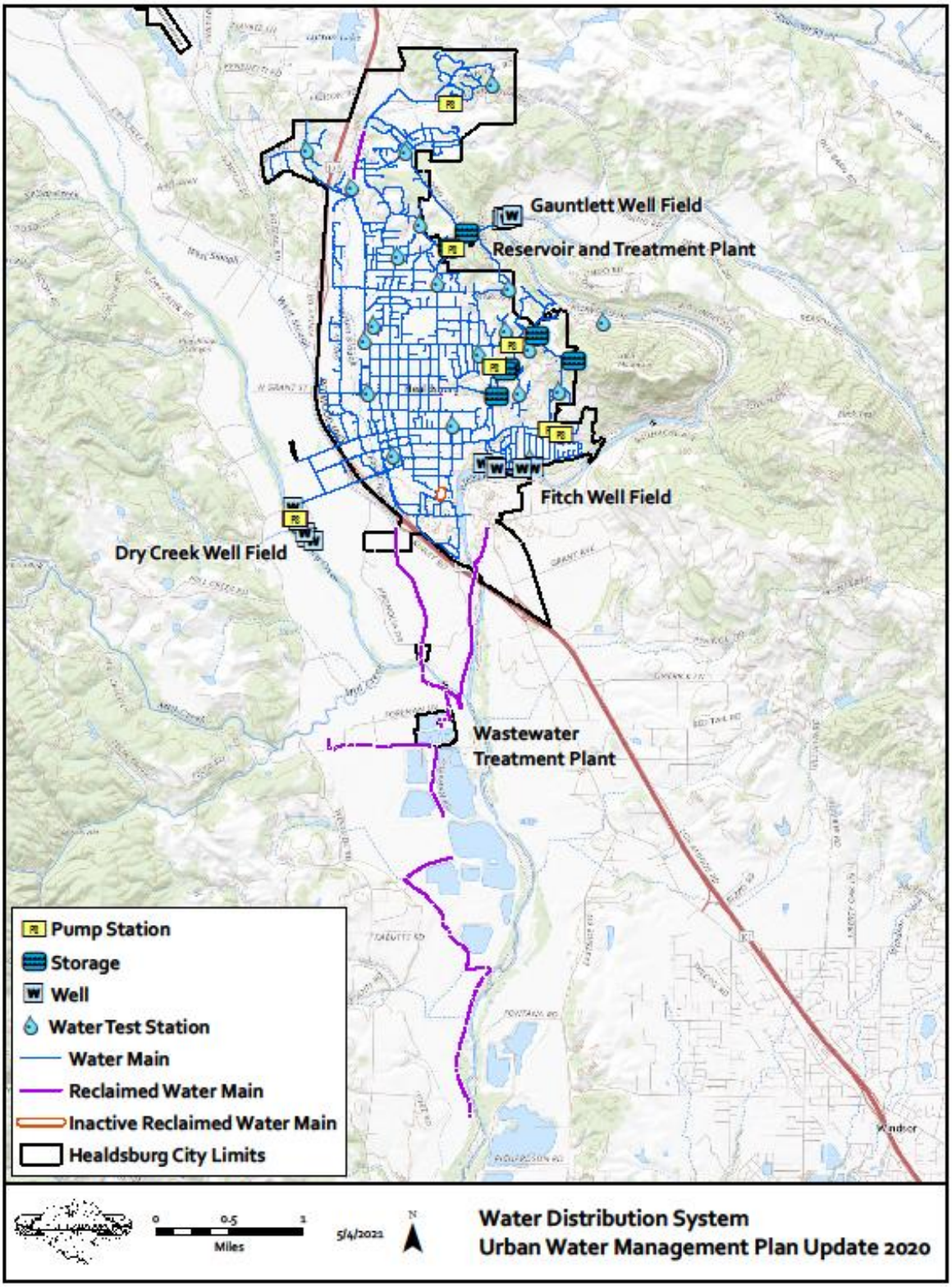


Figure 3-3 Water Distribution System



4. Water Use Characterization

This section of the UWMP presents the City's water system use by user type for the past, current projected in five-year increments between 2020 and 2045.

4.1 Non-Potable versus Potable Water Use

In order to clearly distinguish recycled water use from potable water use, reporting for these uses is comprehensively discussed in Chapter 6 but a summary of recycled water use is included in Table 4-5.

4.2 Past, Current, and Projected Water Use by Sector

The California Water Code (CWC) requires the reporting of past and projected demand in terms of pre-determined water use sectors. Sectors applicable to the City are outlined in Section 4.2.1, along with a description obtained from the 2020 UWMP Guidebook. The definitions listed in Table 4-1 are used by DWR for each of the water sectors listed in the CWC that apply to the City of Healdsburg. The order of the sectors follows the order found in the CWC.

4.2.1 Water Use Sectors Listed in Water Code

The City's potable water system serves these sectors:

- **Residential dwelling units:** A single-family dwelling unit is a parcel with a free-standing building containing one dwelling unit that may include a detached secondary dwelling. Multi-family dwelling units are those contained within one building or several buildings within one complex. The City's billing data does not distinguish between these use sectors. This is a retail demand.

- **Commercial:** A water user that provides or distributes a product or service. This is a retail demand.

- **Industrial:** A water user that is primarily a manufacturer or processor of materials as defined by the North American Industry Classification System (NAICS), or an entity that is a water user primarily engaged in research and development. This is a retail demand.

- **Industrial, Winery:** A primary industry of Healdsburg are wineries. The City tracks water use by wineries separate from other industries. This is a retail demand.

- **Institutional and Governmental:** A water user dedicated to public service. This type of user includes, among other users, higher education institutions, schools, courts, churches, hospitals, government facilities, and non-profit research institutions. This is a retail demand.

- **Landscape**: Water connections supplying water solely for landscape irrigation. Such landscapes may be associated with multi-family, commercial, industrial, or institutional/governmental sites, but are considered a separate water use sector if the connection is solely for landscape irrigation.

- **Sales to other agencies:** Water sales made to another agency.

- **Distribution System Water Loss**: Generally, the difference between water produced and water delivered. See description in Section 4-4 below.

4.2.2 Water Use Sectors in Addition to Those List in Water Code

Since the mid-1990s, the City has sold water to the County of Sonoma Department of Transportation and Public Works (TPW) under the County's operation of the Fitch Mountain County Service Area (CSA) #41, which is a small water system located outside of the City's limits. The TPW currently does not own water supply facilities and is solely dependent upon the City to supply municipal water for CSA 41.

4.2.3 Past Water Use

While not part of the DWR UWMP Reporting Tables, the Water Code requires Retail Suppliers to quantify past water use. Past water use helps a Supplier 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.

Table 4-1: Historical Water Use by Sector from 2015 to 2020, MG

Sector	2015[1]	2016[1]	2017[1]	2018[1]	2019	2020
Residential	333.6	342.3	387.0	400.0	399.8	444.9
Commercial	95.2	92.9	94.2	95.5	104.0	91.51
Industrial	2.7	3.0	2.4	1.8	2.3	2.72
Industrial Winery	11.0	10.8	12.2	11.0	11.8	12.3
Institutional and Governmental	16.4	9.3	6.6	6.84	6.6	8.2
Landscape	46.6	57.5	77.2	75.2	76.3	68.7
Sales to Other Agencies	Included in Residential	Included in Residential	Included in Residential	Included in Residential	Included in Residential	Included in Residential
Total Water Usage	505.5	515.9	579.5	590.2	600.8	628.0
Water Produced	**535.3**	**542.3**	**609.5**	**621.3**	**640.4**	**661.4**
Water Loss[2]	29.8	26.4	30.0	31.1	29.6	33.4

[1] 2015, 2016, 2017, 2018 were drought years.

[2] Water loss in this table differs from water loss audit values in that the water loss audit includes allowance for unbilled unmetered uses, thus reporting a lower water loss value

4.2.4 Distribution System Water Loss

Distribution system water losses (also known as real losses) are the physical water losses from the water distribution system and from the water storage facilities up to the point of customer consumption. For this UWMP, total losses are included as a demand sector and are calculated as the difference between all water supplied and all water delivered or metered. Total losses include both actual water loss and apparent water loss. Actual water loss is due to system leaks while apparent are due to unmetered authorized uses, such as hydrant flushing, inaccurate water use measurement due to faulty meters, and firefighting.

Table 4-2 presents the total potable water loss for calendar years 2016 through 2020, as calculated by subtracting the total potable water sold to customers from the total potable water supplied by the potable water delivery system. Water loss audit loss volumes include an allowance for unbilled unmetered usage and reports a lower net water loss than the difference of water produced less water used. Water loss values of less than 10 percent are generally considered acceptable by industry standards. Water loss audit reports for 2016 through 2020 are included as Table 4-2, and can be found the appendices. The rate of increase of water loss is anticipated to be consistent with the non-residential uses at 1% per year.

Table 4-2: Last Five Years of Water Loss Audit Reporting (DWR Table 4-4 Retail)

Reporting Period Start Date	Volume of Water Loss [1]
01/2020	31.376
01/2019	37.939
01/2018	23.504
01/2017	30.059
01/2016	25.106

[1] Taken from the field "Water Losses" (a combination of apparent losses and real losses) from the AWWA worksheet.

4.2.5 Current Water Use

This section and the following section discuss water use for the various water use sectors listed in Table 4-1. The following information could be helpful when reviewing the water use by sector in Tables 4-1: institutional facilities include City facilities, schools, and churches; landscape includes separately metered usage from both residential and non-residential properties; sales to other agency represents water sold to the County of Sonoma for the Fitch Mountain service area. While commercial hydrants require a manual adjustment, the flow from the hydrants is accounted as part of the commercial sector.

Customer water use for the year 2020, presented in Table 4-3a, was obtained from actual billing data provided by the City's Finance Department. Actual water deliveries in 2020 were 661 MG. Compared with the 2015 UWMP forecast for 2020 880 MG (2,703AF), actual total water deliveries in 2020 were 25 percent lower. Actual water deliveries in 2020 were lower than projected because of the dramatic water conservation achieved in response to continued drought conditions. Years 2014 to 2018 included passive conservation measures (low flow fixtures, less-water gardens, etc) that continue to keep water usage low even after drought conditions subside.

Water use in the City's service area is predominantly residential use. In 2020, residential customers received 63 percent of the total water deliveries. The second largest use is commercial customers, who received 13 percent. The remaining end uses include: separately metered landscape irrigation 11 percent; water loss 6 percent; sales to other agencies 3 percent; industrial (wineries) 3 percent; and institutional/governmental 1 percent. Tayman Park Golf Course and Badger Park are the only customers that receive raw (untreated) water, which is used for irrigation purposes only, separate from the water utility.

Table 4-3 Retail details actual water served in 2020 by sector, including sales and losses. Table 4-3 Wholesale details actual water sold to the County of Sonoma's CSA 41 (Fitch Mountain).

Table 4-3a Retail: Demands for Potable – 2020 Actual
(DWR Table 4-1 Retail)

Use Type	2020 Actual		
	Additional Description	Level of Treatment When Delivered	Volume[2]
Single Family		Drinking Water	360
Multi-Family		Drinking Water	64
Commercial		Drinking Water	91
Industrial		Drinking Water	3
Industrial	Winery	Drinking Water	12
Institutional/Governmental	Churches, Schools, Municipal	Drinking Water	8
Landscape		Drinking Water	68
Losses		Drinking Water	33
Other Non-Potable	Raw water irrigation for parks	Raw Water	1
		TOTAL	**640**

[1] Recycled Water Demands are not reported in this table. Recycled water demands are reported in Table 6-6

[2] This data was gathered from FY 2019-2020 and FY2020-2021 Utility Statistics Reports from the City's Finance Department

Table 4-3b Wholesale: Demands for Potable – 2020 Actual
(DWR Table 4-1 Wholesale)

Use Type	2020 Actual		
	Additional Description	Level of Treatment When Delivered	Volume
Sales to other agencies	CSA 41	Drinking Water	21
		TOTAL	**21**

4.2.6 Projected Water Use

Due to mandatory water conservation measures in place in 2015, water use for that year was lower than it would have been, absent those restrictions. Using this data to project water use could potentially understate future water demands. Because of this, future demand is projected based on actual water use in 2020, with assumed population growths rates discussed in Chapter 2 of 3% per year for the first 10-years and 1% per year after the first 10 years. However, this projection presents a worst-case for water use projections.

It should be noted that this level of projected growth outpaces the historic norm of less than 1% per year for Healdsburg. The City's Planning and Building Departments anticipates approximately 1,217 new affordable housing units over the next 20 years, reflecting approximately 1.3% per year increase in housing. Market value housing, on the other hand, is restricted by the City's growth management ordinance to 30 units per year.

The non-residential sectors are not expected to grow as rapidly as the residential sector. The Healdsburg 2030 General Plan EIR has generalized estimates of land areas to be developed into commercial or industrial uses. Without specific business use information, it is difficult to determine specific water use estimates. Therefore, it was assumed that water consumption for increased commercial, industrial, and institutional sector growth would follow the historical growth rates. The growth rates discussed in Section 3.40 are estimated to be at 1.0% per year through 2045. These growth rate estimates were applied to all non-residential demand sectors equally, except for water losses (discussed in Section 4.2.4) and recycled water (discussed in Section 6.2.53). Actual future population and water consumption may differ from these projections.

4.2.6.1 20-Year Planning Horizon

In accordance with Water Code Section 10635(a), all Suppliers will need to report their projected water use, in five-year increments through 2040. Suppliers are encouraged to project through 2045 to bridge the data gap between plan cycle years. The City of Healdsburg water use projections in five-year increments through 2045 is presented in Table 4-4. It summarizes the potable water demand projections for the water use sectors discussed above from 2020 through the year 2045, including projected distribution system water losses.

Table 4-5 presents the water demand projections for the City of Healdsburg through 2045 based on the projected growth (3% per year of residential growth for the first 10 years followed by 1% per year for the remaining years and 1% for all non-residential sectors. Table 4-5 also presents this data and the water demands for 1% growth throughout the planning horizon for all sectors, which is closer to the historical norm.

Table 4-4a Retail: Use for Potable Water and Non-Potable – Projected (DWR Table 4-2 Retail)

Use Type	Additional Description	Projected Water Use				
		2025	2030	2035	2040	2045
Single Family[1]		417	484	508	534	562
Multi-Family		74	86	90	95	100
Commercial		96	101	106	111	117
Industrial		3	3	3	3	4
Industrial	Winery	13	14	14	15	16
Institutional/Governmental	Government, Schools, Churches	9	9	10	10	11
Landscape		72	75	79	83	87
Losses		35	37	39	41	43
Other Non-Potable	Raw water irrigation for parks	1	1	1	1	1
	TOTAL	**720**	**809**	**851**	**894**	**940**

[1]Residential growth is based on 3% per year for the first 10 years then 1% per year thereafter. All other use sectors based on 1% per year.

Table 4-4b Wholesale: Use for Potable Water and Non-Potable – Projected (DWR Table 4-2 Wholesale)

Use Type	Additional Description	Projected Water Use				
		2025	2030	2035	2040	2045
Sales to other agencies	CSA 41[1]	21	21	21	21	21
TOTAL		**21**	**21**	**21**	**21**	**21**

[1]No growth is forecasted for the CSA service territory due to the limited of developed terrain and challenges with onsite wastewater treatment.

Table 4-5a Retail: Total Water Use (Potable and Non-Potable) (DWR Table 4-3 Retail)

	2020	2025	2030	2035	2040	2045
Potable Water, Raw, Other Non-potable	640	720	809	851	894	940
Recycled Water Demand	1	1	41	41	41	41
Optional Deduction of Recycled Water Put Into Long-Term Storage						
TOTAL WATER USE	**641**	**721**	**850**	**892**	**935**	**981**

Table 4-5b Wholesale: Total Water Use (Potable and Non-Potable) (DWR Table 4-3 Wholesale)

	2020	2025	2030	2035	2040	2045
Potable and Raw Water	21	21	21	21	21	21
Recycled Water Demand	0	0	0	0	0	0
TOTAL WATER DEMAND	**21**	**21**	**21**	**21**	**21**	**21**

4.2.6.2 Water Year Types

For the water service reliability assessment in Chapter 7, normal water is characterized in order to estimate water supply reliability and drought risk in the event of a single dry year. The City of Healdsburg normal water use projections in five-year increments through 2045 is presented in Table 4-4.

4.2.6.3 Codes and Other Considerations Used in Projections

Water savings from codes, standards, ordinances, or transportation and land use plans are known as "passive savings". These various factors decrease the water use for new and future customers, compared to historical customers.

The City has greatly increased its efforts to reduce water loss and increase water conservation through addressing water system leaks, performing meter calibration and replacement, as well as developing and implementing a robust water conservation program.

Through the robust water conservation program implemented during the drought of 2013 to 2018, passive demand measures are in place and still in use. The City's future water demand projections set forth in Table 4-4 assume no future water savings from demand management measures.

Water agencies are required to state the extent to which passive water savings are considered in these water use projections. The information meeting this requirement is included Table 4-6.

Table 4-6: Inclusion of Future Water Savings in Water Use Projections (DWR Table 4-5)

Are Future Water Savings Included in Projections?	No[1]
Are Lower Income Residential Demands Included in Projections?	Yes

[1] Healdsburg will be pursuing water conservation measures that are not included in these forecasts. This provides a conservative water supply versus demand forecast.

4.2.7 Characteristic Five-Year Use

Every urban water supplier shall include, as part of its urban water management plan, a drought risk assessment for its water service to its customers as part of information considered in developing the demand management measures, water supply projects and programs to be included in the urban water management plan. The urban water supplier may conduct an interim update or updates to this drought risk assessment within the five-year cycle of its urban water management plan update. The drought risk assessment shall include each of the following.

- A comparison of the total water supply sources available to the water supplier with the total projected water use for the drought period.
- Considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change conditions, anticipated regulatory changes, and other locally applicable criteria.

The water uses projected for 2021 through 2025 should reflect anticipated use prior to expected benefits of WSCP responses. As noted above, these water usage values may still include water conservation actions already in place, planned actions, anticipated code changes, and other known or planned actions that would occur, regardless of whether there is a drought in effect. Table 4-7

presents the annual water use projections for 2021 through 2025. Residential growth reflects 3% per year. All other sectors' growth reflect a 1% per year.

Table 4-7: Characteristic 5-year Water Use for Potable Water and Non-Potable – Projected

Use Type[1]	Additional Description	2020 Water Use	Projected Water Use				
			2021	2022	2023	2024	2025
Single Family	Single and multi-family residential combined	360	371	382	393	405	418
Multi-Family		64	66	68	70	72	74
Commercial		92	92	93	94	95	96
Industrial		3	3	3	3	3	3
Industrial	Wineries	12	12	12	12	12	13
Institutional/ Governmental		8	8	8	8	8	8
Landscape		69	69	70	70	71	72
Sales/Transfers/ Exchanges to other agencies[2]	CSA 41	21	21	21	21	21	21
Losses		33	33	34	34	34	35
Recycled Water[3]		0	0	0	0	0	0
Total		**662**	**675**	**691**	**705**	**721**	**740**

[1] Residential growth is based on 3% per year for the first 10 years then 1% per year thereafter. All other use sectors based on 1% per year.

[2] Sales/transfers to Other Agencies based on CAS 41 2020 flow values. No growth is anticipated for this sector.

[3] Table 4-5 summarizes the total projected potable and recycled water demands from 2020 through the year 2040. Discussion of recycled water can be found in Chapter 6.

4.3 Water Use for Lower Income Households

Under the statute, a lower income household is defined by California Health and Safety Code as being 80 percent of the median income, adjusted for family size. In addition, the U.S. Office of Management and Budget defines low-income households as households with incomes less than twice the federal poverty line.

Based on City of Healdsburg population data from the United States Census 2020, the estimated 80 percent median household income is approximately $90,900 (this is a family of four) and 33% of the household in the City of Healdsburg earn less than 80 percent of the median income[2].

Table 4-8 shows the estimated 2020 and projected water demands through the year 2045 for lower income residential households. The City does not have records of water use for single vs. multi-family residential use, and does not document water demands for lower income residents.

Table 4-8: Current and Projected Water Use for Lower Income Residential Households

Water Distributed	2020	2025	2030	2035	2040	2045
Residential (Single and Multi-Family)	140	162	188	198	208	218

Because these lower-income water demands estimates are a subset of the total residential water use for the City, they are not added to the previous water demand estimates and projections. The estimated water demand for lower-income households in 2020 was 140 MG based on 33% of actual 2020 residential water use reported in Table 4-2. Subsequent year projections are derived in like manner, and account for Regional Housing Allocation Needs (RHNA) of an additional 1,217 affordable housing units by 2040.

4.4 Climate Change

As discussed in Section 3.3.1, impacts of climate change must be considered in the preparation of long-term planning documents. Due to climate change and more severe weather patterns, we can expect adverse and variable impacts to our water supply and demand:

- Water Demand: Hotter days and nights will result in a longer irrigation season and therefore increase landscaping and irrigation water needs.
- Water Supply: More frequent and exacerbated weather events such as longer drought periods and higher temperatures can impact water supply and supply reliability.
- Natural Disaster: Wildfires are predicted to increase in intensity and frequency, droughts may become longer and more severe, and floods are expected more frequently. All of these have impacts on water supply, demand and operations.

Appendix G - I shows climate modelling forecasts for precipitation, temperature and dry spells in Healdsburg, CA. The models detail historical data (1961-1990), and predicts outcomes based two emissions scenarios – medium and high. Based on the modelling for mid-century (2035-2064), precipitation may increase by 0.8-1.5 inches however dry spells could increase by 5 or 6 days. Additionally, temperatures are estimated to increase by 3.2 to 3.9°F. These future projections further reinforce the assumptions to plan for extended droughts such as a single-dry year or five-year consecutive drought, as well as increased water demand due to prolonged dry spells and increased temperatures.

The City continues to offer water conservation programs to achieve long-term passive savings (lawn conversion, toilet replacement, appliance upgrades, etc.). Implementation of these types of measures will offset customer's need to increase water demand from climate change (e.g. hotter and drier weather may lead to an increased demand in landscape irrigation).

[2] Source: https://www.census.gov/quickfacts/healdsburgcitycalifornia, median household income $96,016; percentage of household incomes under 80 percent of median income from City Housing Office.

5. SB X7-7 Baselines, Targets, and 2020 Compliance

Senate Bill SB X7-7 established new requirements for Urban Water Management Plans, beginning with the 2010 update, to include the development of baseline water use and urban water use targets. Specifically, each urban water supplier developed a long-term baseline daily per capita water use and established a per capita water use target for 2020.

The purpose of SB X7-7 was to establish requirements for the State of California to reduce its state-wide urban per capita water use by 20 percent by the year 2020. An interim target is set for 2015 which requires a 10 percent reduction in urban per capita water use. After year 2021, failure to meet the 2020 water use target constitutes a violation of State law. Compliance with the 2015 and 2020 water use targets is also a requirement for eligibility for State water grants and loans. The City is required to meet these water use targets and has demonstrated compliance.

5.1 General Requirements for Baseline and Targets

The purpose of developing a baseline daily per capita water use is to establish a benchmark from which the 2015 and 2020 water use targets are derived. For most urban water suppliers, the baseline daily per capita water use is developed using a 10-year average, ending no earlier than December 31, 2004, and no later than December 31, 2010.

The baseline daily per capita water use is the City's average gross daily per capita use, in gallons. The baseline includes all water entering the water distribution system, including water losses. It does not, however, include recycled water delivered within the supplier's service area, water placed into long-term storage, or water conveyed for use by another urban water supplier (per CWC § 10608.12).

The City is a wholesale water supplier to the County of Sonoma, who owns and operates the water distribution system in the Fitch Mountain service area. Since this area is not part of the City's water distribution system, it is not included in the baseline period or water use targets established in the City's UWMP.

5.2 Service Area Population

To correctly calculate its compliance year GPCD, the City must determine the population that it served in 2020. California Department of Finance E-1 population estimates were used for the baseline 2020 City of Healdsburg population.

5.3 Gross Water Use

Annual gross water use is the water that enters the City's distribution system over a 12-month period (calendar year) with certain exclusions. This section discusses the City's annual gross water use for each year in the baseline periods, as well as 2020, in accordance with *DWR's Methodologies* document. The City's 2020 actual gross potable water use (does not include recycled water) for Calendar Year 2020 is 661 MG as presented in Chapter 4 of this plan.

5.4 Baselines and Targets Summary

Daily per capita water use is reported in gallons per capital daily (GPCD). Annual gross water use is divided by annual service area population to calculate the annual per capita water use for each year in the baseline periods. In order to verify compliance, the City updated its population data, added total water use, and confirmed its 2020 target in its 2015 UWMP. The City's 10-year base daily per capita water use is 162 GPCD. Because the maximum 2020 target is 20 percent of the 10-15 year baseline, the City's 2020 Target is 162 GPCD (203 GPCD * .80%).

The City's baseline and target are summarized in Table 5-1. The SB X7-7 Verification Form and associated tables are included in appendix.

Table 5-1: Baseline and Targets Summary

Baseline Period	Start Year	End Year	Average Baseline GPCD*	Confirmed 2020 Target*
10-15 year	1995	2004	203	***162***
5 Year	2003	2007	201	

5.5 2020 Compliance Daily Per Capita Water Use

The City calculated its actual 2020 water use for the 2020 calendar year in accordance with *DWR's Methodologies* document. As shown in Table 5-2, urban per capita water use in 2020 was 149 GPCD, which is well below the confirmed 2020 water use target of 162 GPCD. Therefore, the City has met its 2020 water use target.

Table 5-2: SB X7-7 2020 Compliance

2020 GPCD			2020 Confirmed Target GPCD	Did Supplier Achieve Targeted Reduction for 2020?
Actual 2020 GPCD*	2020 TOTAL Adjustments	Adjusted 2020 GPCD		
150	0	N/A	162	Yes

6. Water Supply Characterization

This section describes the City's water supplies: surface water, the water treatment system, recycled water supply, and future water supply projects. Water supply constraints, such as water rights and water quality, are also discussed in this section.

6.1 Water Supply Analysis Overview

The City is partially located in the North Coast Hydrologic Region, at the north end of the Santa Rosa Valley Groundwater Basin, and partially in the long and very narrow Healdsburg Area Subbasin No. 1-55.02 (Figure 6-1) as identified in DWR Bulletin 118. Healdsburg encompasses approximately 4 square miles, and also extends east of the Healdsburg Area Subbasin to an area west of the narrow Alexander Area Subbasin. The Healdsburg Area subbasin includes the floodplain of the Russian River, where the City diverts potable water from wells along the Russian River and Dry Creek. Many smaller communities rely on the local surface water and groundwater systems in the North Coast Region. Figure 6-1shows the Healdsburg Area Subbasin.

Surface water and groundwater storage changes as precipitation varies from year to year. In wetter years, the volume of water stored usually increases. In drier years, storage volumes may be reduced. The City's water sources are solely from surface waters with 8.39 cubic feet per second (cfs) year-round derived from the Russian River, as well as 1 cfs derived from Dry Creek. The natural flow and stored water for the Russian River based supply is Lake Mendocino (the location of storage) and the natural flow and storage for Dry Creek is Lake Sonoma (the location of storage). Releases from the stored water is controlled by Sonoma Water and the Army Corps of Engineers.

6.2 Water Supply Characterization

The City of Healdsburg's water supply is derived from surface water primarily through water rights but also includes a backup supply of contracted water as detailed below.

6.2.1 Purchased or Imported Water

In 1992 the City signed a contract with the Sonoma County Water Agency (SCWA) for a backup water supply. The purpose of the 1992 agreement was to supply the City with a backup water supply should the City water rights become unavailable. After two one-year extensions of the 20-year contract, the City and Sonoma Water were able to negotiate a Water Sale Agreement for 138.5 million gallons per year (425 AFY). In this agreement, the City is obligated to maintain a conservation program as well as increase local water supplies through the promotion and expanded use of recycled water.

6.2.2 Groundwater

The City does not currently pump from groundwater basins or aquifers. The City is currently studying the feasibility of construction groundwater wells at three locations (see Section 6.2.8). Additionally, the City is studying the feasibility of using these wells to store water (aquifer storage) during periods of high instream flows. Storing water in this manner could allow the City to draw upon this water during dry periods or prolonged droughts.

Table 6-1: Groundwater Volume Pumped

☑	Supplier does not pump groundwater. The supplier will not complete the table below.

6.2.3 Surface Water

The City's water supply comes only from surface water diverted either through City held water rights or the Sonoma Water water-sale agreement. As discussed previously in the document, the City diverts surface water at three locations: the Gauntlett Well Field, the Fitch Well Field, and the Dry Creek Well Field. Through the City's water rights and agreements, each of these diversion points are available to the City year-round. Due to turbidity issues, the Fitch Well Field is not used to supply potable water between November 1 and May 1. Instead, during this period, a limited portion of this water right is used to provide irrigation of Tayman Park Golf Course and Badger Park.

Table 6-2 Existing Water Rights and Diversion Limits

Permit Number	Location	Maximum Water Right (million gallons per year)	Actual Currently Available Supply (AFY)	Diversion Rate Limit (cfs)[1]	Diversion Season
	Russian River Water Rights				
11039 (A 017121)	Gauntlett Well Field (b)	943	943	4	Year Round
7847 (A 013217)	Fitch Well Field [2]	708	415	3	Year Round
13059 (A 017632)	Fitch Mountain – CSA Right Diversion Points	192	192	1.39	April 1 to November 1
	Dry Creek Water Rights				
8594 (A 014068)	Dry Creek Well Field	138	138	1	April 1 to November 1
	Russian River or Dry Creek				
	Purchase agreement with Sonoma County Water Agency	138	138	9.74	Year Round
Total		2,119	1,826		

[1] Cubic feet per second

[2] With the issuance of the City's current Domestic Water Supply Permit in 1999, operation of the Gauntlett and Fitch Well Fields was restricted to May 1 through October 31 due to elevated levels in turbidity. This was a temporary condition that was eliminated on the Gauntlett Well Field in October 2005 with the microfiltration water treatment system. In 1988, the permit Order was amended so that the combined maximum annual use under the three permits for 7847, 8594, and 11039 was limited to 3,250 acre-feet.

Additionally, the City has one application pending with the SWRCB for additional water rights on Dry Creek. On December 5, 1997, the City filed for an additional water right permit for Dry Creek water (Application Number A30663). The application seeks an appropriative right to divert an additional 286.7 million gallons per year (880 AFY) from the five existing Dry Creek wells at a maximum rate of 1.6 cfs from April 1st through October 31st, and 2.6 cfs from November 1st through March 31st. The application was publicly noticed by the SWRCB in 2001 and is still under consideration, as the City and the SWRCB work to resolve water availability analysis and resolve public comments received in response the application.

For planning purposes, the City conservatively assumes that the additional water right petition will not be resolved within the time horizon of the 2020 UWMP. Table 6-3 summarizes the pending water rights and the diversion limits for information only.

Table 6-3: Pending Water Rights and Diversion Limits

Application Number	Location	Additional Water Right (million gallons per year)	Total Diversion Rate Limit (cfs)	Diversion Season
A30663	Dry Creek Well Field	286.7[1]	1.6 (from 1.0)	April 1 through Oct. 31
			2.6 (from 0)	Nov 1 through March 31
Total of Water Rights from Table 4-1 (includes CSA Right, and 424 AFY maximum for Dry Creek)		2119	NA	
Total of Water Rights with Assumed Rate of Pending Water Rights		2,405.7		

[1]Currently, there is a limitation of 1 cfs diversion rate between April and October. The pending Dry Creek application, if approved in full, would be added to the current water right for a total of 420 + 880 = 1,300 AFY.

The Russian River's flow has been augmented by diversions from the Eel River since 1908 for the operation of the Potter Valley hydroelectric power plant. Under the SWRCB permits 8594, 7847, 11039, and 13059 the City diverts (pumps) water from the Russian River and Dry Creek. Table 6-2 shows the total water supply available to the City based on current water rights for each of the well fields less any limitation due to treatment requirements.

The City's water rights on the Dry Creek Well Field are currently under review with respect to the definition of this water supply as surface water versus groundwater. In 2012, the California Department of Public Health (CDPH) wrote a letter to the City indicating that data collected in 1997 identified that the Dry Creek wells may be under the direct influence of surface water and required the City to conduct testing to further clarify the issue. For planning purposes, the City assumes that the Dry Creek wells are under the influence of surface water and additional treatment may be necessary over time.

Russian River and Dry Creek Flows

Three major reservoirs provide water supply for the Russian River watershed: Lake Pillsbury on the Eel River, Lake Mendocino on the East Fork of the Russian River and Lake Sonoma on Dry Creek. The Russian River and Dry Creek water flows are controlled by releases from two dams: Warm Springs Dam, located on Dry Creek forming Lake Sonoma, and Coyote Valley Dam which is located on the Russian River to the northeast of Ukiah that forms Lake Mendocino. Both Lake Sonoma and Lake Mendocino have separate pools for water supply and flood control, determined by the elevation of the water surface. Above a specific elevation, the United States Army Corps of Engineers (Corps) controls releases for flood control; below that elevation Sonoma Water controls releases for water supply.

Currently, Sonoma Water must maintain sufficient water flow in the river to be protective of human health, fish and wildlife and for recreation in the Russian River. In 2008, the National Marine Fisheries Service (NMFS), through the determination of a Biological Opinion (biOp), concluded that Sonoma Water should modify some of the flood control and water supply operations. The BiOp requires that the summertime flows be permanently reduced to replicate natural summertime river flows, starting in 2010. The BiOp conclusions differ from the water rights decision made by the State Water Resources Control Board in 1986, known as

"Decision 1610." Decision 1610 set minimum summertime flow requirements for the Russian River. Since then, Sonoma Water has annually petitioned the State Board for interim changes to Decision 1610 depending on what type of water year it is: normal or dry. During a normal year, Sonoma Water is required to maintain minimum flow from the confluence of the East Fork and West Fork of the Russian River and Dry Creek (upper Russian River) 185 cfs during the summer and 150 cfs during winter months. During dry years, for that same stretch the minimum flow requirement is reduced to 75 cfs and 25 cfs during critically dry years.[3]

Sonoma Water has petitioned for, and has received, temporary urgency change orders to preserve water levels in Lake Mendocino to ensure an adequate supply in the fall for both human uses and for the fall Chinook salmon run.

The City's water rights are affected by the flow of these rivers, but with a minimum flow required, the City's supply reliability is improved. Under Decision 1610, Sonoma Water is obligated to reserve a certain amount of water and instream flows for water rights holders such as the City of Healdsburg.

Dry Creek Well Field

The Dry Creek Well Field is located above the 100-year floodplain along the east bank of Dry Creek next to the City's corporation yard on Westside Road and southwest of the City. The geology of the Dry Creek Well Field consists of a uniform sequence of blue clay overlain by 30 to 50 feet of alluvial sand and gravel, which in turn is overlain by a surficial zone of sand, silt, or silty clay.

The Dry Creek Well Field has a total of five wells, which are permitted for use in the City's domestic water system (Permit 8594). The City's SWRCB Department of Drinking Water (DDW) permit allows the use of two of the wells in conjunction with ortho-polyphosphate sequestration treatment for manganese. In practice, the City minimizes the use of these wells to avoid introducing manganese to the distribution system, even with the sequestration treatment. The City can legally pump up to 1.0 cfs seasonally (April 1 to November 1st each year) from these wells. This flow rate is equivalent to a maximum of delivery rate of 138 million gallons per year (426.5 AFY).

As previously stated, the City applied to the SWRCB for an additional water right for Dry Creek in the amount of 880 AFY in December 1997, which would bring the total Dry Creek diversion to approximately 1,306.5 AFY. This application is still pending, as it has not yet been fully reviewed and approved by the SWRCB. For planning purposes, the City assumes that this pending water right will not be granted in the time horizon of the 2020 UWMP.

Gauntlett and Fitch Well Fields

Studies performed by the City in 1998 and 1999 indicated that the Russian River alluvial deposits provided sufficient river bank filtration for the Gauntlett and Fitch Well Fields to be used between May and October, without additional treatment. The DDW concurred with these findings; however, the DDW also determined that during the rainy season, when turbidity levels of the Russian River increase, the well water turbidity levels would increase, and the alluvium does not provide a sufficient filtration barrier for turbidity. Subsequently, the DDW reissued the City's Domestic Water Supply Permit in June of 1999, placing a seasonal restriction on the use of the Gauntlett and Fitch Well Fields. This permit did not allow the Gauntlett and Fitch Well Fields to be operated between November 1st and April 30th. Until late 2005, this seasonal restriction on the Gauntlett and Fitch Well Fields prevented the City from fully utilizing its Russian River water rights. In 2004 and 2005, the City constructed a water treatment facility for the Gauntlett/Fitch Well Fields. In August 2005, the City submitted an application to modify the DDW permit to eliminate the seasonal restriction on the use of the Gauntlett Well Field. The DDW responded in October 2005, lifting the

[3]

seasonal restrictions for those wells now being treated. This action allows the City to use of the Gauntlett Wells year-round. Further descriptions of the Gauntlett and Fitch Well Fields are provided below.

Gauntlett Well Field

The Gauntlett Well Field is located along the west bank of the Russian River and is situated within the 100-year flood plain at the north end of the City. The geology consists of a uniform stratigraphic sequence of grey-green massive shale from the Franciscan formation, overlain by alluvial stream channel and over-bank deposits of coarse-grained sand and gravel.

With no seasonal restrictions, the City's permit allows for a diversion of up to 4 cfs from the Gauntlett Well Field. These wells pump to the Gauntlett Reservoir where the raw water is gravity fed to the City's microfiltration plant to reduce the turbidity. From there the water goes to Panorama Reservoir, where it is distributed to customers. Most of the potable water used by the City in the winter months comes from these wells.

As mentioned in previous sections, there are four active potable use wells at the Gauntlett Well Field. The number of wells operating, and the rate of production, are based on demand and are controlled to maintain a minimum level in the Gauntlett Reservoir. When the Well Field is in use, the City typically operates two of the wells, and brings the other two on-line if needed to meet demand. Overlapping cones of depression limit the simultaneous operation of all four wells.

Fitch Well Field

The Fitch Well Field is located along the north bank of the Russian River, just south of Fitch Mountain Road and in the southeast part of the City. It is situated within the 100-year flood plain. The Well Field is characterized by a consistent stratigraphic blue clay overlain by 30 to 50 feet of alluvial sand and gravel, in turn overlain by brown sand, silt or silty clay with occasional gravels.

Because the Fitch Well Field is directly adjacent to the Russian River, it is affected by the river's flow. These wells are considered groundwater under the direct influence of surface water. The City is allowed to pump these wells up to 3 cfs year round with an annual maximum of 3,250 acre-feet shared between Fitch, Dry Creek, and Gauntlett Well Fields.

Currently, the City's ability to supply drinking water from the Fitch Well Field is limited by the DDW, due to water quality issues.

Only three of the five wells at the Fitch Well Field are active and permitted for use in the potable water system. The fifth well had a collapsed casing and was properly abandoned. The third well has been disconnected from the potable water system due to high manganese levels but is used to irrigate Tayman Park Golf Course and Badger Park. Of the 3 active potable water wells, the number of those wells in use and the rate of production are varied to maintain minimum water levels in the Tayman Reservoirs.

The City was given water rights to divert flow from the Russian River by the CSA. One of the allowable diversion points for that water right is located within the Fitch Well Field. The City may pump a total of 188 million gallons (578 AFY) using this right. However, due to turbidity issues at the Fitch Well Field, there is a seasonal restriction on this well. This is illustrated in Table 6-2.

Water Quality

According to DWR's 2009 California Water Plan Update (Bulletin 160-09, Volume 3), the North Coast Hydrologic Region has several water quality challenges. In the Healdsburg Area, sediment, temperature, and nutrients are the focus for the Russian River. Turbidity and manganese are two main water quality concerns for the City.

Turbidity

The Russian River is listed as a 303(d) impaired water body for sedimentation/siltation and temperature. The City also has turbidity issues with the water from some of their Gauntlett and Fitch Well Fields in the winter. It is for this reason that the City installed a water treatment plan for the Gauntlett wells, allowing year-round production. A treatment plant may be installed at the Fitch wells, if needed.

Manganese

The City has discovered manganese in concentrations above drinking water limits in some of the Dry Creek wells. To lower the manganese level to allowable drinking water limits, the water is treated with ortho-polyphosphate treatment.

6.2.4 Stormwater

The City has no large-scale stormwater recovery system in place for water supply augmentation. The City does have storm water low impact development (LID) features throughout the City. These include recent retrofit projects of pervious street bulb outs in downtown as well as detention basins. These features are largely designed for flood control, ground water recharge, and water quality treatment purposes.

6.2.5 Wastewater and Recycled Water

The City operates a tertiary level wastewater treatment plant (WWTP), known as the City of Healdsburg's Wastewater Treatment, Reclamation and Disposal Facility, which treats all of the City's wastewater to Title 22 recycled water standards. The City certified an Environmental Impact Report (EIR) on July 11, 2005 for the WWTP Upgrade Project, and the WWTP went into operation in May 2008.

The WWTP Project provides tertiary treated wastewater that can be used in agricultural and urban irrigation areas. The service area for recycled water use was expanded in 2014, in 2016 by addendum to the EIR for seasonal irrigation of vineyards by pipeline and trucked water deliveries, and in 2019 by Subsequent EIR to expand the service area south (to approximately Hop Kiln) and west to reach areas west of Westside Road. The City's recycled water program is regulated by State of California Water Resources Control Board General Water Reclamation Requirements for Recycled Water Use – Order WQ 2016-0068-DDW-R1001 and California Recycling Criteria – CCR Title 22, Chapter 3, Article 7 Section 06323 administered by the North Coast Regional Water Quality Control Board.

6.2.5.1 Recycled Water Coordination

The City does not coordinate with any other wastewater facilities or agencies within the City's service area regarding the quality and availability of recycled water for beneficial reuse. There are no other agencies collecting, treating, or discharging municipal wastewater both generated and treated within the City's service area.

The primary driver for the City's recycled water program is compliance with the seasonal discharge prohibition from the wastewater treatment plant. The City conducted a feasibility study with respect to compliance with the seasonal discharge prohibition. It was determined that agricultural beneficial reuse of the recycled water was the most cost-effective approach for compliance.

Included in the study is a plan to bring recycled water into the City's water distribution service area for municipal irrigation. The cost of this approach makes to project prohibitive unless outside funding is available.

6.2.5.2 Wastewater Collection, Treatment, and Disposal

The City's wastewater collection, treatment and disposal system is described in detail in the Title 2 Engineering Report. The collection system consists of a network of underground pipelines that collect and convey raw wastewater from individual user connections to the City's advanced Water Reclamation Facility (WRF), sometimes referred to as the WWTP. The WRF is shown on Figure 2.

The WRF includes the following treatment processes:

- Influent equalization ponds.
- Primary screening and grit removal.
- Secondary biological and aeration treatment using aerobic, anoxic, and pre-anoxic basins to provide biological removal of BOD and nitrogen.
- Waste Activated Sludge (WAS) pumping.
- Tertiary membrane bioreactors (MBR)
- Effluent disinfection using ultraviolet (UV) lamps.
- Treated effluent storage (40 million gallon storage capacity) and pumping.
- Solids stabilization (sludge management).
- Dewatering facilities (sludge dewatering).
- Discharge of treated effluent (recycled water) to the Basalt Pond or reuse through the City's recycled water system.

Table 6-4 summarizes some of the relevant details about the City's WRF. Table 6-5a summarizes details of the City's wastewater discharge permit as well as the volume of wastewater treated and discharged in 2020. Currently, from October 1 to May 14 the City discharges the treated effluent to a former gravel extraction pit (Basalt Pond) for percolation into the underlying groundwater basin, which is hydrologically connected to the Russian River. The Basalt Pond is owned by Syar Industries and was created by terrace mining operations that ended in 1985. The remainder to the year, May 15 to September 30, the City is prohibited from discharging to Basalt Pond. During the discharge prohibition, effluent is stored on-site and distributed for irrigation and construction purposes.

Table 6-4: Wastewater Collection within Service Area in 2020 (DWR Table 6-2 Retail)

Wastewater Collection			Recipient of Collected Wastewater			
Name of Wastewater Collection Agency	Wastewater Volume Metered or Estimated?	Volume of Wastewater Collected from UWMP Service Area 2020	Name of Wastewater Treatment Agency Receiving Collected Wastewater	Treatment Plant Name	Is WWTP Located Within UWMP Area?	Is WWTP Operation Contracted to a Third Party?
City of Healdsburg	Metered	302	City of Healdsburg	City of Healdsburg Wastewater Treatment, Recycling and Disposal Facility	No	No

Table 6-5a Retail: Wastewater Treatment and Discharge within Service Area in 2020 (DWR Table 6-3 Retail)

Wastewater Treatment Plant Name	Discharge Location Name or Identifier	Discharge Location Description	Wastewater Discharge ID Number [2]	Method of Disposal	Does This Plant Treat Wastewater Generated Outside the Service Area?	Treatment Level	2020 volumes (MG)				
							Wastewater Treated	Discharged Treated Wastewater	Recycled Within Service Area	Recycled Outside of Service Area	Instream Flow Permit Requirement
City of Healdsburg Wastewater Treatment, Recycling and Disposal Facility	Basalt Pond	Part of the Russian River	1B82046 OSON	River or creek outfall	No	Tertiary	302	183	2	49	0
						Total	302	183	2	49	0

Table 6-5b Wholesale: Wastewater Treatment and Discharge within Service Area in 2020 (DWR Table 6-3 Wholesale)

☑	Wholesale Supplier neither distributes nor provides supplemental treatment to recycled water.

6.2.5.3 Recycled Water System Description

The City completed design of a recycled water pumping, storage and distribution system in 2011, and has been implementing elements of the project as funding allows. In 2014, portions of the recycled water distribution system were constructed to serve areas north of the WRF up to Kinley Drive, south of the 101 freeway, and south approximately 5,200 feet south of the WRF. In 2016 the southern reach of the recycled water system was extended approximately 12,000 feet south and approximately 3,500 feet west to engage more agricultural acreage. In 2019, approximately 2,200 feet of recycled water transmission pipeline was added to reach properties west of Westside Road. Another project in 2021 will add approximately 8,000 feet of pipeline to recycled water system.

The recycled water system improvements implemented to date address agricultural uses as these are the most cost-effective to reach. Section 6.8.1 discusses the future implementation options of recycled water for urban irrigation, should it become cost effective.

Recycled Water Beneficial Uses

Currently, most of the City's treated wastewater is delivered to irrigate vineyards just north and south of the WRF via transmission piping. This use of recycled water does not significantly offset the City's potable water use; it is mainly offsetting the use of groundwater derived from private wells. In addition to the recycled water transmission piping, there are automated kiosk dispensers connected to the recycled water system at Kinley Drive and another at the WRF. The kiosks allow the City to meter the recycled water used. However, the City's metering practices do not differentiate between recycled water that does or does not offset potable use.

The kiosks can be accessed by water tank trucks to supply a small amount of recycled water for dust control, construction site operators and a few vineyards.

The City delivers recycled water for industrial use outside the water service area. A direct connection to the recycled water pipeline provides recycled water to the Syar Industries gravel plant for dust control and make up water for gravel processing.

The areas that may receive hauled recycled water are located within the Dry Creek, Alexander, and Russian River Valleys. The extent of the potential recycled water hauling area is shown in Figure 6-2.

Table 6-6a lists the current and projected beneficial uses of the City's recycled water and compares the actual 2020 recycled water use to the 2020 projections from the 2015 UWMP.

Table 6-6a Retail: Current and Projected Recycled Water Direct Beneficial Uses within Service Area (DWR Table 6-4 Retail)

Name of Supplier Producing (Treating) the Recycled Water:	City of Healdsburg
Name of Supplier Operating the Recycled Water Distribution System:	City of Healdsburg
Supplemental Water Added in 2020 (volume)	None
Source of 2020 Supplemental Water	N/A

Beneficial Use Type	**Potential** Beneficial Uses of Recycled Water (Describe)	Amount of **Potential** Uses of Recycled Water (Quantity)	General Description of 2020 Uses	Level of Treatment *Drop down list*	2020	2025	2030	2035	2040	2045
Agricultural Irrigation										
Landscape Irrigation (exc golf courses)							10	10	10	10
Golf course Irrigation							30	30	30	30
Commercial use	Construction water, dust control, landscape irrigation	1 MG	Construction water, dust control, landscape irrigation	Tertiary	1	1	1	1	1	1
Industrial use	Aggregate processing	7 MG	Aggregate processing	Tertiary	0	0	0	0	0	0
Geothermal and other energy production										
Seawater intrusion barrier										
Recreational impoundment										
Wetlands or wildlife habitat										
Groundwater recharge (IPR)										
Reservoir water augmentation (IPR)										
Direct potable reuse										
Other (Description Required)										
				Total:	**1**	**1**	**41**	**41**	**41**	**41**

Table 6-6b Wholesale: Current and Projected Recycled Water Direct Beneficial Uses within Service Area (DWR Table 6-4 Wholesale)

☑	Recycled water is not directly treated or distributed by the Supplier.

Table 6-7a Retail: 2015 UWMP Recycled Water Use Projection Compared to 2020 Actual (DWR Table 6-5 Retail)

Beneficial Use Type	2015 Projection for 2020 [1]	2020 Actual Use[1]
Agricultural irrigation	65	40
Landscape irrigation (exc. golf courses)	1	1
Golf course irrigation		
Commercial use	8	1
Industrial use	5	8
Geothermal and other energy production		
Seawater intrusion barrier		
Recreational impoundment		
Wetlands or wildlife habitat		
Groundwater recharge (IPR)		
Reservoir water augmentation (IPR)		
Direct potable reuse		
Other (Description Required)		
Total	**79**	**50**

[1] Agricultural and Industrial use for recycled water are outside the water distribution service area.

Table 6-7b Wholesale 2015 UWMP Recycled Water Use Projection Compared to 2020 Actual (DWR Table 6-5 Wholesale)

☑	Recycled water is not directly treated or distributed by the Supplier. The Supplier will not complete the table below.

6.2.5.4 Potential, Current and Projected Recycled Water Uses

The City of Healdsburg treats all collected wastewater to advanced treatment levels, complying with Title 22. In 2020, 302 million gallons were treated to this level, 50 million gallons were beneficially reused. The remainder was discharged to the Russian River.

The City has been identifying beneficial reuses, primarily to address the seasonal discharge prohibition During the discharge prohibition period, the City can generate approximately 138 MG, but in 2020 approximately 106 MG was treated. In 2020, approximately 50 MG of the 106 MG was reused and 52 was impounded. Project to expand the agricultural reuse program are underway to add more allowed uses and increase allowed service are. These are expected to increased usage to approximately 76 MG, increasing the total beneficial reuse to approximately 126 MG. Coupled with 40 MG of onsite storage, the projected 126 MG of reuse with storage is expected to require the storage of recycled water from outside the discharge prohibition season to later be used as a summer water supply.

Extending the recycled water into the city to offset the use of potable water for municipal irrigation (parks cemetery and school athletic fields) would save approximately 40 MG. This extension is cost prohibitive for reaching the goal of compliance with the seasonal discharge prohibition. However, outside funding may make this project attractive to offset potable water use.

6.2.5.5 Actions to Encourage and Optimize Future Recycled Water Use

The original impetus for the City of Healdsburg to develop a recycled water system was to curtail effluent discharge into the Russian River from May 15 to September 30. The City estimates that if all of the vineyards currently connected to the recycled water pipeline irrigated using recycled water rather than well water, and if nearby vineyards were to continue using trucked recycled water, approximately 22.5 million gallons would be diverted from Basalt Pond to these uses. The City actively pursues users of the recycled water system by meeting with vineyard operators, and currently provides recycled water at no cost to encourage its use. Further the City is working with the Regional Water Quality Control Board to amend the discharge use permit and allow agricultural uses other than vineyard and landscape irrigation. These non-vineyard uses could add approximately 76 million gallons of recycled water usage. While this use is not a direct offset of City potable water, it does contribute to meeting the requirement of the seasonal discharge prohibition and improves the water supply of the Russian River watershed.

Included in the 2005 EIR and master plan for the recycled water system was the irrigating of public properties with recycled water (Table 6-6). These properties have the potential to consume approximately 8.5 million gallons (26 AFY) of recycled water for urban irrigation. Unfortunately, to reach these properties requires a lengthy and costly extension of the pipeline, making these sites less attractive than the vineyards adjacent the WWTP. In future years, changes to regulatory requirements may make use of recycled water within the City limits more feasible.

Issues constraining expanded use of recycled water include public perception, regulatory reporting requirements, and the cost of expanding the recycled water system to reach all potential users identified in the City's service area and surrounding areas.

Table 6-8: Methods to Expand Future Recycled Water Use (DWR Table 6-6)

Name of Action	Description	Planned Implementation Year	Expected Increase in Recycled Water Use[1]
RW Expansion Phase 1	Expand RW to 120 Ac vineyard on west side of Westside Road	2020	7
RW Expansion Phase 2	Expand RW to 40 Ac and 13 Ac vineyard on west side of Westside Road	2021	3
Expanded uses	Engage hay fields and other non-vineyard allowable uses	2022	66
RW Expansion Phase 3	Expand RW to Healdsburg's community parks, and golf course	2030	40
		Total	**116**

[1] Agricultural uses for recycled water are outside the water distribution service area.

6.2.6 Desalinated Water Opportunities

There are currently no plans for desalination, and no desalination for future water supply is anticipated.

6.2.7 Exchanges or Transfers

The City has no current agreements of future plans for water exchanges or transfers with other water users or agencies.

6.2.8 Future Water Projects

The City is planning to provide treatment at the Fitch well field. This improvement would allow year-round use of this water right. This effort is in the concept stages and may include or consist of expanded water rights at the Dry Creek Well Field as the source from Lake Sonoma may be more reliable in the future than sources from the Russian River derived from Lake Mendocino. Implementing improvements at Dry Creek will require modification to the City's water rights at this diversion point.

To increase water supply and build drought resilience, the City is studying the construction of three groundwater wells to supply water during dry years. Combined these wells are estimated to provide roughly 300gpm and would help increase the City's annual supply of water by roughly 158 million gallons. Additionally, the City is studying the use of these wells as an aquifer storage and recovery system. If proven feasible and permitted by the State, this would help the City store water during periods of high instream flow (wet years), saving this water for later use during periods of low instream flows (dry years).

Table 6-9a Retail: Expected Future Water Supply Projects (DWR Table 6-7 Retail)

Name of Future Projects	Joint Project with other suppliers?		Description	Planned Implementation Year	Planned for Use in Year Type	Expected Increase in Water Supply to Supplier
Filtration for Fitch	No		Provide filtration for Fitch Well Field to allow year round use of the water right	2035	All Year Types	292
Aquifer Storage and Recovery Wells	No		Develop ASR wells to supplement drinking water supply during times of drought	2030	Average and Single-Dry Year	158
Recycled Water Pipeline	No		Extend RW pipeline for landscape irrigation	2030	Average and Multi-Dry Year	40

Table 6-9b Wholesale: Expected Future Water Supply Projects (DWR Table 6-7 Wholesale)

☑	No expected future water supply projects or programs that provide a quantifiable increase to the agency's water supply. Supplier will not complete the table below.

6.2.9 Summary of Existing and Planned Sources of Water

Table 6-10 shows the actual volume of water available in 2020 from each supply source. Projected water supply for the next 25 years was calculated using 2020 actual water supply, as well as the recycled water for potable water offset projections shown in Table 6-6a. Future water projections are shown in Table 6-11a.

Table 6-10a Retail: Water Supplies – Actual (DWR Table 6-8 Retail)

Water Supply	Additional Detail on Water Supply	2020		
		Actual Volume	Water Quality	Total Right or Safe Yield* (optional)
Surface water (not desalinated)	Gauntlett Well Field	433	Drinking Water	943
Surface water (not desalinated)	Fitch Well Field	127	Drinking Water	415
Surface water (not desalinated)	Dry Creek Well Field	97	Drinking Water	138
Surface water (not desalinated)	Fitch Mountain CSA Right	0	Drinking Water	192
Purchased or Imported Water	Sonoma Water supplement	4	Drinking Water	138
	Total	**661**		**1,826**

Table 6-10b Wholesale: Water Supplies – Actual (DWR Table 6-8 Wholesale)

Water Supply	Additional Detail on Water Supply	2020		
Drop down list May use each category multiple times.These are the only water supply categories that will be recognized by the WUEdata online submittal tool		Actual Volume	Water Quality Drop Down List	Total Right or Safe Yield* (optional)

Add additional rows as needed				
Surface water (not desalinated)	Fitch Mountain CSA Right	21	Drinking Water	192
	Total	**21**		**192**

Table 6-11a Retail: Water Supplies – Projected (DWR Table 6-9 Retail)

Water Supply	Additional Detail on Water Supply	Projected Water Supply (MG)									
		2025		2030		2035		2040		2045	
		Reasonably Available	Total Right or Safe Yield	Reasonably Available	Total Right or Safe Yield	Reasonably Available	Total Right or Safe Yield	Reasonably Available	Total Right or Safe Yield	Reasonably Available	Total Right or Safe Yield
Surface water (not desalinated)	Gauntlett Well Field	943	943	943	943	943	943	943	943	943	943
Surface water (not desalinated)	Fitch Well field	415	415	415	415	415	415	708	708	708	708
Surface water (not desalinated)	Dry Creek Well Field	138	138	138	138	138	138	138	138	138	138
Surface water (not desalinated)	CSA	192	192	192	192	192	192	192	192	192	192
Purchased or Imported Water	Sonoma County Purchased Water	138	138	138	138	138	138	138	138	138	138
Groundwater (not desalinated)	ASR Well - Ground Water Basin 1-055.02	0	0	236	236	236	236	236	236	236	236
	Total	**1,826**	**1,826**	**2,062**	**2,062**	**2,062**	**2,062**	**2,355**	**2,317**	**2,355**	**2,355**

(1) year-round use of Fitch water right expected after filtration added, anticipated after 2035

Table 6-11b Wholesale Water Supplies – Projected
(DWR Table 6-9 Wholesale)

Water Supply	Additional Detail on Water Supply	Projected Water Supply* Report to the Extent Practicable									
		2025		2030		2035		2040		2045 (opt)	
		Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)
Surface water (not desalinated)	Retail source	21	21	21	21	21	21	21	21	21	21
Total		**21**	**21**	**21**	**21**	**21**	**21**	**21**	**21**	**21**	**21**

6.2.9 Summary of Existing and Planned Water Sources

The preceding sections of Chapter 6 present a description of the City of Healdsburg existing and planned water supplies. These sections draw upon the tables in the 2020 UWMP Guidance tables as indicated in Table 6-11.

6.3 Energy Intensity

Energy intensity is a measure of the unit energy required to acquire, treat and distribute water throughout the system. Additionally, the unit energy to collect, treat and dispose of the water used by the service area is also quantified.

For the water distribution system, power is used at the wells to lift water to the treatment processes. Gauntlett wells pump to the Gauntlett Reservoir after which the raw water flows through the treatment process by gravity and finished water is stored in the Panorama Reservoir. Fitch wells pump to the Tayman Reservoir with chemical injection in route. Dry Creek pumps to the Dry Creek clear well with chemical injection on the route.

Panorama and Dry Creek have booster pumps to distribute the water. Tayman flows by gravity to the distribution system. The distribution system also has booster pumps to move water between pressure zones. The distribution system booster pumps consist of Dry Creek, Panorama, Revel, McDonough and Passalacqua booster pump stations.

Table 6-12 presents the estimated water supply energy intensity for 2020.

Table 6-12 – Water Supply Energy Intensity for 2020 (DWR Table O1-A)

		Urban Water Supplier Operational Control							
		Water Management Process						Non-Consequential Hydropower (if applicable)	
	Water Volume Units Used	Extract and Divert	Place into Storage	Conveyance	Treatment	Distribution	Total Utility	Hydropower	Net Utility
Volume of Water Entering Process	MG	644	0	0	644	644	644	0	644
Energy Consumed kWh	N/A	660,725	0	0	6,607.25	46,6012	1,133,345		1133345.3
Energy Intensity kWh/vol.	kWh/ MG	1,026	0	0	10.3	723.6	1,759.9	0	1759.9

The power consumed for acquiring the produced water (Extract and Divert) is estimated based on the flow produced (including losses) and the average lift (approximately 245 feet) to or through the treatment processes. Treatment power to facilitate compressed air, backwash pumps and chemical feed pumps is assumed to be minor in comparison to Extract and Divert; one percent of the Extract and Divert power is estimated. Distribution power is estimated based on the water volume delivered and an average delivery pressure of 80 psi. For water production, an estimate 1,133 MW-hours are estimated to be consumed to deliver the 644 MG to the system. The energy intensity for water production is estimated to be approximately 1,759 kW-hours per million gallons.

The power consumed in providing treatment of the wastewater generated from the water use is presented in Table 6-13

Table 6-13 – Wastewater and Recycled Water Supply Energy Intensity for 2020 (DWR Table O-2)

		Urban Water supplier Operational Control			
		Water Management Process			
Water Volume Units Used		Collection / Conveyance	Treatment	Discharge / Distribution	Total
Volume of Wastewater Entering Process	MG	302	302	302	302
Energy Consumed (kWh)		155,709	1,476,000	0	1,631,709
Volume of Recycled Water Entering Process		0	0	0	0
Recycled Water Energy Consumed		0	0	0	0
Energy Intensity (kWh/vol.)		0	0	0	0

The power consumed to collect and convey the wastewater to the WRF for treatment is upon based utility billing for the lift stations, with the exceptions of Hendricks, Giorgi Park, Corporation Yard and Dry Creek lift stations. Hendricks Lift Station operates on PG&E power because it is outside of the service area of the City's electric utility. The Giorgi Park, Corporation Yard and Dry Creek lift stations billing is embedded in the metering of other facilities. These lift stations are small and their combined power usage was estimated to be approximately 100 kW-hours per month.

Treatment power usage is based on meter reading at the WRF power meter. Treatment power includes blowers, compressors, pumps, UV disinfection, and process equipment. Recycled-water power usage is embedded in the WRF power usage. Sub metering of the recycled-water power usage was added in November 2020.

The energy intensity for wastewater collection, treatment and disposal / reclamation is approximately 5403 kW-hours per million gallons. The treatment process for wastewater at Healdsburg is much more energy intensive than its water production. As a result, in November 2018, the City of Healdsburg moved all of it's municipal accounts, including water production and treatment, to a 100% renewable green rate. The Healdsburg Electric "Green Rate" is sourced from 100% geothermal energy. By moving the Green Rate, the city was effectively able to reduce the carbon intensity associated with municipality's processes including the conveyance of water and wastewater.

Figure 6-1. Groundwater Basins

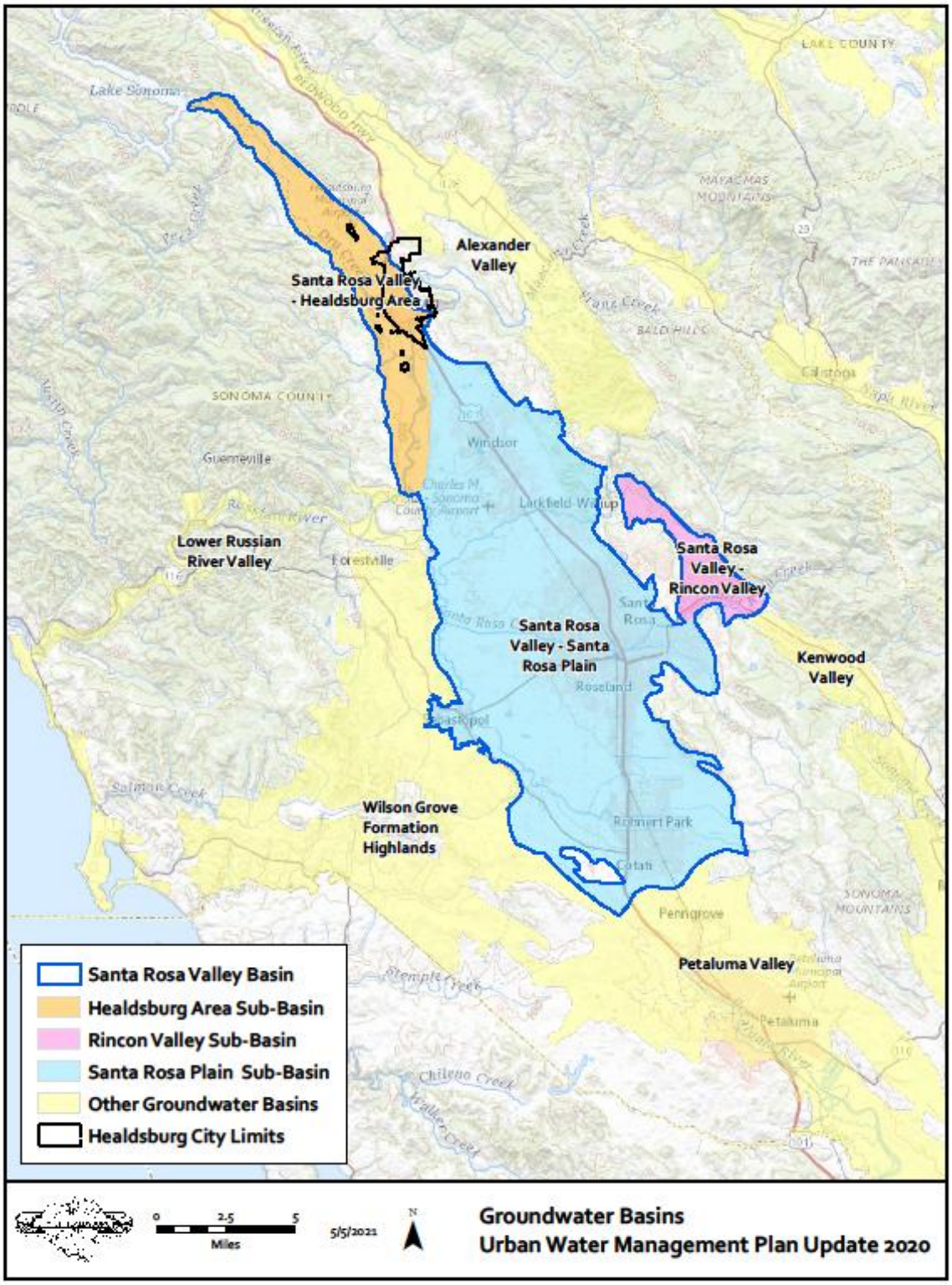
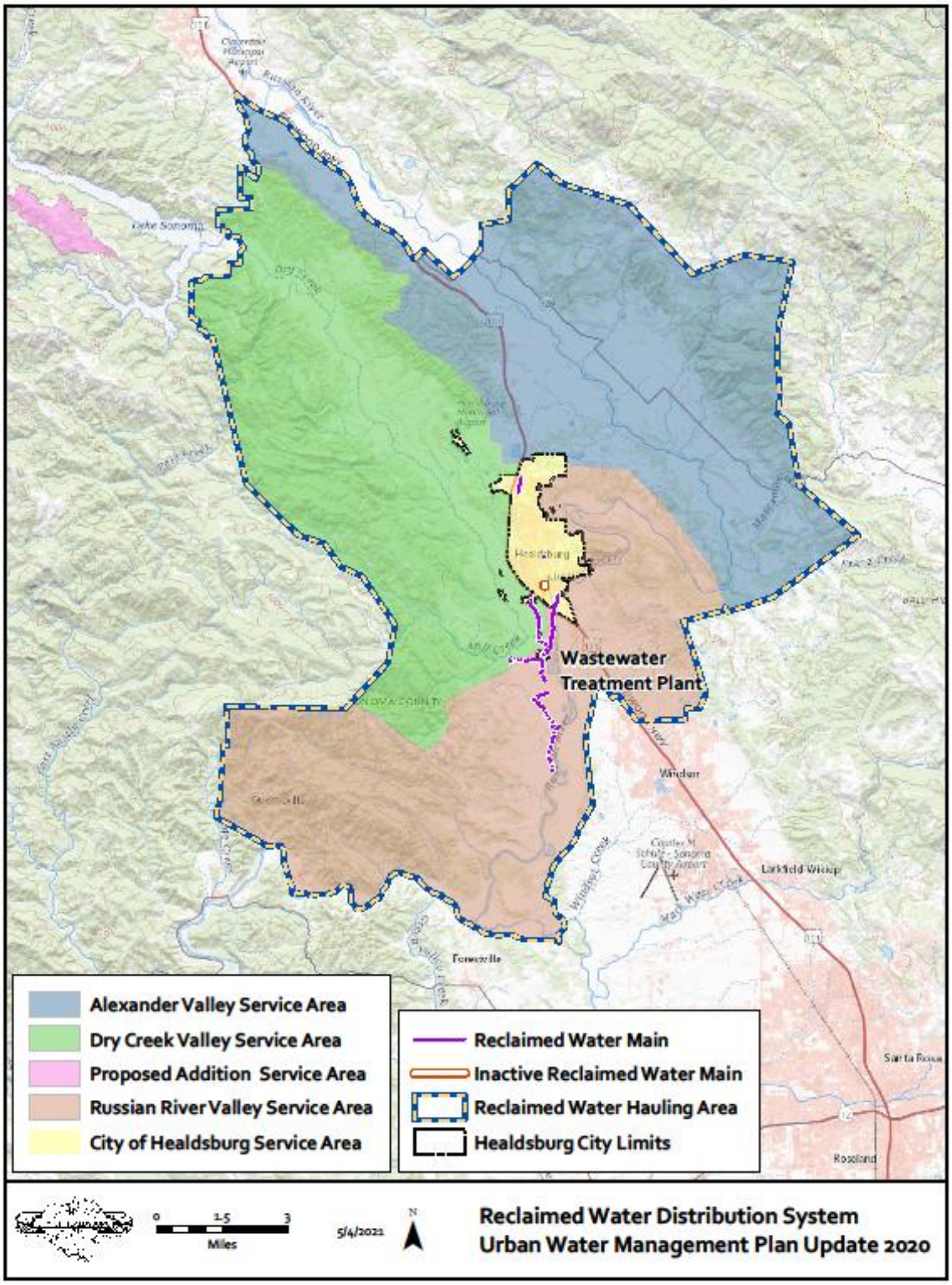


Figure 6-2 Reclaimed Water Distribution Facility



7. Water Supply Reliability and Drought Risk Assessment

7.1 Introduction

Assessing water service reliability is the fundamental purpose for an urban water supplier (Supplier) to prepare an Urban Water Management Plan (UWMP). Water service reliability reflects the Supplier's ability to meet the water needs of its customers, including end-use customers and retail urban suppliers, with water supplies under varying conditions.

7.2 Water Service Reliability Assessment

The UWMP include an assessment of its water supply reliability in normal, dry, and multiple dry water years. Factors influencing the City's water supply reliability are discussed in this section.

7.2.1 Constraints on Water Sources

Several constraints affect the reliability of the City's supply, consisting of source constraints, legal and environmental constraints, and water quality constraints, as described in the following sections.

7.2.1.1 Source Constraints

The reliability of the City's supply is generally protected by the Sonoma Water, formerly known as Sonoma Water diversion requirement to maintain the flow of the Russian River at minimum levels at specific points in the Russian River. As described in Chapter 3, Sonoma Water has the responsibility for maintaining these minimum flows with releases from Warm Springs Dam, which ensures adequate flows at the Dry Creek Well Field, located below the dam.

The flow of the Russian River has been augmented by diversions from the Eel River since 1908 for operation of the Potter Valley hydroelectric power project. This water diversion has been controversial for many years due to concerns over impairment of Eel River salmonid populations over the life of the project. In January 2004, the Federal Energy Regulatory Commission issued a decision that amended the plant's operational license, currently held by Pacific Gas & Electric (PG&E). The amended plan generally reduced the allowable annual diversion from the Eel River by 15%. This license expires in April of 2022[4] and several parties have formed a coalition and petitioned FERC to take on the Potter Valley Project and FERC license. Sonoma Water, one of the parties seeking to take on this project, is assuming the PVP will operate under annual licenses after April 2022 for the 25-year planning horizon of the 2020 Plan[5].

As described in Section 6.3.2, Sonoma Water must maintain sufficient water flow in the river to be protective of human health, fish and wildlife and for recreation in the Russian River. In 2008, the National Marine Fisheries Service (NMFS), through the determination of a Biological Opinion (BiOp), concluded that Sonoma Water should modify some of the flood control and water supply operations. The BiOp requires that the summertime flows be permanently reduced to replicate natural summertime river flows, starting in 2010. Since then, Sonoma Water has annually petitioned the State Board for interim changes to Decision 1610 depending on what type of water year it is: normal, dry or critically dry. During a normal year, Sonoma Water is required to maintain 185 cfs for the upper Russian River (between the confluence of the East and West Forks of the Russian

[4] Sonoma County Water Agency, 2010 Urban Water Management Plan, June 2011. Note that the SCWA 2005 UWMP reported that the permit would expire in 2033.

[5] Sonoma County Water Agency, 2020 Urban Water Management Plan, June 2021.

River and the confluence of the Russian River and Dry Creek) and 125 cfs for the lower Russian River (between its confluence with Dry Creek and the Pacific Ocean).

The City executed a water sale agreement with the Sonoma Water in 2015. The agreement allows the City to divert up to 138 MG (425 AF) per year from stored water within Lake Mendocino and Lake Sonoma. Under the agreement if Sonoma Water has a shortage of water, the water sold to the City could also be curtailed.

7.2.1.2 Legal & Environmental Constraints

There are factors other than drought or emergency that cause, or have the potential to cause, inconsistent supply to meet demands and are due to legal, environmental, or climatic issues.

The City presently holds four existing water rights permits for diversion from Dry Creek and the Russian River. In addition, the City has one application pending with the SWRCB for additional water rights on Dry Creek. Summaries of each existing and pending water rights permit are provided in Table 6-8a.

In September 2008, a final Biological Opinion (BiOp) was released by the National Marine Fisheries Service (NMFS) and issued to the Sonoma Water, the U.S. Army Corps of Engineers (Corps), the California Department of Fish and Game, and the Mendocino County Russian River Flood Control and Water Conservation Improvement District. The BiOp is a federal mandate on Russian River operations of the receiving agencies listed above that affect salmonids on state and federal endangered species lists (steelhead, Coho, and Chinook) which affects Sonoma Water supply operations and subsequent delivery to its water customers, including the City.

The BiOp calls for the elimination or reduction of impacts to salmonids due to water supply and flood control activities in the Russian River watershed through measures deemed to be “reasonable and prudent alternatives,” including:

- Extensive monitoring of both habitat and fish in Dry Creek, the estuary and the Russian River;
- Eliminating impediments to fish migration and improving habitat on several streams;
- Restoring up to six miles of habitat in Dry Creek and studying a bypass project;
- Requesting the SWRCB to reduce summertime flows in the Russian River; and
- Creating a freshwater lagoon in the estuary at the mouth of the Russian River during the summer months.

NMFS concluded that lower flows in Dry Creek and Russian River create a better environment for juvenile salmon and steelhead and the BiOp identified habitat restoration projects in Dry Creek to reduce water velocities in the stream/river. Current minimum summer flows are based on weather conditions, and range from 125 cfs (during a normal year, as measured at the Healdsburg Gage upstream of the Dry Creek confluence) to 85 cfs (as measured during a dry year). Under the terms of the BiOp, minimum flows would be dropped to 70 cfs with an additional 15 cfs to maintain system flexibility for a total flow of 85 cfs. The BiOp acknowledged a need for balance and flexibility and noted that Sonoma Water may find alternative minimum flow requirements that meet the goals of restoring functional salmonid-rearing habitat while promoting water conservation and limited adverse effects on other in-stream resources.

7.2.1.3 Water Quality Constraints

The quality of the City’s water deliveries is regulated by the California State Water Resource Control Board (SWRCB) and the Division of Drinking Water (DDW), which requires regular collection and testing of water samples to ensure that the quality meets regulatory standards and does not exceed Maximum Contaminant Levels (MCLs). The City performs water quality testing, which has

consistently yielded results within the acceptable regulatory limits (2020 Healdsburg Consumer Confidence Report).

The quality of existing surface water, groundwater, and recycled water supply sources over the next 25 years is expected to be adequate. Groundwater and groundwater under the influence of surface water will continue to be treated to drinking water standards, and no surface water, groundwater, or recycled water quality deficiencies are foreseen to occur in the next 25 years.

Various City-owned wells have or have had water quality issues and use restrictions due to manganese and/or elevated turbidity. These concerns are managed with water treatment facilities and use management, as discussed in Section 6.2.3 Currently, the seasonal use restrictions affecting the City due to water quality concerns are seasonal restrictions on the Gauntlett and Fitch Well Fields. The City treats water obtained from the Gauntlett Well Field in order to utilize this water source year-round. The City is exploring options for the Fitch Well Field to extend the availability of this water source year-round. The City anticipates completing improvements or adding diversion points to allow the year-round use of the Fitch Water Right after 2035. The City is not constrained in its access to its total water right due to water quality constraints; but rather limited in when it can use water pumped from these sources without treatment seasonally.

7.2.2 Reliability by Type of Year

This section describes the historic reliability of the City's water supply and any vulnerability due to seasonal or climatic shortage. Discussion generally pertains to curtailments of supply due to hydrologic shortages. It does not preclude possible requirements imposed by the state to reduce demand.

The following section, 7.2.2.1, discusses the types of rainfall years for which the UWMP requires forecast planning: average, single-dry, and multiple-dry years. Previous UWMPs prepared by the City of Healdsburg have used representative years identified in watershed modelling developed by Sonoma Water. Because of changing weather patterns, the recent drought, and comments received from the Public during development of the 2015 UWMP, the City decided to re-evaluate the representative years. Unfortunately, rainfall data is not consistent for the City of Healdsburg. Because of this, the analysis was completed for period from 1910 to 2020 using Ukiah rainfall data, which has the most complete data set and represents precipitation available to fill storage within Lake Mendocino.

The findings of this analysis and adjustments to the representative years, as well as supply reduction assumptions, are discussed in the subsequent section and summarized in Table 7-1.

7.2.2.1 Types of Years

Normal Year

For the purposes of UWMP, Normal Year is defined as a year, or an averaged range of years, that most closely represents the average water supply available to the City. This is also referred to as "normal" conditions in the UWMP Act.

For forecasting purposes, the Western Regional Climate Center set for Ukiah will be used with no increase adjustment for Healdsburg, with 37 inches per year being the average year for which calculations will assume no restriction to supply. Tables 7-2 and 7-3 project water supply in average year conditions over the next 25 years.

Single-Dry Year

The single-dry year is the year that represents the lowest water supply available to the City. For the 1990-2020 CIMIS data, the single driest water year was the 2020-2021 water year with a rainfall of 13.48 inches in Ukiah. This water year is 9 inches less than the 1991-1992 water-year rainfall (22.4 inches) and triggered curtailments of each of the City's water rights during the summer of 2021.

For forecasting purposes, 2020-2021 water-year will be used as the single-dry year and calculations will assume full curtailment of all City water rights and that only public health and safety diversions are permitted up to a citywide or gross GPCD of 112. This results in approximately 73% reduction in the City's available water supply in the first 10-years of the study period. Starting in 2030 the development of groundwater wells helps to increase supply but does not fully alleviate the need for conservation during drought years. Tables 7-3 and 7-4 show projected water supply in single-dry year conditions over the next 25-years.

Five-Consecutive-Year Drought

The multiple-dry year period is a period that represents the lowest average water supply available to the City over a consecutive five-year period.

The 2015 UWMP used a three-year period from 2013 to 2015 as the City's multiple-dry year period. This period received 73 inches of rainfall total, an average of about 18 inches per year. The 2020 UWMP guidelines require the study of a consecutive five-year period for the multiple-dry year analysis. In review of the past 30-years of precipitation records period from 1990-2020 finds the lowest average water-year rainfall was from water year 2010-11 to water year 2014-15: 110 inches of rainfall, or an average of about 22 inches per year.

For forecasting purposes, water-years 2010-11 through 2014-15 will be used as the multiple-dry year period. During this period, the 2020 UWMP assumes all but the City's Fitch water right will be curtailed as experienced during the 2014/2015 drought. Future water supplies for the multiple-dry year period is based upon only the Fitch Water right and starting in 2030 availability of groundwater supplies.

Table 7-1 provides the base years for average, single-dry and multiple-dry water years. These base years may change in future UWMPs, if it is determined that the current or a future drought is a worse scenario than the years listed here. This table also summarizes the reliability of the City's water supply when compared to historical drought conditions, as related to potential supply curtailments. Table 7-1 illustrates single-year and multi-year drought scenarios based on actual historical droughts and the assumed water right and supply curtailments noted above.

Table 7-1a Retail: Basis of Water Year Data
(DWR Table 7-1 Retail)

Year Type	Base Year	Volume Available	% of Average Supply
Average Year	WY 1999-20	1,826	100%
Single-Dry Year	WY 2020-21	482	26%
Consecutive Dry Years 1st Year	WY 2010-11	708	39%
Consecutive Dry Years 2nd Year	WY2011-12	708	39%
Consecutive Dry Years 3rd Year	WY 2012-13	708	39%
Consecutive Dry Years 4th Year	WY 2013-14	708	39%

Consecutive Dry Years 5th Year	WY 2014-15	708	39%

Based on CIMIS Station 83 data, Jan 1990 to Dec 2020. Supply percentage is based on water year (October to September) rainfall divided by the average rainfall for data period.

Table 7-1b Wholesale: Basis of Water Year Data
(DWR Table 7-1 Wholesale)

Year Type	Base Year	Volume Available	% of Average Supply
Average Year	WY 1999-20	192	100%
Single-Dry Year	WY 2020-21	17	9%
Consecutive Dry Years 1st Year	WY 2010-11	23	12%
Consecutive Dry Years 2nd Year	WY2011-12	23	12%
Consecutive Dry Years 3rd Year	WY 2012-13	23	12%
Consecutive Dry Years 4th Year	WY 2013-14	23	12%
Consecutive Dry Years 5th Year	WY 2014-15	23	12%

7.2.3 Water Service Reliability

This section summarizes the City's expected water supply reliability and demands for average, single-dry, and multiple-dry years for 2025, 2030, 2035, 2040, and 2045. Each supply reliability scenario is compared against demand projects both including and excluding conservation. This additional analysis indicates what role conservation can play in ensuring demand is met. For clarity and comparison's sake, these demand scenarios are shown in separate tables.

7.2.3.1 Water Service Reliability - Normal Year Supply and Demand Assessment

Tables 7-2 show comparisons for the average or normal year supply and demands; projected total supply is referenced from Table 6-11 and total demand is referenced from Table 4-5.

Both Tables show that, in a normal year, the City of Healdsburg is expected to maintain a projected surplus sufficient to meet projected demands.

Table 7-2a Retail: Normal Year Supply and Demand Comparison
(Table 7-2 Retail)

	2025	2030	2035	2040	2045
Supply totals	1,826	2,062	2,062	2,355	2,355
Demand totals	721	850	892	935	981
Difference	1,105	1,212	1,171	1,420	1,375

Table 7-2b Wholesale: Normal Year Supply and Demand Comparison (DWR Table 7-2 Wholesale)

	2025	2030	2035	2040	2045
Supply totals	21	21	21	21	21
Demand totals	21	21	21	21	21
Difference	0	0	0	0	0

7.2.3.2 Single-Dry Year Supply and Demand Assessment

Table 7-3, 7-4, 7-5 show comparisons for the single-dry year; projected total supply is referenced from Table 6-12, reduced to assuming full curtailment of all available water right and that diversions for public health and safety needs will be allowed up to 112 GPCD.

The tables show that, in a single-dry year, there will be a water supply shortage. Table 7-3a shows a mandatory conservation requirement of near 40% for the single-dry year scenario. During these conditions, mandatory water conservation will be required to mitigate the supply shortage.

Table 7-3a Retail: Single Dry Year Supply (26% available) and Demand Comparison (DWR Table 7-3 Retail)

	2025	2030	2035	2040	2045
Supply totals[1]	559	648	681	716	753
Demand totals	721	850	892	935	981
Difference	**(162)**	**(202)**	**(211)**	**(219)**	**(228)**

[1]This table may overstate resilience of the water supply as the City's use of water varies greatly with the seasons and the desire for outdoor irrigation.

Table 7-3b Wholesale: Single Dry Year Supply and Demand Comparison (DWR Table 7-3 Wholesale)

	2025	2030	2035	2040	2045
Supply totals	17	17	17	17	17
Demand totals	21	21	21	21	21
Difference	**(4)**	**(4)**	**(4)**	**(4)**	**(4)**

7.2.3.3 Water Service Reliability – Five Consecutive Dry Years

Tables 7-4a show comparisons for the multiple-dry year scenario. The multiple-dry year scenario projections are based upon the assumption that all but the City most senior water, the Fitch right, will be curtailed and not available to the City. In future years the water supply increases due to the availability of groundwater. Total demand, excluding any long-term conservation, is referenced from Table 4-5.

Both tables show that, in a multiple-dry year period, the City of Healdsburg has an insufficient water supply to meet demand without mandatory conservation efforts (except for year 2030). While conservation is needed during these periods of prolonged drought, the level of conservation over the study period is minor and ranges from less than five-percent to roughly twelve percent.

Table 7-4a Retail: Multiple Dry Years Supply and Demand Comparison – Million Gallons (DWR Table 7-4 Retail)

		2025*	2030*	2035*	2040*	2045*
First year	Supply totals	708	866	866	866	866
	Demand totals	721	850	892	935	981
	Difference	**(13)**	**15**	**(26)**	**(69)**	**(115)**
Second year	Supply totals	708	866	866	866	866
	Demand totals	721	850	892	935	981
	Difference	**(13)**	**15**	**(26)**	**(69)**	**(115)**
Third year	Supply totals	708	866	866	866	866
	Demand totals	721	850	892	935	981
	Difference	**(13)**	**15**	**(26)**	**(69)**	**(115)**
Fourth year	Supply totals	708	866	866	866	866
	Demand totals	721	850	892	935	981
	Difference	**(13)**	**15**	**(26)**	**(69)**	**(115)**
Fifth year	Supply totals	708	866	866	866	866
	Demand totals	721	850	892	935	981
	Difference	**(13)**	**15**	**(26)**	**(69)**	**(115)**
Sixth year	Supply totals	708	866	866	866	866

	Demand totals	721	850	892	935	981
	Difference	**(13)**	**15**	**(26)**	**(69)**	**(115)**
NOTES: Demands include 21 MG/yr for CSA 41. No reductions for WSCP are included.						

Table 7-4b Wholesale: Multiple Dry Years Supply and Demand Comparison – Million Gallons
(DWR Table 7-4 Wholesale)

		2025	2030	2035	2040	2045
First year	Supply totals	23	23	23	23	23
	Demand totals	21	21	21	21	21
	Difference	**2**	**2**	**2**	**2**	**2**
Second year	Supply totals	23	23	23	23	23
	Demand totals	21	21	21	21	21
	Difference	**2**	**2**	**2**	**2**	**2**
Third year	Supply totals	23	23	23	23	23
	Demand totals	21	21	21	21	21
	Difference	**2**	**2**	**2**	**2**	**2**
Fourth year	Supply totals	23	23	23	23	23
	Demand totals	21	21	21	21	21
	Difference	**2**	**2**	**2**	**2**	**2**
Fifth year	Supply totals	23	23	23	23	23
	Demand totals	21	21	21	21	21
	Difference	**2**	**2**	**2**	**2**	**2**
Sixth year	Supply totals	23	23	23	23	23
	Demand totals	21	21	21	21	21

	Difference	**2**	**2**	**2**	**2**	**2**

Table 7-5: Five-Year Drought Risk Assessment (DWR Table 7-5)

Submittal Table 7-5: Five-Year Drought Risk Assessment Tables
To address Water Code Section 10635(b)

2021	**Total**
Total Water Use	675
Total Supplies	708
Surplus/Shortfall w/o WSCP Action	33
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	
Revised Surplus/(shortfall)	33
Resulting % Use Reduction from WSCP action	0%

2022	**Total**
Total Water Use	691
Total Supplies	708
Surplus/Shortfall w/o WSCP Action	17
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	
Revised Surplus/(shortfall)	17
Resulting % Use Reduction from WSCP action	0%

2023	**Total**
Total Water Use	705
Total Supplies	708
Surplus/Shortfall w/o WSCP Action	3
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	
Revised Surplus/(shortfall)	3
Resulting % Use Reduction from WSCP action	0%

2024	Total
Total Water Use	721
Total Supplies	708
Surplus/Shortfall w/o WSCP Action	(13)
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	
Revised Surplus/(shortfall)	-13
Resulting % Use Reduction from WSCP action	0%

2025	Total
Total Water Use	740
Total Supplies	708
Surplus/Shortfall w/o WSCP Action	(32)
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	
Revised Surplus/(shortfall)	-32
Resulting % Use Reduction from WSCP action	0%

7.3 Drought Risk Assessment

The City's combined projected water supplies are sufficient to meet projected demands during normal water supply conditions. Under single-year and multiple-dry year conditions, this plan shows there is a need to for mandatory conservation ranging from as little as five percent to as high as 40% or higher.

7.3.1. Data, Methods and Basis for Water Shortage Condition

The single dry year condition reflects a sharp reduction in available water supplies. Based on robust use projections, the loss of available water necessitates conservation in all years when comparing demand to available water supply (Tables 7-3). Future severe droughts will limit the City's available water supply. To lessen the negative affects of future droughts the City will need to continue efforts towards water conservation, water supply contingency planning, and investigate the development of new and more resilient water supplies.

The water supply data for five consecutive dry years were based on the lowest consecutive five-year period in the historical rainfall data used for this UWMP. Each of these years showed a smaller reduction in supply than the single driest year. As such, the supply versus normal demand deficit is less pronounced but still requires conservation and water supply contingency planning.

7.3.2 Drought Resilience Assessment – Water Source Reliability

As previously discussed, the City has successfully implemented conservation – both voluntary and mandatory – to reduce overall water demands and accommodate supply shortages. However, the

City water supply remains largely tied to annual rainfall and storage levels within Lake Mendocino and Lake Sonoma. The City will need to continue working closely with Sonoma Water and other regional water entities to maximize the water available to the City. The City will also need to develop alternative sources of water and potentially aquifer storage to build resiliency to future droughts.

7.3.3 Total Water Supply and Use Comparison

The water supply data for five consecutive dry years shows a shortfall in water supply and a need for conservation during these years. The single-dry year scenario shows a significant shortfall in supply compared to forecasted water demands. In either case the City must prepare for mandatory conservation during times of drought and invest in new and additional water supplies to lessen the level of conservation necessary.

Options for the development of new water supplies include the potential to develop groundwater wells that include or allow for aquifer storage, development of recycled water use within the City's service territory, ongoing development of long-term water conservation, and continued efforts to support the City's existing and pending water rights. A major obstacle in implementing these additional supplies is the development of funding sources adequate to effect each project within a short period of time. Healdsburg water system is aged and requires significant replacement of existing capital infrastructure. Funding of new infrastructure projects will likely result in rate increases.

The City could contract for additional stored water from Sonoma Water. If agreed to by Sonoma Water, this additional water would provide an immediate increase to Healdsburg available water supplies but would come at a cost. Currently the backup water supply agreement with Sonoma Water is the highest cost of water for Healdsburg. Increasing the volume of contracted water will require a rate increase.

8. Water Shortage Contingency Planning

Water shortage contingency planning is a strategic planning process to prepare for and respond to water shortages. Section 10632 of the California Water Code (CWC) requires that UWMPs provide a contingency analysis to serve as a resource in the case of water supply interruption due to drought or other factors causing water shortage. Specifically, the CWC requires UWMPs to:

- The analysis of water supply reliability conducted pursuant to Section 10635.
    - The procedures used in conducting an annual water supply and demand assessment that include, at a minimum, both of the following:
    - 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. Urban water suppliers shall define these shortage levels based on the suppliers' water supply conditions, including percentage reductions in water supply, changes in groundwater levels, changes in surface elevation or level of subsidence, or other changes in hydrological or other local conditions indicative of the water supply available for use. Shortage levels shall also apply to catastrophic interruption of water supplies, including, but not limited to, a regional power outage, an earthquake, and other potential emergency events.
    - Shortage response actions that align with the defined shortage levels and include, at a minimum, all of the following:
    - Communication protocols and procedures to inform customers, the public, interested parties, and local, regional, and state governments, regarding, at a minimum, all of the following:
    - For an urban retail water supplier, customer compliance, enforcement, appeal, and exemption procedures for triggered shortage response actions as determined pursuant to Section 10632.2.

Section 8.1 Water Supply Reliability Analysis

The City of Healdsburg sources water from water wells along the Russian River (Fitch and Gauntlett well fields) and the Dry Creek well field. Water from these well fields is diverted under surface water rights dating back to 1949 (Fitch), 1950 (Dry Creek) and 1956 (Gauntlett). Surface water flows in both the Russian River and Dry Creek are sustained by storage in Lake Mendocino and Lake Sonoma. The City also gains an additional backup supply of water by contracting for water with Sonoma Water (formally Sonoma County Water Agency).

In normal years, flows are sufficient to support continued diversions from both the Russian River and Dry Creek. In low rain years, storage within Lake Mendocino and Lake Sonoma helps to support instream flows and downstream water rights but depending on the storage levels some conservation measures may be required.

There are other less frequent issues may impact the City's ability to divert water from the Russian River. A spill releasing toxins within the Russian River could result in a loss of one or more well fields in the impacted river causing the City to divert from other, unimpacted, well fields. Equipment damage or natural disasters (earthquake, landslide, flooding) could also impact the City's ability to divert water

from one or more of the three well fields. Under these more immediate and unforeseen conditions City staff would need to identify the amount of water available within City storage tanks and the duration of the well field loss such that appropriate conservation measures (if any) could be implemented quickly.

8.2 Annual Water Supply Demand Assessment Procedures

The City will use the decision-making process described below to determine water supplies, water demands, and water reliability on an annual basis. The City may adjust this process annually as needed for improved decision-making.

8.2.1 Decision Making Process

Starting in July of 2022 and each year after, City staff will complete the following steps each year to assess the City's water supply reliability. Upon completion of these steps, staff will present findings to the City Council for their action if needed.

- By February 20 of the reporting calendar year – develop a two-year forecast water demands with the first year taking into account best available data from the National Weather Service, historical water storage plus future demands, and other policy decisions that may reduce or increase water usage. The second year of this two-year forecast shall be based upon dry weather patterns.
- By March 20 of the reporting calendar year – identify existing and forecasted water storage levels for both Lake Mendocino and Lake Sonoma and any potential impact that would curtail or limit the City's existing water rights and wholesale water agreements over the coming 24 months
- By April 20 of the reporting calendar year – identify any existing equipment, projects, maintenance, city staffing, or exterior influences that may impact the City's ability to divert and treat water from the City's well fields.

Upon assessing and determining the City water supply reliability, City staff will present their findings to the City Council in the month of May or sooner. At that time City Council could choose to implement water conservation measures or direct staff to continue to monitor the City's water supply for any necessary changes.

8.2.2 Data and Methodologies

This section provides a description of key data inputs and annual assessment methodologies used to evaluate water service reliability for the current year and one subsequent dry year. This section is not intended to provide a fully complete list of indicators of water supply but rather to provide a starting point and minimum amount of data necessary for assessing the current years water supply reliability.

Evaluation Criteria

The largest influence on the City's water supply is annual rainfall and storage within Lake Mendocino and Lake Sonoma. Key data for the annual assessment will be based upon annual rainfall and water storage.

Water Supply

The majority of the City's water is diverted from the Russian River with a lesser amount diverted from Dry Creek. The Russian River's yearly instream flows are maintained by natural flows and water

storage within Lake Mendocino. Dry Creek's natural flows are supplemented by storage within Lake Sonoma. While Lake Sonoma contains multiple years of water storage, lake Mendocino is typically limited to a single year of supply.

Storage levels within these two bodies are controlled by the Army Corp and Sonoma Water. Water storage levels are managed to control flooding, maintain instream flows, and supply water throughout the year. Sonoma Water posted online storage levels for these two bodies of water and also provides monthly forecasts of storage levels.

Current Year Customer Demand

Current year demand will be forecasted based upon the straight-line trend of the past three years of water usage. If one of the past three years of water usage included mandatory conservation measures adjustments will be made to forecast typical demand unrestricted by mandatory conservation measures. The forecasted years shall be adjusted for any large-scale development project planned for completion within the forecast period. Forecasted customer demands shall include both a monthly total usage (MG) and a forecasted daily peak usage (CFS) for each month.

Current Year Available Supply

The current year's available supply should be determined based upon a combination of water storage within Lake Mendocino, availability of the City's water rights, wholesale contracts, and any potential capital projects, maintenance projects, out of service equipment, or other external influence that would limit the City's ability to divert water from the Russian River and/or Dry Creek.

Infrastructure Considerations

Included with the Annual Assessment, City staff will review capital improvement projects, maintenance projects, conditions of well field equipment, condition of treatment facilities, water storage facilities, and other related equipment that could limit the City's ability to produce and treat water. Any identified limitation shall be quantified as to its effect on monthly water production (MG) and daily peak production (CFS)

Other Factors

Other factors that could affect the City's ability to produce and treat drinking water for the community include potential toxic spills in Dry Creek or the Russian River, natural disasters such as earthquakes, landslides or wildfires, regional power outages, staffing levels, and funding of preventative maintenance and capital improvement projects. Each year staff will make an assessment of how other internal and external influences may affect the water supply for the City.

8.3 Six Standard Water Shortage Levels

Water Suppliers must include the six standard water shortage levels that represent shortages from normal water supply levels. The shortage levels have been standardized to provide a consistent regional and state wide approach to conveying the relative severity of water supply shortage conditions. This is an outgrowth of the severe state-wide drought of 2012-2016, and the widely recognized public communication and state policy uncertainty associated with the many different local definitions of water shortage stages.

A concise summary of the response actions taken for each shortage level are described in Submittal Table 8-1, shown below.

Table 8-1: Water Shortage Contingency Plan Levels

Shortage Level	Percent Shortage Range	Shortage Response Actions
1	Up to 10%	Voluntary – 10% reduction in use communitywide
2	Up to 20%	Mandatory – 20% reduction in use communitywide
3	Up to 30%	Mandatory – 30% reduction in use communitywide, with water allocations assigned
4	Up to 40%	Mandatory – 40% reduction in use communitywide, with water allocations assigned
5	Up to 50%	Mandatory – 50% reduction in use communitywide, with water allocations assigned
6	>50%	Mandatory – greater than 50% reduction in use communitywide, with water allocations assigned

8.4 Shortage Response Actions

Shortage response actions that align with the defined shortage levels and include, at a minimum, all of the following:

(A) Locally appropriate supply augmentation actions.

(B) Locally appropriate demand reduction actions to adequately respond to shortages.

(C) Locally appropriate operational changes.

(D) Additional, mandatory prohibitions against specific water use practices that are in addition to state-mandated prohibitions and appropriate to the local conditions.

(E) For each action, an estimate of the extent to which the gap between supplies and demand will be reduced by each action.

8.4.1 Demand Reduction

There are several demand reduction measures the City can implement as response actions to address shortage levels. Some of these include public education and outreach campaigns, watering and other outdoor use restrictions, and rate structure changes. Other demand reduction actions, such as infrastructure improvements or installation of water-efficient appliances and fixtures would be implemented over a longer-term and may not be appropriate as an immediate WSCP response action.

For the City of Healdsburg, the largest water savings come from irrigation reductions. As such the City's water shortage contingency plan relies heavily on reducing irrigation, especially for non-functional / ornamental plantings and landscapes. Other methods for water conservation will still be employed but result in lower overall reductions in usage.

DWR Submittal Table 8-2, as shown below, estimates the amount of reduction expected from specific actions included within the revised water shortage contingency plan.

Table 8-2: Demand Reduction Actions

Shortage Level	Demand Reduction Actions ***Drop down list*** *These are the only categories that will be accepted by the online submittal tool.*	How much is this going to reduce the shortage gap? *Include units used (volume type or percentage)*	Additional Explanation or Reference *(optional)*	Penalty, Charge, or Other Enforcement?
1	Provide Rebates on Plumbing Fixtures and Devices	Reduces total water use by less than 0.5%	Always offered. Expect increase in participation during shortages.	No
1	Provide Rebates for Landscape Irrigation Efficiency	Reduces total water use by less than 0.5%	Always offered. Expect increase in participation during shortages.	No
1	Provide Rebates for Turf Replacement	Reduces total water use by less than 0.5%	Always offered. Expect increase in participation during shortages.	No
1	Expand Public Information Campaign	Reduces total water use by 5-20%	Based on community response to calls for reductions over the past 30 years	No
1	Other - Require automatic shut of hoses	Reduces total water use by less than 0.5%	Always required.	No
1	Other - Prohibit use of potable water for washing hard surfaces	Reduces total water use by less than 0.5%	Always prohibited.	Yes
1	Landscape - Limit landscape irrigation to specific times	Reduces total water use by 1-5%	No watering between 7am - 8pm	Yes
1	Landscape - Restrict or prohibit runoff from landscape irrigation	Reduces total water use by less than 0.5%	Always prohibited.	Yes
1	Landscape - Other landscape restriction or prohibition	Reduces total water use by 1-5%	Eliminate over spray	Yes
2	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	Reduces total water use by less than 0.5%	Always required.	Yes
2	Other	Reduces total water use by less than 0.5%	Wash personal vehicles with bucket and hose equipped with an automatic shut-off	Yes

2	Other	Reduces total water use by 1-3%	Use of water from a fire hydrant for uses other than firefighting and line flushing	Yes
2	Other water feature or swimming pool restriction	Reduces total water use by less than 1%	Use of potable water for the City to fill a new swimming pool is prohibited	Yes
2	Other water feature or swimming pool restriction	Reduces total water use by less than 1%	Refilling of a swimming pool except to top off to prevent damage to pump and filter	Yes
2	Other - Prohibit use of potable water for construction and dust control	Reduces total water use by 1-5%	Use recycled water only	Yes
2	CII - Other CII restriction or prohibition	Reduces total water use by 1-5%	Commercial use shall be limited to 80 percent of the water used by the customer during the corresponding billing period in the previous year	Yes
3	Landscape - Limit landscape irrigation to specific days	Reduces total water use by 10-20%	Irrigation allowed 2 days per week	Yes
3	Other	Reduces total water use by 10-20%	Assign Water Budgets: Residential water budget of 4 HCF per person per month. Commercial and Industrial customers to reduce usage by 30%	Yes
4	Landscape - Limit landscape irrigation to specific days	Reduces total water use by 20-30%	Irrigation allowed 1 day per week	Yes

4	Other	Reduces total water use by 10-20%	Assign Water Budgets: Residential water budget of 3 HCF per person per month. Commercial and Industrial customers to reduce usage by 40%	Yes
5	Landscape - Prohibit all landscape irrigation	Reduces total water use by 30-40%	Prohibit all irrigation	Yes
5	Other	Reduces total water use by 10-20%	Assign Water Budgets: Residential water budget of 2 HCF per person per month. Commercial and Industrial customers to reduce usage by 50%. Occupancy of new buildings held until developer implements new conservation equal to projected demands	Yes
6	Other	Reduces total water use by 10-20%	Water budgets of less than 40 gallons per person per day, Commercial and Industrial reduction of 50% or greater Occupancy of new buildings held until developer implements new conservation equal to two times projected demands	Yes

8.4.2 Supply Augmentation

The City is working to increase and diversify the City's water supply primarily through the development of aquifer storage and recovery (ASR) wells. Using ASR wells to store water during periods of high-flows and plentiful supply will allow the City to later draw from that stored water when surface waters are limited. ASR wells are a sustainable way of creating increased water storage and supply, something of great need within the Russian River watershed.

Additionally, the City is considering the construction of a recycled water pipeline to offset potable water demands during normal years but to also improve access to recycled water during times of extreme drought. The construction of a pipeline inside City limits will provide an opertunity to install recycled water filling stations and shorten hauling distances. A primary challenge with constructing the pipeline is gaining funding. The extension of the pipeline is expected to cost roughly $10 million and currently is not within the City's available funding.

DWR Submittal Table 8-3 below shows the supply augmentation and other actions by shortage level available to the City of Healdsburg.

Table 8-3: Supply Augmentation

Shortage Level	Supply Augmentation Methods and Other Actions	How much is this going to reduce the shortage gap? Include units used (volume type or percentage)	Additional Explanation or Reference
2	Draw upon aquifer storage	Potentially 40MG per month	use of aquifer storage and recovery wells
5	New Recycled Water	Increase supply by 4 MG per month	Residential recycled water hauling program

8.4.3 Operational Changes

Within the WSCP, the City should consider operational changes that can be implemented to address water shortage on a short-term basis. Some operational changes may be related to supply augmentation or demand-reduction response actions and can be addressed when describing those response actions. For the City of Healdsburg operations response actions for a non-catastrophic water shortage may include, but are not limited to:

- Improved monitoring, analysis, and tracking of customer water usage rates:
    - The City is in the early stages of replacing its Utility Billing software. Replacement of this software tool would allow the City to leverage existing remote read water meters and provide daily usage information to water customers. The software would also provide early detection of leaks, high usage, and usage above average when compared to similar properties.
    - The City is also considering the implementation of adjustable-rate structures that would increment as water becomes scarcer. Implementation of these rates would help ensure adequate revenues to maintain water department operations as well as encourage conservation.
- Alterations in maintenance cycles and plans to expedite infrastructure repairs and improve system efficiency:
    - Through the annual water audit the City tracks the overall efficiency of the water distribution system and the amount of water lost to system leaks. The City also provides a 24-hour emergency response hotline for customer to call in leaks at any time of the day or night.
- Adjust timing of system flushing for water quality needs to winter months:
    - To conserve water during the summer season, a period most likely to result in water shortages, City staff will defer flushing of lines for water quality needs (when possible) until supply's have sufficiently recovered. Where possible City staff have implemented the collection of water used for flushing such that it can be used for landscape irrigation or other non-potable beneficial uses of water.

8.4.4 Additional Mandatory Restrictions

Implementation of mandatory restrictions can be an effective but unpopular method for reducing customer usage because it is associated with enforcement actions and penalties. Mandatory

restrictions can include several items such as limitations on outdoor water use (timing, volume, location), limiting total residential water use, restrictions on using water for certain functions (e.g., car washing), and other restrictions.

When forecasted demand exceeds the available water supply, Healdsburg will implement an appropriate level of mandatory restriction on current water customers. These restrictions will follow the city's water shortage contingency plan ordinance but may be adjusted by Council upon the recommendation of the City Engineer or Utility Director. To counter negative impacts of mandatory conservation, the City will, as funding exists, provide additional water conservation programs.

8.4.5 Emergency Response Plan

Catastrophic water shortages limiting supplies can be addressed by implementing the appropriate stage of water conservation. For catastrophic water shortage conditions, and depending on the scale of the event, the City may have sufficient facilities and infrastructure to reroute around a temporary disruption.

The City of Healdsburg has completed both a Local Hazard mitigation plan and updated the City's Emergency Operations Plan. These two documents guide the City through catastrophic events. The City is also working to complete a water specific Emergency Response Plan for the Water Department. In the event of a supply emergency, the City would implement its WSCP and increase public awareness to the water supply situation as appropriate for the situation.

Major risk associated with the City of Healdsburg's water system are listed in the table below.

Catastrophe / Emergency	Action Summary
Structure Fires	Monitor water storage and water production to meet demands
Wildfires	Monitor fire progression and potential to damage water infrastructure, monitor storage levels and increased use of sprinkler systems.
Power Outage or PSPS	Maintain fleet of backup generators and monitor fuel levels throughout outage.
Flooding	Monitor river levels and potential to inundate water facilities such as the Guantlett Well field.
Drought	Monitor available water supplies and implement conservation as needed
Earthquake	Inspect system and isolate breaks to prevent water loss. Monitor water quality and potential for boil notices.
Toxic Spills	Switch water production to a source not affected by the spill. Monitor storage levels and work with state and regional entities to identify when safe to return to normal supply sources

8.4.6 Seismic Risk Assessment and Mitigation Plan

Per California Water Code Section 10632.5, suppliers are required to assess seismic risk to water supplies as part of their WSCP. In addition, the WSCP must include the mitigation plan for seismic risk, i.e., earthquake.

Due to the nearby Rodgers Creek fault, Healdsburg's water facilities (source water, treatment plant, storage, and distribution system) are exposed to the seismic risk. As with other areas of California this risk is substantial and full mitigated is not feasible. To manage the risk of earthquakes and other catastrophes, the City maintains a level of redundance with its facilities. Additionally, the City maintains a membership in CalWARN to supply mutual aid should a large event affect the City.

The City of Healdsburg completed a Local Hazard Mitigation Plan (LHMP) in 2018. This plan identifies specific hazards that could affect the City of Healdsburg. Included in this plan is a detailed discussion of seismic hazards including the negative effects of ground shaking and liquefaction. Like many other communities, during a significant earthquake event Healdsburg could face substantial damage, injury or loss of life, interruptions to critical services, and other major challenges.

8.4.7 Shortage Response Action Effectiveness

For each specific Shortage Response Action identified in the plan, the WSCP also estimates the extent to which that action will reduce the gap between supplies and demands identified in DWR Submittal Table 8-2. To the extent feasible, Healdsburg has estimated percentage savings for specific conservation measures. These estimates can help inform which measures will deliver the necessary outcomes to meet given shortage level requirements.

As a normal practice for California water providers, customers are individual metered to track specific usage and help customers understand their normal usage levels. The City is also beginning the process to install a customer portal that will allow customers more frequent access (daily) to water usage. The City can also track usage on a large scale through the monitoring of production wells and storage levels. The combination of both individual customers meters and production meters helps the City determine the level of conservation being achieved and if adjustments are necessary.

8.5 Communication Protocols

Timely and effective communication is a key element of the WSCP implementation. In the context of water shortage response, the purpose may be an immediate emergency water shortage situation, such as may result from an earthquake, fires, infrastructure failures, or a longer-term emergency shortage condition, such as droughts. In an immediate emergency, the City will activate the communication protocol detailed in the City's Emergency Operations Plan.

Communications regarding water shortage and conservation efforts will be sent to individual customers via phone call, email, and social media posts. The City will also reach out to local media and use the City's website to post information regarding the current event and what response, if any, is needed from the public. During more prolonged events such as drought, the City will create a constant social media presence to continue to inform and remind customers of requirements necessary to conserve available water supplies. This may also include the use of print media through bill inserts and direct mailers.

Education and outreach campaigns will primarily help to inform customers of the level of conservation needed and methods they can use to reach these conservation goals. The City would increase media attention to the water supply limitations and would encourage property owners to plan for landscape

conversions and the replacement of low-efficiency plumbing fixtures and appliances with higher-efficiency fixtures and appliances.

Healdsburg's Utility Conservation Analyst will develop and lead public information and outreach efforts in close coordination with the City's Utility Director. Customer outreach is required to successfully achieve targeted water savings during each shortage and will include the above-mentioned actions as well as other that may be appropriate for the specific situation.

8.6 Compliance and Enforcement

Per California Water Code Section 10632 (a)(6), Healdsburg has defined customer compliance, enforcement, appeal, and exemption procedures for triggered shortage response actions. Communication procedures to ensure customer compliance are described in Section 8.5 and customer enforcement, appeal, and exemption procedures are defined in the Healdsburg Municipal Code, Section 1.12, and Section 13.12.220.

To gain compliance with the need for conservation levels, the City will employee several technics. This includes education and outreach as noted in Section 8.5 but also include routine patrols to observe water use, close monitoring of customer usage through automated meter readings, monitoring of overall system usage, and other measure as necessary for the situation. If compliance is not gained, fines or loss of water privileges could occur.

When mandatory water conservation is imposed by the City Council, violations of the water use restrictions and prohibitions shall be enforced consistent with City Policies and Codes and generally as outlined below:

1. For the first such violation, the customer shall be given a warning, generally by phone or directly by leaving a door tag notice informing the customer of the problem and asking that it be corrected.

2. If the violation continues or is repeated, the City will send Healdsburg's enforcement officer or mail a letter to the customer who receives the water bill. The enforcement officer or mailed letter will describe the violation and request that it be corrected, cured, and abated immediately or within such specified time as reasonable under the circumstances. Said letter shall state the consequences of noncompliance with the request.

3. If the violation continues, the City's may impose any penalty or pursue enforcement action pursuant as allowed by Healdsburg Municipal Code.

8.7 Compliance and Enforcement

Per California Water Code Section 10632 (a)(7)(A), (B), and (C) Healdsburg must include a description of the legal authorities that empower the City to implement and enforce its shortage response actions, a statement that the City shall declare a water shortage emergency, and a statement that the City shall coordinate with any other city or county within which it provides water supply services for the possible proclamation of a local emergency.

As allowed by Healdsburg's Municipal Code (HMC), the City Council can enact, and will enact as the need arises, HMC section 13.12.220 to implement mandatory water conservation measures as necessary to reduce water demand to or below available water supplies. These mandatory conservation measures can be enforced through HMC Section 1.12 which includes monetary fines or potentially the loss of water service. If a regional event occurs, such as a drought or flood, the City will work with other agencies through the possible proclamation of a local emergency.

8.8 Financial Consequences of WSCP

During times of short duration supply loss and conservation measure no significant financial consequence is expected. During times of longer duration supply limitation and mandatory conservation measures, the City expects that moderate to significant financial consequences could occur. This is primarily due to the City's existing water rate structure that predominately develops revenue through a per-unit charge rather than a larger fixed charge to recover ongoing, non-volumetric costs. The range of revenue loss can reach up to 50% of annual revenues. Additionally, years following mandatory conservation also show a tendency to result in below average usage and lower water sale revenues. While long-term conservation gained during droughts is beneficial, changes to rate structures may be necessary to maintain adequate cost recovery to maintain regulatory compliance and system reliability.

In future rate structures the City will consider establishing a drought surcharge to recover fixed costs not associated with volumetric usage but also to encourage conservation during times of short supply. Changes to the City's water rates structure is subject to Proposition 218 and associated procedures. Consideration of new rate structures will likely come before the City Council in early 2022.

8.9 Monitoring and Reporting

Per California Water Code Section 10632(a)(9), Healdsburg must provide a description of the monitoring and reporting requirements and procedures that have been implemented to ensure appropriate data is collected, tracked, and analysed for purposes of monitoring customer compliance and to meet state reporting requirements.

Through the City's System Control and Data Acquisition (SCADA) system, water production figures are tracked daily. This data is used to measure the effectiveness of any water shortage contingency level that may be implemented. Further the City, through remote read meters, can track individual water usage to ensure compliance with mandatory conservation measures.

As with previous droughts, State Water Board reporting requirements increase to track water demand and diversions from impacted water sheds. The City will use both production well field data and data collected from customer meters to fulfill these requirements.

8.10 WSCP Refinement Procedures

Per California Water Code Section 10632 (a)(10), Healdsburg shall revaluation and improvement procedures for systematically monitoring and evaluating the functionality of the water shortage contingency plan to ensure shortage risk tolerance is adequate and appropriate water shortage mitigation strategies are implemented. The analysis provided from monitoring water savings; the City can develop more efficient demand reduction requirements for each WSCP stage.

Healdsburg's WSCP and HMC are dynamic tools to implement water-saving measures when the need arises. The City Manager and City Engineer can make recommendations for the City Council to adopt, adjust, change, or add to existing mandatory water conservation stages. Through City outreach and education programs, customers will be notified of any changes to mandatory water conservation measures.

8.11 WSCP Refinement Procedures

Per Water Code Section 10632(b), water features, pools, and hot tubs (spas) shall be defined for clear distinction in the WSCP. For the purposes of the WSCP, water features are not categorized under defined terminology. Pools, hot-tubs (spas), fountains as well as artificial ponds, lakes, and waterfalls (collectively

ornamental fountains) will all be called out specifically during each stage that requires their decrease or fully terminated use.

8.12 Plan Adoption, Submittal and Availability

Per California Water Code Section 10632 (a)(c), the water shortage contingency plan will be posted no later than 30 days after adoption. To fulfill this requirement the City will post the adopted version of the WSCP to the City's website following the public hearing noticed for October 18, 2021.

9. Demand Management Measures

Demand management measures (DMMs) are water conservation measures. The DMMs listed in the UWMP Act correlate to the California Urban Water Conservation Council's (CUWCC's) original Best Management Practices (BMPs) for water conservation. The 2020 Urban Water Management Plan (UWMP) Guidebook uses the terms DMMs and BMPs interchangeably.

The purpose of this section is to provide a comprehensive description of the City's water current and future conservation and how it corresponds to the water use reduction plan meant to ensure ample water supply. Previously, UWMPs could only include information about 14 specific DMM measures. Any programs outside of these 14 were not to be included. New to this UWMP is a streamlined reporting requirement that allows the City to report all water conservation measures (programs) under the following six DMM categories:

- Water waste prevention ordinances
- Metering
- Conservation pricing (as allowed by PROP 218)
- Public education and outreach
- Programs to assess and manage distribution system real loss
- Water conservation program coordination and staffing support

Other demand management measures that have a significant impact on water use as measured in gallons per capita per day (GPCD), including innovative measures, if implemented.

9.1 Demand Management Measures for Retail Agencies

Implementation is discussed by category for the six DMM topics in Sections 9.2.1 through 9.2.6 below.

9.2.1 Water Waste Prevention Ordinances

In 2014, the City updated the Water Supply Emergency Plan (WSEP) ordinance to include water waste prohibitions as part of Stage 2 and 3 water shortage scenarios. In accordance with the 2020 Urban Water Management Plan, an amended Water Shortage Contingency Plan (WSCP) ordinance will be included that details 6 water shortage scenarios.

9.2.2. Metering

The City's water system is fully metered, including: production, consumption, and sales to the County for the Fitch Mountain Water District. Metering is essential for water conservation as it allows for water customers to be billed for the volume of water consumed rather than a flat rate, which incentivizes water efficiency. Metering also allows for tracking water use by sector and individual accounts, which allows for better evaluation of water conservation programs.

All the City's water accounts are metered and all water is billed by volume (versus a flat fee). In 2005, the City began implementing a $2 million meter and pipe replacement program. This effort for meter replacement was initiated because the meter inventory was old and no longer measuring water use accurately. Because failing meters tend to err on the side of under-measuring water consumed, inaccurate meters contribute to the volume of water perceived as water loss and cause a loss of revenue to the City and potential waste of water. The City reviews individual accounts for water use to search for accounts that have unusually low water use characteristic for the type of account. The meters on those accounts are prioritized for meter inspection, and replacement if appropriate.

In 2014, the City began installing Advance Metering Infrastructure (AMI) which allows water meters to be read multiple times a day instead of once a month. This provides a more granular level of

water use data, which is helpful in identifying water use behaviour and patterns, conservation potentials, and leaks much more quickly.

9.2.3 Conservation Pricing

Conservation pricing is a rate structure for water and sewer rates designed to recover the cost of providing service based on volume of use rather than a flat rate charged irrespective of volume used. A conservation pricing structure is always in place and is not dependent upon a water shortage for implementation.

The City's rate structure includes both a flat fee per account, charged each billing cycle regardless of volume of water used, and a volumetric charge for water used during the same billing cycle. The City's rate structure meets the requirements of conservation pricing because of the volumetric charge; customers will pay less on a monthly basis if they use less water.

9.2.4 Public education and outreach

In 2015, the City of Healdsburg's Utility Department created the Smart Living Healdsburg program umbrella which is dedicated to providing customers with information, opportunities, and incentives to help them use their utilities efficiently and effectively. The water conservation section of the Smart Living Healdsburg web page provides information about mandatory water conservation measures, indoor and outdoor water conservation tips, water saving rebate programs and applications, and presentations and workshops. The City uses the Smart Living Healdsburg Facebook page to connect with customers and provide information about conservation.

Several times a year, the City develops and disseminates marketing material about water conservation programs to customers. This includes ads in the newspaper, utility billing inserts, and the annual water quality report. The City provides educational workshops and presentations covering water use, efficiency, and conservation to the public.

9.2.5 Programs to Assess and Manage Distribution System Real Loss

To implement this DMM, water suppliers should annually calculate the percentage of water lost from the water distribution system and, if that loss is greater than 10%, conduct a water system leak audit and repair the leaks found, as feasible. Additionally, the water supplier should evaluate real water loss (system leaks), versus apparent water loss, (water consumed by customers that is not accurately metered or accounted for in the supplier's water billing system). A water system leak audit indicating a low level of leaks signals inaccurate metering or accounting.

As discussed in section 9.2.2, starting in 2005, the City implemented a $2 million meter and pipe replacement program. The primary goal for this program was to significantly reduce the percentage of water loss in the distribution system (23% in 2005). This loss reduction program has been highly successful; since implementation of this program, the percent of water loss decreased significantly: 8% in 2010; 0% in 2013; and 3% in 2015. The real water loss for these periods may differ slightly due to differences in the billing and production data time periods.

In 2020, the City replaced a leaky wood tank with a water-tight glass-lined steel take. Additionally, the City is undergoing a system-wide project to replace old water mains that will result in a reduction in water loss. Along with the main replacements, the City is assessing a computerized maintenance management system for linear assets which will also contribute to reduced water loss.

Industry standard considers a water loss of less than 10% is acceptable. The City will continue its efforts in leak detection, leak repair, and meter replacement to maintain a water loss level less than 10%.

9.2.6 Water conservation program coordination and staffing support

In 2014, the City Council approved the addition of a Utility Conservation Analyst staff position, whose duties include water conservation program development, implementation, and marketing. The full-time employee position spends approximately 40 percent of their time supporting the water conservation program.

In addition, other City Staff provide program support through water waste monitoring, rebate processing, lawn conversion inspections, customer coordination and education, and other tasks. This additional support is equal to 25 percent a full-time equivalent (FTE) employee.

The Utility Conservation Analyst can be contacted at conservation@ci.healdsburg.ca.us or 707.431.3122.

9.2.7 Other demand management measures

This section is dedicated to other DMMs that have a significant impact on water use as measured in gallons per capita per day (GPCD), including innovative measures, if implemented.

In 2015, the City designed and implemented a robust collection of water conservation rebate programs; building on and adding to, those developed in 2014. These include:

- Free indoor water saving items
- Low-Flow Toilet Rebate Program
- High-Efficiency Clothes Washer Rebate
- Lawn Conversion Rebate
- Irrigation System Update Rebate
- Greywater System Rebate

The City Council adopted the Water Efficient Landscape Ordinance (No. 1091) in December 2009. In coordination of ever improving State building and landscape codes, the City's ordinance promotes the efficient design and installation of water-efficient landscapes in Healdsburg for new construction and substantial alterations of existing development where landscapes are proposed. The ordinance applies standards and guidelines for irrigation system efficiency as well as encouraging climate appropriate plantings. The implementation of this ordinance will reduce water use on new and substantially renovated landscapes on a per square foot basis for the following categories of development:

- All new residential, commercial, office, industrial, public or quasi-public projects with landscaping.
- All additions/remodels to existing residential, commercial, office, industrial, public or quasi-public projects with new or replaced contractor-installed landscapes of 2,500 square feet or more.
- All additions/remodels to existing residential, commercial, office, industrial, public or quasi-public projects with new or replaced property owner-installed landscapes of 5,000 square feet or more.

The City offers dedicated irrigation meters to customers to better track their outdoor irrigation needs versus indoor water needs, and continues a popular a lawn conversion rebate program providing $1.00 per square foot of lawn replaced with climate appropriate landscape.

9.2 Reporting Implementation

9.3.1 Implementation over the Past Five Years

AB 2067 requires urban water suppliers to provide narratives describing the water supplier's demand management measures. The bill requires "the narrative to address the nature and extent of each water demand management measure implemented over the past 5 years and describe the water demand management measures that the supplier plans to implement to achieve its water use targets."

As discussed previously, in 2014, the City Council approved the addition of one staff position which was developed to include water conservation coordinator tasks. In 2015, the City implemented a robust water conservation program. This program was developed in response to continued drought conditions, State drought regulation, and long-term water use efficiency targets.

The rebate programs have helped achieve over 6.5 million of gallons of water saved every year.

Table 9-1: 2020 Water Conservation Results since 2015

Water Saving Measure	Units	Water Savings (gallons)
Lawn Conversion	311,748 sq ft	5,455,590
Low Flow Toilets	385	910,180
Clothes Washers	27	98,451
Irrigation Upgrades	19	49,795
Total	-	6,514,017

9.3.2 Planned Implementation to Achieve Water Use Targets

The City of Healdsburg has met its 2020 water use target, as detailed in Chapter 5. Although a portion of that water savings is due to the temporary emergency drought restrictions, the water use reduction is also due to increases in water efficiency achieved through implementation of water conservation programs.

The City will continue to implement the demand management measures outlined in Section 9 as well as complete regular analysis to identify other measures that can be implemented to reduce water consumption.

10. Plan Adoption, Submittal, and Implementation

This chapter details the process of soliciting input from public and private entities regarding this Plan, and includes information regarding public hearings, plan adoption, and submittal to the DWR and other agencies for approval and implementation.

10.1 Inclusion of All 2020 Data

For reporting of water use and supply information, data for the entire calendar year of 2020 was included in this Plan.

10.2 Notice of Public Hearing

A notice of public hearing will be published in the Healdsburg Tribune on October 7, 2021 and October 14, 2021.

10.2.1 Notice to Cities and County

A notice of public hearing of revisions were sent to the County of Sonoma and Sonoma Water on March 9, 2021.

10.2.2 Notice to the Public

The City hosted three community meeting to review the preliminary results of the 2020 UWMP, receive feedback and answer questions. A virtual meeting was held on May 18, 2021 and had approximately 30 attended. The second community meeting was held with City Council on August 23, 2021. The third community meeting was held virtually on September 22 and had approximately 25 attendees. All of these meetings were recorded and are publicly available.

10.3 Public Hearing and Adoption

The City invited public involvement and input in the Plan update via two public workshops, a public hearing and review/comment of the draft document. In addition, Sonoma County was contacted directly, by email to inform the appropriate contacts of the hearing location and time.

Table 10-1. Notification to Cities and Counties

City Name	60 Day Notice	Notice of Public Hearing
County of Sonoma	Yes	Yes

The public hearing was held October 18, 2021. The hearing provided opportunity for the public to learn and ask questions regarding the quantity, reliability, and quality of their water supply. The public hearing included a discussion of the City's achievements in meeting its 2020 water use targets. A hard copy of the Plan is available for review at City Hall and an electronic version was available for review on the City website 14 days prior to the hearing.

Plan Submittal

After the Plan is adopted, it will submitted to the Department of Water Resources. Additional copies of the Plan were also sent to the California State Library as well as the County of Sonoma.

Public Availability

The Final 2020 Plan will be available for review on the City Website at the following link: http://cityofhealdsburg.org/622/Urban-Water-Management-Plan. The 2020 Plan is also available in hard copy form at City Hall for public review upon request.

Amending an Adopted UWMP

If the City amends the Plan after it has been adopted, the amendments will be made available for public review prior to adoption. Amendments to the Plan will be publicly noticed and presented at a public hearing

Appendix A - 2016 Water Loss Audit Report

AWWA Free Water Audit Software: Reporting Worksheet

WAS v5.0

? Click to access definition
\+ Click to add a comment

Water Audit Report for: City of Healdsburg (4910005)
Reporting Year: 2016 1/2016 - 12/2016

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

WATER SUPPLIED

Volume from own sources:	6	542.370	MG/Yr					MG/Yr
Water imported:		0.000	MG/Yr					MG/Yr
Water exported:		0.000	MG/Yr					MG/Yr
WATER SUPPLIED:		**542.370**	MG/Yr					

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

				Pcnt:	Value:	
Billed metered:	5	515.908	MG/Yr			
Billed unmetered:			MG/Yr			
Unbilled metered:			MG/Yr			
Unbilled unmetered:	5	1.356	MG/Yr		1.356	MG/Yr
AUTHORIZED CONSUMPTION: ?		**517.264**	MG/Yr			

Use buttons to select percentage of water supplied **OR** value

WATER LOSSES (Water Supplied - Authorized Consumption)

25.106 MG/Yr

Apparent Losses

				Pcnt:	Value:	
Unauthorized consumption:		1.356	MG/Yr	0.25%		MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	3	0.258	MG/Yr	0.05%		MG/Yr
Systematic data handling errors:		1.290	MG/Yr	0.25%		MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: ? **2.904** MG/Yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: ? **22.202** MG/Yr

WATER LOSSES: **25.106** MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: ? **26.462** MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	8	49.0	miles
Number of active AND inactive service connections:	9	4,680	
Service connection density: ?		96	conn./mile main
Are customer meters typically located at the curbstop or property line?		Yes	
Average length of customer service line:			

(length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure: 7 65.0 psi

COST DATA

Total annual cost of operating water system:	8	$4,300,000	$/Year
Customer retail unit cost (applied to Apparent Losses):	8	$4.49	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	5	$0.00	$/Million gallons ☑ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 59 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Customer metering inaccuracies
3: Billed metered

Appendix B - 2017 Water Loss Audit Report

AWWA Free Water Audit Software: Reporting Worksheet

WAS v5.0

? Click to access definition
\+ Click to add a comment

Water Audit Report for: City of Healdsburg (4910005)
Reporting Year: 2017 1/2017 - 12/2017

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

WATER SUPPLIED

Volume from own sources:	3	609.530	MG/Yr	3	0.00%		MG/Yr
Water imported:	n/a		MG/Yr				MG/Yr
Water exported:	n/a		MG/Yr				MG/Yr
WATER SUPPLIED:		**609.530**	MG/Yr				

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

				Pcnt:	Value:	
Billed metered:	6	579.471	MG/Yr			
Billed unmetered:	n/a	0.000	MG/Yr			
Unbilled metered:	n/a	0.000	MG/Yr			
Unbilled unmetered:	5	1.524	MG/Yr		1.524	MG/Yr
AUTHORIZED CONSUMPTION:		**580.995**	MG/Yr			

WATER LOSSES (Water Supplied - Authorized Consumption)

28.535 MG/Yr

Apparent Losses

			Pcnt:	Value:	
Unauthorized consumption:	1.524	MG/Yr	0.25%		MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies: 3	7.335	MG/Yr	1.25%		MG/Yr
Systematic data handling errors:	1.449	MG/Yr	0.25%		MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: **10.308** MG/Yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: **18.228** MG/Yr

WATER LOSSES: **28.535** MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: **30.059** MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	7	64.8	miles
Number of active AND inactive service connections:	7	4,713	
Service connection density:		73	conn./mile main
Are customer meters typically located at the curbstop or property line?		Yes	
Average length of customer service line:			

(length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure: 5 — 65.0 psi

COST DATA

Total annual cost of operating water system:	10	$5,697,450	$/Year
Customer retail unit cost (applied to Apparent Losses):	5	$4.99	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	6	$554.62	$/Million gallons

☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 49 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Customer metering inaccuracies
3: Billed metered

Appendix C - 2018 Water Loss Audit Report

AWWA Free Water Audit Software: Reporting Worksheet

WAS v5.0

? Click to access definition
\+ Click to add a comment

Water Audit Report for: City of Healdsburg (4910005)
Reporting Year: 2018 1/2018 - 12/2018

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

<---------- Enter grading in column 'E' and 'J' ---------->

Master Meter and Supply Error Adjustments

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED

	Grading	Value		Grading	Pcnt:	Value:	
Volume from own sources:	6	621.270	MG/Yr	3	0.00%		MG/Yr
Water imported:	n/a	0.000	MG/Yr				MG/Yr
Water exported:	n/a	0.000	MG/Yr				MG/Yr
WATER SUPPLIED:		**621.270**	MG/Yr				

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

	Grading	Value		Pcnt:	Value:	
Billed metered:	5	590.000	MG/Yr			
Billed unmetered:	n/a	0.000	MG/Yr			
Unbilled metered:	6	0.000	MG/Yr			
Unbilled unmetered:		7.766	MG/Yr	1.25%		MG/Yr

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

Use buttons to select percentage of water supplied **OR** value

AUTHORIZED CONSUMPTION: ?	**597.766**	MG/Yr

WATER LOSSES (Water Supplied - Authorized Consumption)

23.504 MG/Yr

Apparent Losses

	Grading	Value		Pcnt:	Value:	
Unauthorized consumption:		1.553	MG/Yr	0.25%		MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

	Grading	Value				
Customer metering inaccuracies:	3	7.468	MG/Yr	1.25%		MG/Yr
Systematic data handling errors:		1.475	MG/Yr	0.25%		MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: ?	**10.497**	MG/Yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: ?	**13.008**	MG/Yr
WATER LOSSES:	**23.504**	MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: ?	**31.270**	MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

	Grading	Value	
Length of mains:	7	64.8	miles
Number of active AND inactive service connections:	7	4,725	
Service connection density:		73	conn./mile main
Are customer meters typically located at the curbstop or property line?		Yes	
Average length of customer service line:			

(length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure:	5	65.0	psi

COST DATA

	Grading	Value	
Total annual cost of operating water system:	10	$6,017,430	$/Year
Customer retail unit cost (applied to Apparent Losses):	8	$5.19	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	5	$448.18	$/Million gallons

☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 60 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Customer metering inaccuracies
3: Billed metered

Appendix D - 2019 Water Loss Audit Report

AWWA Free Water Audit Software: Reporting Worksheet

WAS v5.0

? Click to access definition
+ Click to add a comment

Water Audit Report for: City of Healdsburg (4910005)
Reporting Year: 2019 1/2019 - 12/2019

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

Master Meter and Supply Error Adjustments

WATER SUPPLIED

<---------- Enter grading in column 'E' and 'J' ---------->

					Pcnt:	Value:	
Volume from own sources:	6	640.420	MG/Yr	3	0.00%		MG/Yr
Water imported:	n/a	0.000	MG/Yr				MG/Yr
Water exported:	n/a	0.000	MG/Yr				MG/Yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: 640.420 MG/Yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

			Pcnt:	Value:	
Billed metered:	3	600.850	MG/Yr			
Billed unmetered:	n/a	0.000	MG/Yr			
Unbilled metered:	9	0.030	MG/Yr			
Unbilled unmetered:	5	1.601	MG/Yr		1.601	MG/Yr

Use buttons to select percentage of water supplied OR value

AUTHORIZED CONSUMPTION: 602.481 MG/Yr

WATER LOSSES (Water Supplied - Authorized Consumption)

37.939 MG/Yr

Apparent Losses

			Pcnt:	Value:	
Unauthorized consumption:		1.601	MG/Yr	0.25%		MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	4	6.376	MG/Yr	1.05%	MG/Yr
Systematic data handling errors:		1.502	MG/Yr	0.25%	MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: 9.479 MG/Yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: 28.460 MG/Yr

WATER LOSSES: 37.939 MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: 39.570 MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	7	64.8	miles
Number of active AND inactive service connections:	7	4,842	
Service connection density:		75	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure:	5	65.0	psi

COST DATA

Total annual cost of operating water system:	10	$7,089,403	$/Year	
Customer retail unit cost (applied to Apparent Losses):	10	$5.35	$/100 cubic feet (ccf)	
Variable production cost (applied to Real Losses):	5	$464.86	$/Million gallons	☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 63 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Billed metered
3: Customer metering inaccuracies

Appendix E - 2020 Water Loss Audit Report

AWWA Free Water Audit Software: Reporting Worksheet

WAS v5.0

? Click to access definition
\+ Click to add a comment

Water Audit Report for: City of Healdsburg (4910005)
Reporting Year: 2020 1/2020 - 12/2020

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

<---------- Enter grading in column 'E' and 'J' ---------->

Master Meter and Supply Error Adjustments

WATER SUPPLIED

						Pcnt:		Value:	
Volume from own sources:	7	661.320	MG/Yr	8	0.00%	◉ ○		MG/Yr
Water imported:	n/a	0.000	MG/Yr			◉ ○		MG/Yr
Water exported:	n/a	0.000	MG/Yr			◉ ○		MG/Yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: 661.320 MG/Yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

				Pcnt:		Value:	
Billed metered:	8	628.040	MG/Yr				
Billed unmetered:	n/a		MG/Yr				
Unbilled metered:	9	0.030	MG/Yr				
Unbilled unmetered:	5	1.650	MG/Yr		○ ◉	1.650	MG/Yr

Use buttons to select percentage of water supplied **OR** value

AUTHORIZED CONSUMPTION: ? 629.720 MG/Yr

WATER LOSSES (Water Supplied - Authorized Consumption)

31.600 MG/Yr

Apparent Losses

			Pcnt:		Value:	
Unauthorized consumption:	1.653	MG/Yr	0.25%	◉ ○		MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	3	6.344	MG/Yr	1.00%	◉ ○	MG/Yr
Systematic data handling errors:		1.570	MG/Yr	0.25%	◉ ○	MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: ? 9.568 MG/Yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: ? 22.032 MG/Yr

WATER LOSSES: 31.600 MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: ? 33.280 MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	5	69.0	miles
Number of active AND inactive service connections:	5	4,538	
Service connection density:		66	conn./mile main

Are customer meters typically located at the curbstop or property line?		Yes
Average length of customer service line:		

(length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure:	7	43.0	psi

COST DATA

Total annual cost of operating water system:	10	$5,893,133	$/Year	
Customer retail unit cost (applied to Apparent Losses):	5	$5.51	$/100 cubic feet (ccf)	
Variable production cost (applied to Real Losses):	5	$498.64	$/Million gallons	☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 66 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Customer metering inaccuracies
3: Customer retail unit cost (applied to Apparent Losses)

Appendix F - SB X7-7 Compliance Form 2020 GPCD

SB X7-7 Table 5: 2020 Gallons Per Capita Per Day (GPCD)		
2020 Gross Water *Fm SB X7-7 Table 4*	**2020 Population** *Fm SB X7-7 Table 3*	**2020 GPCD**
640	11,800	**149**
NOTES:		

Appendix G - SB X7-7 Compliance Form

SB X7-7 Table 9: 2020 Compliance							
Actual 2020 GPCD[1]	Optional Adjustments to 2020 GPCD Enter "0" if Adjustment Not Used			TOTAL Adjustments[1]	Adjusted 2020 GPCD [1] *(Adjusted if applicable)*	2020 Confirmed Target GPCD [1, 2]	**Did Supplier Achieve Targeted Reduction for 2020?**
	Extraordinary Events[1]	Weather Normalization[1]	Economic Adjustment[1]				
149	-	-	-	-	149	162	**YES**

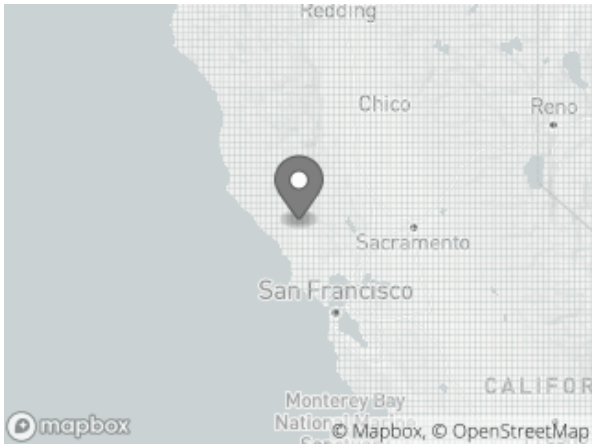
[1] *All values are reported in GPCD*

[2] ***2020 Confirmed Target GPCD*** *is taken from the Supplier's SB X7-7 Verification Form Table SB X7-7, 7-F.*

NOTES:

Appendix H - Forecasted Temperatures

Local Climate Change Snapshot



Healdsburg

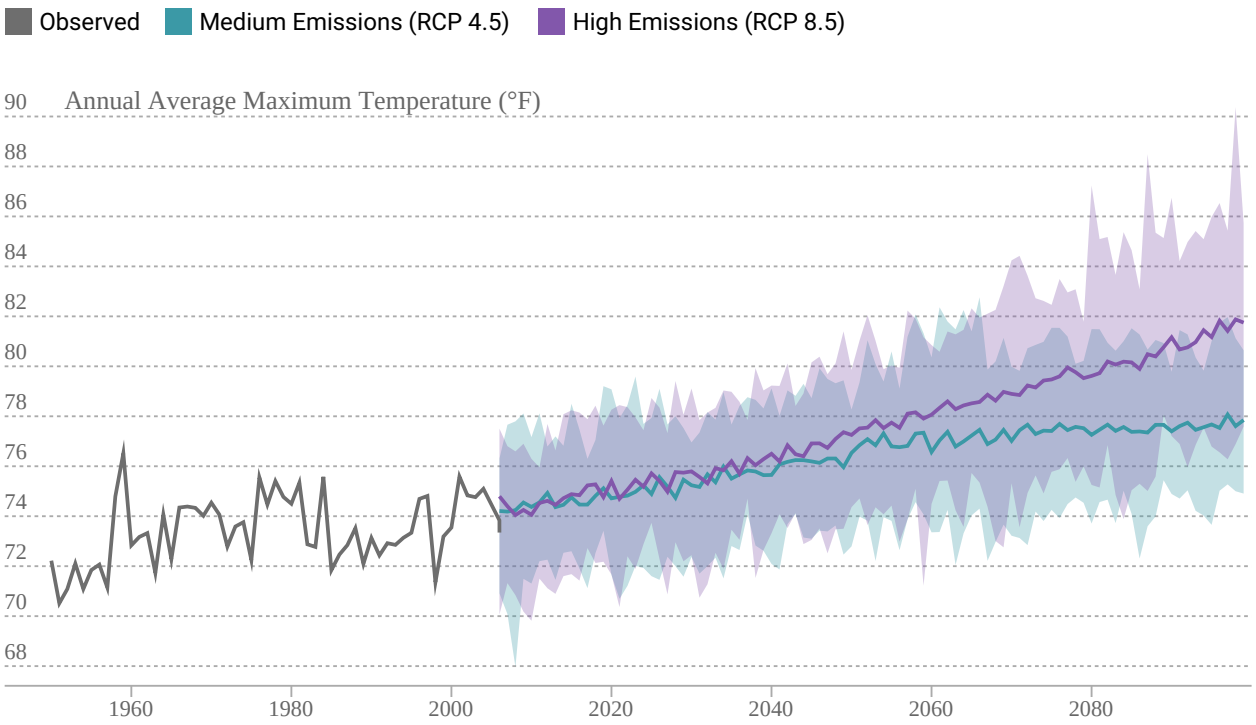
California 95448, United States

Overall temperatures are projected to rise in California during the 21st century. While the entire state will experience temperature increases, the local impacts will vary greatly with many communities and ecosystems already experiencing the effects of rising temperatures.

Appendix H - Forecasted Temperatures

Annual Average Maximum Temperature

Average of all the hottest daily temperatures in a year.



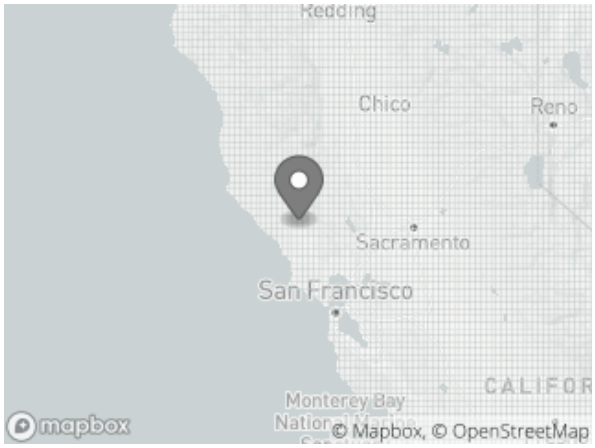
Observed (1961-1990) 30yr Average: 73.7 °F

		30yr Average	30yr Range
Baseline (1961-1990)			
MODELED HISTORICAL	-	73.3 °F	73.0 - 73.7 °F
Mid-Century (2035-2064)			
MEDIUM EMISSIONS (RCP 4.5)	+3.2 °F	76.5 °F	74.5 - 77.8 °F
HIGH EMISSIONS (RCP 8.5)	+3.9 °F	77.2 °F	74.2 - 78.6 °F
End-Century (2070-2099)			
MEDIUM EMISSIONS (RCP 4.5)	+4.2 °F	77.5 °F	75.2 - 79.5 °F
HIGH EMISSIONS (RCP 8.5)	+7.0 °F	80.3 °F	76.0 - 83.4 °F

1. Data derived from 32 LOCA downscaled climate projections generated to support California's Fourth Climate Change Assessment. Details are described in Pierce et al., 2018.
2. Observed historical data derived from Gridded Observed Meteorological Data. Details are described in Livneh et al., 2015.
3. Data presented is for LOCA grid cell (~ 6km x 6km resolution) at -122.87,38.61.

Appendix I - Forecasted Dry Spells

Local Climate Change Snapshot



Healdsburg

California 95448, United States

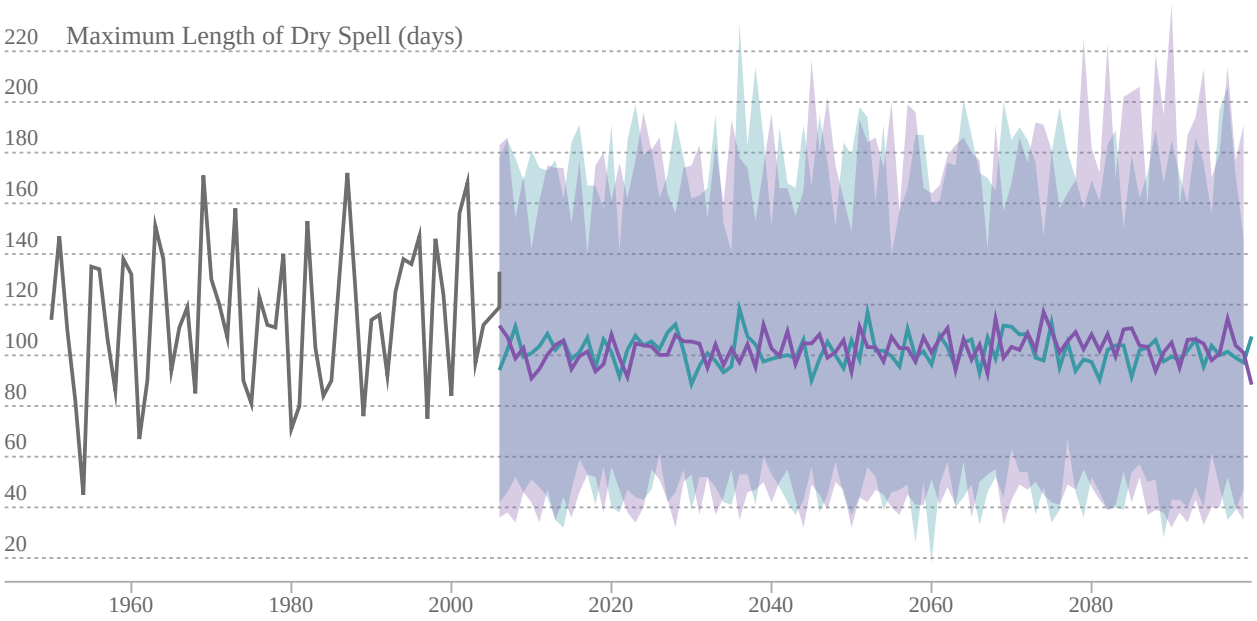
California's climate varies between wet and dry years. Research suggests that for much of the state, wet years will become wetter and the dry years will become drier. Dry years are also likely to be followed by dry years, increasing the risk of drought. While California does not see the average annual precipitation changing significantly in the next 50-75 years, precipitation will likely be delivered in more intense storms and within a shorter wet season. We are already seeing some of the impacts from a shift towards larger year to year fluctuations.

Appendix I - Forecasted Dry Spells

Maximum Length of Dry Spell

The maximum length of dry spell for each year. In other words, the maximum number of consecutive days with precipitation < 1mm for each year.

Observed Medium Emissions (RCP 4.5) High Emissions (RCP 8.5)



Observed (1961-1990) 30yr Average: 113 days

		30yr Average	30yr Range
Baseline (1961-1990)			
MODELED HISTORICAL	-	97 days	87 - 108 days
Mid-Century (2035-2064)			
MEDIUM EMISSIONS (RCP 4.5)	+5 days	102 days	87 - 124 days
HIGH EMISSIONS (RCP 8.5)	+6 days	103 days	83 - 121 days
End-Century (2070-2099)			
MEDIUM EMISSIONS (RCP 4.5)	+4 days	101 days	87 - 119 days
HIGH EMISSIONS (RCP 8.5)	+8 days	105 days	75 - 141 days

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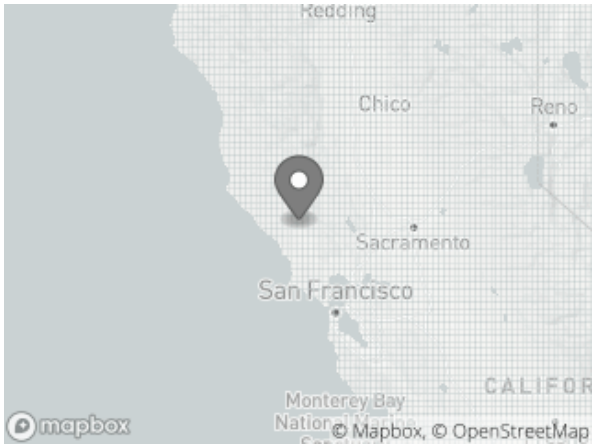
Appendix J - Forecasted Precipitation

Local Climate Change Snapshot



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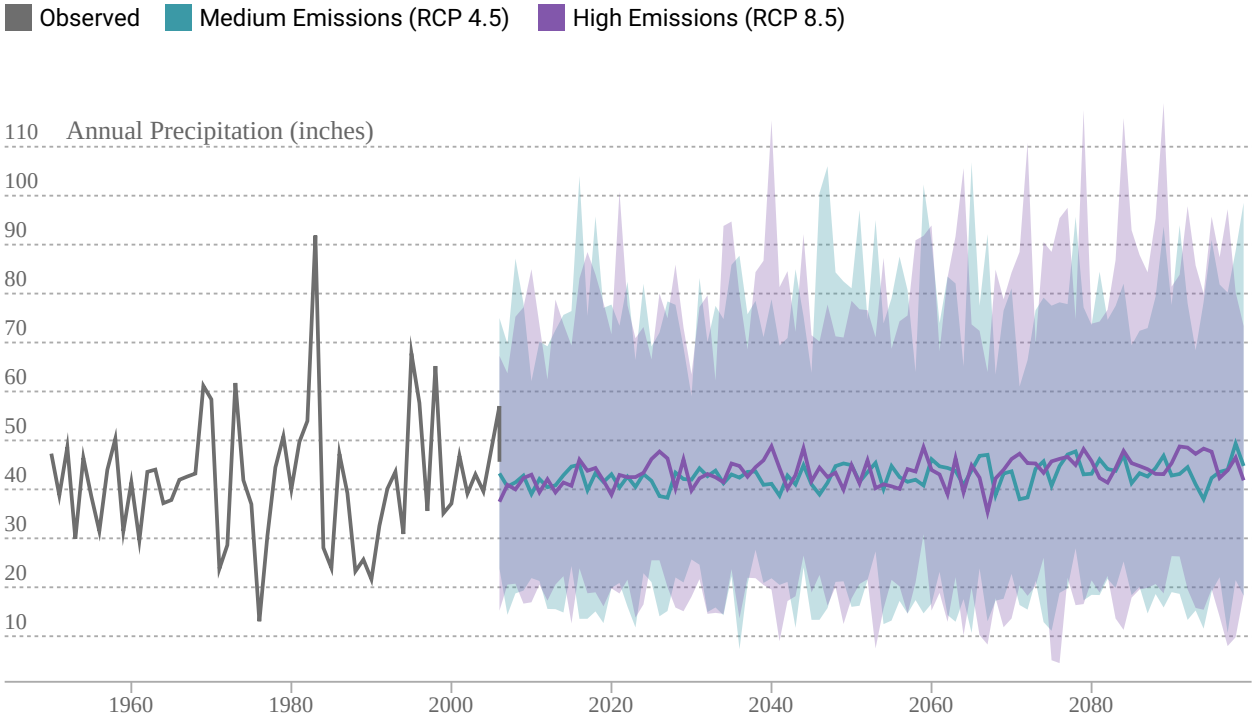
Appendix J - Forecasted Precipitation

Annual Precipitation

Total precipitation projected for a year



Observed (1961-1990) 30yr Average: 40.5 inches

		30yr Average	30yr Range
Baseline (1961-1990)			
MODELED HISTORICAL	-	41.9 inches	38.3 - 45.6 inches
Mid-Century (2035-2064)			
MEDIUM EMISSIONS (RCP 4.5)	+0.8 inches	42.7 inches	36.7 - 55.7 inches
HIGH EMISSIONS (RCP 8.5)	+1.5 inches	43.4 inches	34.6 - 60.2 inches
End-Century (2070-2099)			
MEDIUM EMISSIONS (RCP 4.5)	+1.8 inches	43.7 inches	37.5 - 54.2 inches
HIGH EMISSIONS (RCP 8.5)	+3.5 inches	45.4 inches	33.2 - 62.1 inches

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