CITY OF REDLANDS

2020 IRUWMP

Part 2, Chapter 4
Redlands 2020 UWMP

MAY 27, 2021

Prepared by Water Systems Consulting, Inc.

WSC

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RETAIL URBAN WATER MANAGEMENT PLAN

4 City of Redlands

This chapter describes information specific to the City of Redlands, its supplies, demands and water use efficiency programs. The information and analysis in this chapter is supplemental to the regional information presented in Part 1 of the 2020 IRUWMP and is provided to meet the City of Redlands' reporting requirements for 2020 under the UWMP Act.

The City of Redlands (Redlands or City) has provided water services to the community since 1910. Redlands is a retail public water supplier that meets the definition of an urban water supplier with over 23,600 municipal water service connections in 2020.

The water utility service area generally coincides with the City's incorporated area and sphere of influence. The service area encompasses 22 square miles inside the City's corporate boundaries and 7 square miles outside City boundaries. Water use is largely attributed to landscape irrigation due to arid climate and large residential lots.

A small part in the southeastern section of the City is currently served by Western Heights Mutual Water Company and is not part of this UWMP. **Figure 4-1** shows the Redlands water service area.

All volumes of water in this chapter are presented in units of Acre-Feet (AF). One AF is the volume of water required to cover 1 acre with 1 foot of water, or approximately 325,851 gallons.

IN THIS SECTION

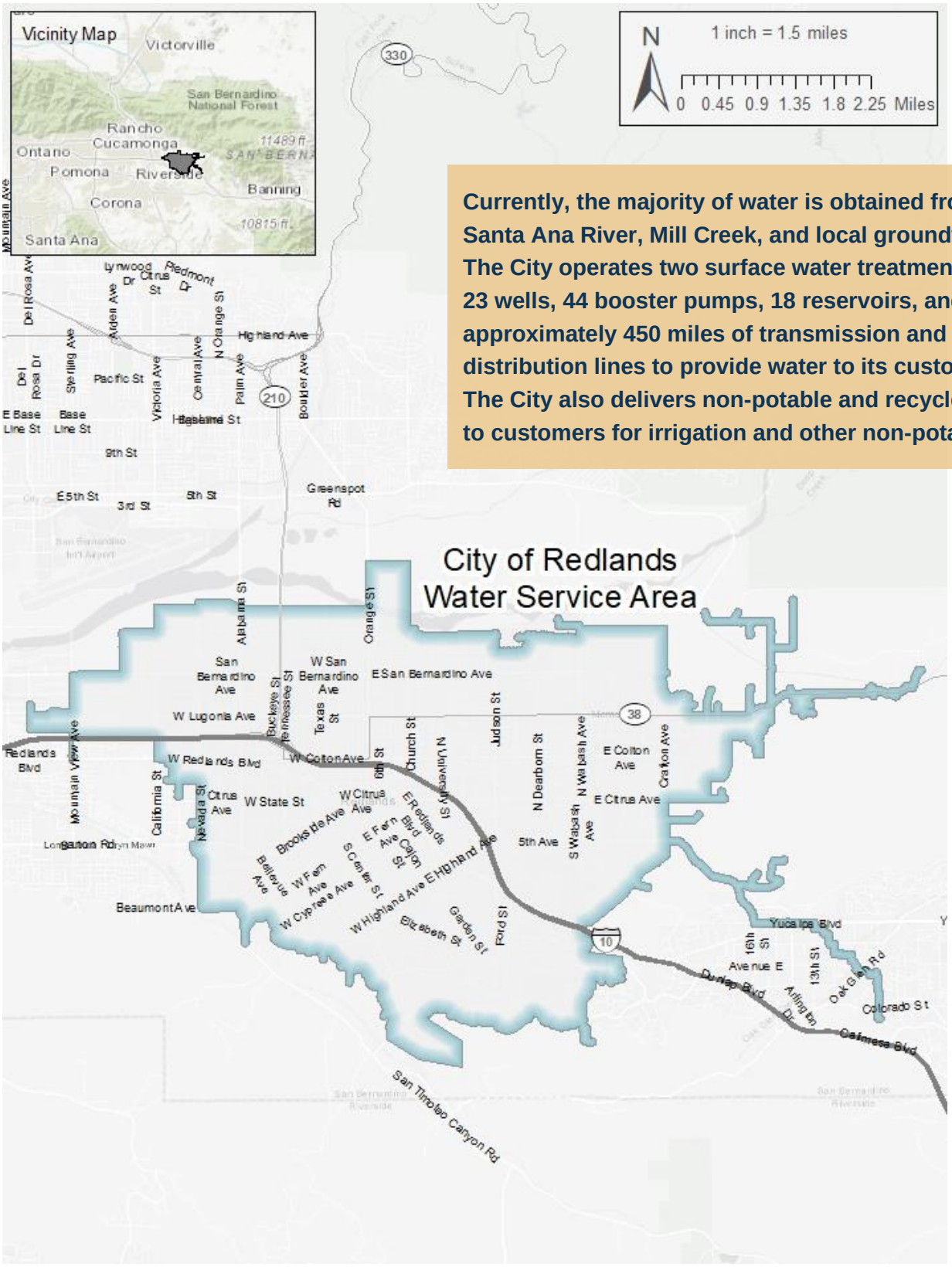

Figure 4-1: City of Redlands Water Service Area Map

4.1 System Description

This section describes the population and land uses within Redlands' service area. The regional climate, which includes Redlands' service area, is described in **Part 1**, **Chapter 2** of the 2020 IRUWMP.

4.1.1 Population

For the purposes of consistent reporting of population estimates, the California Department of Water Resources (DWR) has developed a GIS-based tool (DWR Tool) to estimate the population within a water agency's service area using census data and number of water service connections. The DWR Tool was used to intersect the service area boundary with census data to provide population estimates for 1990, 2000, and 2010. The DWR Tool uses the number of service connections in those prior census years, where available, to calculate a persons-per-connection factor, which is then projected forward to estimate population in a given year using the number of connections in that year. The service area population for 2020 was estimated in the DWR Tool using the number of connections in 2010 and 2020.

To estimate population for future years, projections from the Southern California Association of Governments (SCAG) were used. SCAG has developed a forecast called the 2020 Connect SoCal Regional Transportation Plan and has estimated the population, households, and employment in 2020, 2035, and in 2045 inside each of the approximately 11,300 traffic analysis zones (TAZs) that cover the SCAG region. The service area boundary was intersected with a GIS shapefile of the SCAG TAZs to provide an estimate of population within the service area for years 2020, 2035, and 2045. These estimates were used to calculate compound annual population growth rates for years 2020-2035 and 2035-2045. The population growth rates were applied to the 2020 population to estimate future population. Estimated 2020 and future year population is shown in **Table 4-1**.

Per SCAG requirements, it must be noted that this population modeling analysis was performed by Water Systems Consulting, Inc. based upon modeling information originally developed by SCAG. SCAG is not responsible for how the model is applied or for any changes to the model scripts, model parameters, or model input data. The resulting modeling data does not necessarily reflect the official views or policies of SCAG. SCAG shall not be held responsible for the modeling results and the content of the documentation.

SCAG prepares demographic forecasts based on land use data for their region through extensive processes that emphasizes input from local planners and is done in coordination with local or regional land use authorities, incorporating essential information to reflect anticipated future populations and land uses. SCAG's projections undergo extensive local review, incorporate zoning information from city and county general plans, and are supported by Environmental Impact Reports.

Table 4-1: DWR 3-1R Current and Projected Population

POPULATION SERVED	2020	2025	2030	2035	2040	2045
TOTAL	**78,052**	**81,367**	**84,822**	**88,424**	**91,727**	**95,153**

4.1.2 Land Use

Per the 2017 City of Redlands General Plan, 27% of the land within the City of Redlands is single family residential, 3% is multi-family residential, 3% is commercial, 5% is industrial, 4% is public and institutional facilities, 16% is parks and open space, 4% is agricultural, and 5% is other uses including the Redlands Municipal Airport, utilities facilities, and public parking lots. The balance is made up of vacant land and public and private rights of way (railroads and private roads). This is shown in **Figure 4-2.**

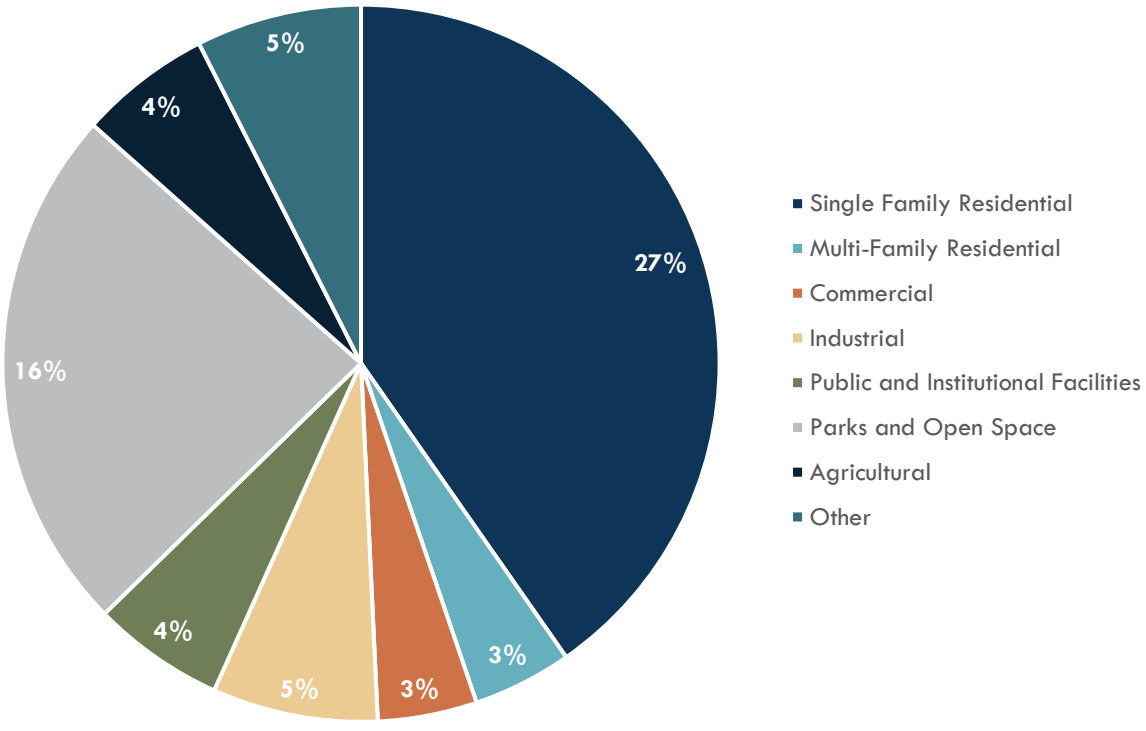

Figure 4-2. Land Uses

4.2 Water Use

This section describes the current and projected water uses within Redlands' service area.

4.2.1 Potable versus Non-Potable Water Use

In addition to serving potable water for domestic use, Redlands provides non-potable groundwater and recycled water to customers in its service area for irrigation, industrial, and other non-potable uses. Recycled water from the City of Redlands Wastewater Treatment Plant (WWTP) is used by the Mountain View Power Plant and a landfill. Recycled water that is not discharged or used by those two customers is mixed with non-potable water from wells and is delivered to customers served by Redlands' non-potable system. This water is billed as "raw water" in Redlands' billing system. Redlands also maintains other separate non-potable systems that are supplied exclusively by non-potable groundwater and raw surface water. This water is also billed as "raw water" in Redlands' billing system.

4.2.2 Water Use by Sector

Redlands categorizes its water customers into six categories for potable deliveries: Single Family, Multi-Family, Commercial/Institutional, Landscape, Agricultural Irrigation, and Other, which includes fire suppression, construction water, and bulk water sales. Redlands also makes deliveries of non-potable water to three customer categories: Commercial/Institutional, Landscape, and Agricultural/Landscape Irrigation, and delivers recycled water to Mountain View Power Plant and a landfill.

Bear Valley Mutual Water Company delivers wholesale raw water to Redlands and Redlands delivers non-potable water to Bear Valley Mutual Water Company through multiple agreements. Additionally, Redlands delivers wholesale potable water to Rocky Comfort Mutual Water Company. The number of active connections in each category from 2016 to 2020 are shown in **Table 4-2**.

Table 4-2: City of Redlands 2016-2020 Connections by Customer Class

CUSTOMER CLASS	2016	2017	2018	2019	2020
Single Family	19,515	19,526	19,532	19,473	19,922
Multi-Family	966	962	961	952	980
Commercial/Institutional	1,357	1,375	1,373	1,363	1,397
Landscape	527	521	525	528	533
Agricultural Irrigation	34	35	30	32	17
Other	633	650	658	672	696
Commercial/Institutional – Raw	8	9	10	10	11

CUSTOMER CLASS	2016	2017	2018	2019	2020
Landscape – Raw[1]	111	121	124	124	135
Agricultural Irrigation – Raw	13	9	10	5	3
Total Potable and Raw	*23,164*	*23,208*	*23,223*	*23,158*	*23,692*
Recycled Water[2]	2	2	2	2	2
TOTAL	**23,166**	**23,210**	**23,225**	**23,160**	**23,694**

[1] In 2016, 48 Landscape – Raw connections were served a blend of recycled water from the Redlands Wastewater Treatment Plant and non-potable water. The number of Landscape – Raw connections receiving a recycled water blend has increased to 73 connections in 2020.

[2] Recycled Water connections only include the Mountain View Power Plant and a landfill.

4.2.2.1 Past Water Use

Redlands' actual water use by customer class from 2016-2020 is shown in **Table 4-3** and **Figure 4-3**. Approximately 94% of Redlands deliveries are potable water. Of potable deliveries, approximately 61% are to single family connections, followed by 14% to multi-family connections, 12% to commercial and institutional connections, with the balance going to landscape, irrigation, and other connections.

Table 4-3: 2016-2020 Actual Water Use (AF)

CUSTOMER CLASS	2016	2017	2018	2019	2020
Single Family	11,340	12,275	12,866	11,624	12,949
Multi-Family	2,835	2,913	2,934	2,750	2,901
Commercial/Institutional	3,180	3,142	3,159	2,705	2,640
Landscape	1,924	2,155	2,340	2,228	2,220
Agricultural Irrigation	556	387	326	283	276
Other	183	253	179	174	151
Commercial/Institutional – Raw	102	175	175	167	158
Landscape – Raw[1]	1,259	1,311	1,405	1,096	1,267
Agricultural Irrigation – Raw	47	33	16	6	4
Water Losses	901	2,177	1,639	2,211	3,327
TOTAL POTABLE AND RAW	**22,327**	**24,822**	**25,038**	**23,244**	**25,892**
Recycled Water – Direct[1]	1,866	1,448	878	680	994
TOTAL DEMAND	**26,537**	**26,270**	**25,916**	**23,924**	**26,866**

[1]Recycled Water – Direct demand only includes deliveries made to the Mountain View Power Plant and landfill recycled water connections. Other recycled water use is included in the blended non-potable water served as Landscape – Raw water.

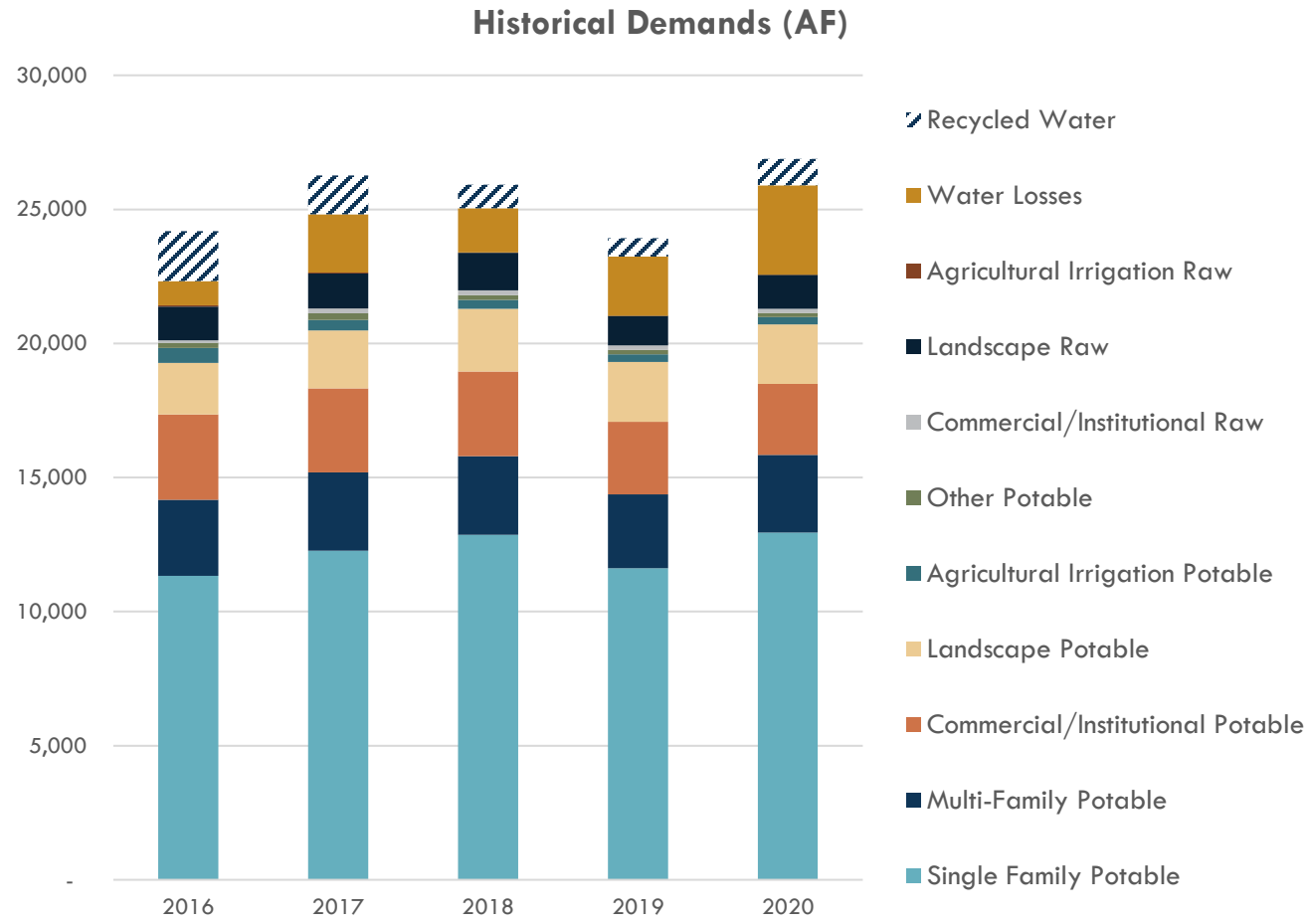

Figure 4-3: City of Redlands 2016-2020 Water Consumption by Customer Class

4.2.2.2 Distribution System Water Losses

Distribution system water losses are the physical potable water losses from the water system, calculated as the difference between water produced and the amount of water billed to customers plus other authorized uses of water.

Sources of water loss include:

- Leaks from water lines - Leakage from water pipes is a common occurrence in water systems. A significant number of leaks remain undetected over long periods of time as they are very small; however, these small leaks contribute to the overall water loss. Aging pipes typically have more leaks.
- Water used for flushing and fire hydrant operations
- Unauthorized uses or theft of water
- Customer Meter Inaccuracies - Customer meters can under-represent actual consumption in the water system.

Redlands monitors its water loss and prepares an annual AWWA Water Audit, attached in **Part 4 Appendix D-8**, to estimate the volume of water loss. The results of the water audits from 2016 to 2019 are shown in **Table 4-4**. The 2020 water loss is estimated based on the difference between production and consumption for 2020. Redlands will complete a 2020 AWWA Water Audit by October 1, 2021 in accordance with reporting requirements to the State.

Table 4-4: DWR 4-4R 12 Month Water Loss Audit Reporting (AF)

REPORT PERIOD START DATE		
MM	YYYY	VOLUME OF WATER LOSS
1	2016	1,977
1	2017	1,637
1	2018	790
1	2019	2,003
1	2020	3,327 (Estimated)

In the past 5 years, Redlands' water loss has ranged from 3% - 15% of water sales. For the purposes of future water use projections, water loss is assumed to be 10% based on 2019 losses, which the City considers to be the most accurate estimate due to data quality.

Redlands is committed to managing system water losses to reduce water waste and will endeavor to meet the future water loss performance standard that is being developed by the State Water Board. Current and planned programs to manage water loss are described in **Section 4.8.1.5**.

4.2.3 Projected Water Use

A demand forecast tool was developed to estimate future demands based on individual customer categories and connections, with the ability to forecast how future changes in indoor and outdoor water use may impact overall water use within each different customer type for current and future customers.

The tool has three steps to project demand:

1. Establish a demand factor per connection for each customer class based on historical consumption data.
2. Project the number of new connections anticipated for each customer class in each 5-year period after 2020.
3. Modify demand factors as appropriate to account for expected changes in future water use.

The demand factors for each customer class were based on connection and demand data from calendar year 2016-2020, which was reviewed against demand factors from other years and determined to be a reasonable representation of average demands. The number of future new connections for each customer category was estimated for each 5-year period through 2045 based on the projected SCAG population growth rate for years 2020-2035 and 2035-2045.

To estimate future water use for each customer category, the demand factor is multiplied by the number of estimated new connections and added to the average 2016-2020 use of existing customers in that category. This process is applied to each customer type, then all of the category results are added to estimate the total future water use. Redlands anticipates that future commercial/institutional connections, where available, will be dual-metered with both a potable service for indoor demands and non-potable service for outdoor demands. Both potable and raw commercial/institutional demands were adjusted to reflect this. Additionally, recycled water demand at the Mountain View Power Plant and landfill were assumed to be equal to their average annual consumption from 2016 to 2020. Projected future demands by customer class are presented in **Table 4-5**, **Table 4-6**, and **Figure 4-4**.

Table 4-5: DWR 4-2R Projected Demands for Potable and Raw Water (AF)

	PROJECTED WATER USE				
CUSTOMER CLASS	2025	2030	2035	2040	2045
Single Family	12,943	13,470	13,997	14,461	14,925
Multi-Family	3,036	3,160	3,284	3,393	3,501
Commercial/Institutional	3,081	3,145	3,209	3,265	3,321
Landscape	2,292	2,385	2,478	2,560	2,643
Agricultural Irrigation	206	206	206	206	206
Other	206	214	223	230	238
Commercial/Institutional - Raw	248	319	391	454	517
Landscape - Raw	1,451	1,510	1,569	1,621	1,673
Agricultural Irrigation - Raw	9	9	9	9	9
Water Losses	2,347	2,442	2,537	2,620	2,703
TOTAL:	**25,818**	**26,860**	**27,902**	**28,818**	**29,735**

Table 4-6: DWR 4-3R Total Gross Water Use (AF)

-	2020	2025	2030	2035	2040	2045
Potable and Raw Water From Table 4-1R and 4-2R	25,892	25,818	26,860	27,902	28,818	29,735
Recycled Water Demand* From Table 6-4R	994	1,173	1,173	1,173	1,173	1,173
TOTAL WATER USE:	**26,866**	**26,991**	**28,033**	**29,075**	**29,991**	**30,908**

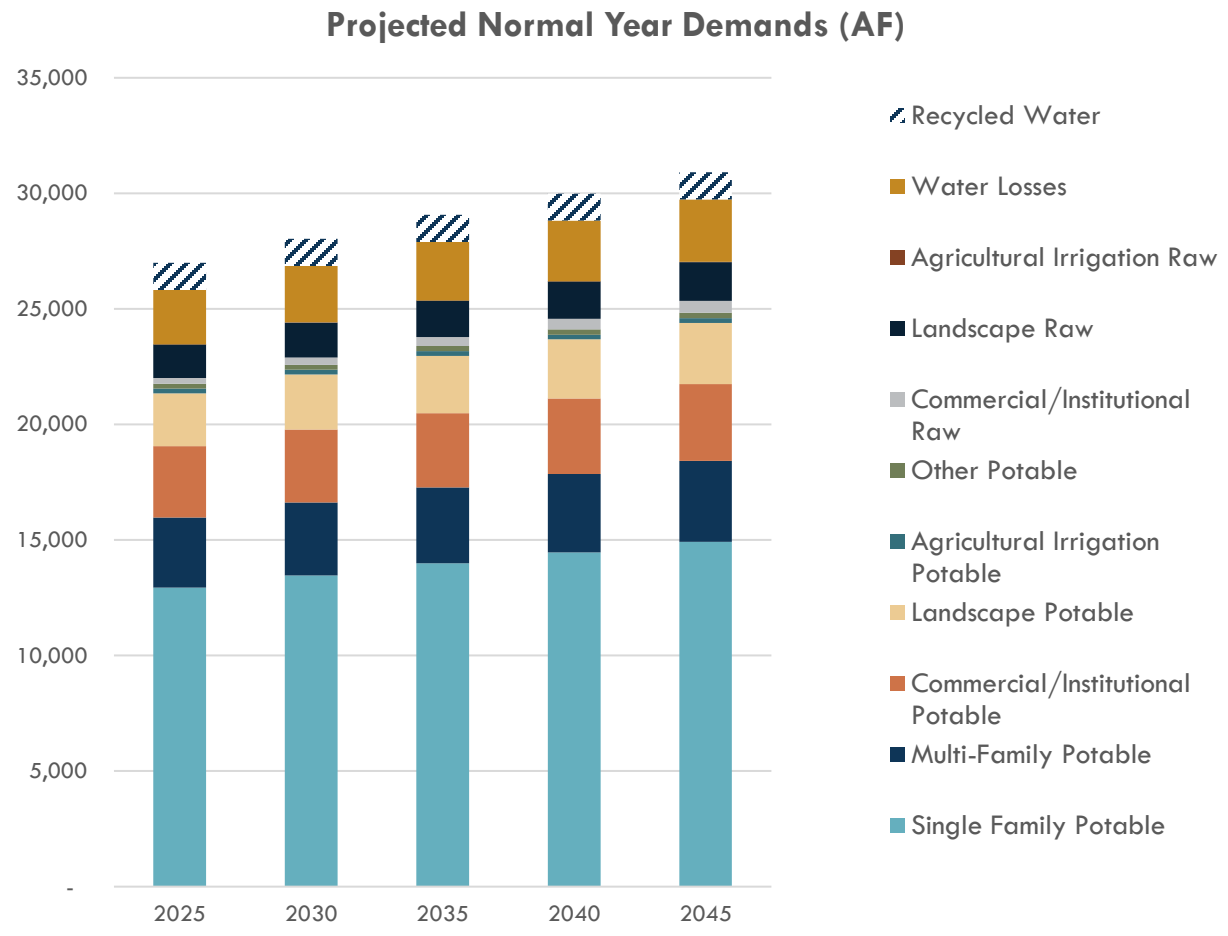

Figure 4-4: City of Redlands Projected Future Water Consumption by Customer Class

4.2.3.1 Estimating Future Water Savings

The demand tool used to project future water use has the capability to modify demand factors for both new and existing connections to quantify reductions in current and future customer demand that may occur as a result of active conservation programs implemented by Redlands or passive savings from more water efficient fixtures and landscapes that are required by current and future building codes and standards. Redlands may use this tool in the future to consider the impacts of changing customer water use on overall demand; however, Redlands has elected not to incorporate demand reductions from future conservation programs and passive savings from codes and standards into the demand projections at this time. In 2018, the legislature enacted SB 606 and AB 1668, which provide for implementation of a water budget-based approach to establishing new urban water use objectives for water suppliers. The series of water use efficiency standards that will inform calculation of Redlands' new water use objective are still under development and will take effect in 2023. Once the new standards have been established, Redlands will reevaluate customer demands and identify approaches to comply with the new standard, which will be incorporated into the next UWMP prepared in 2025. Redlands is committed to promoting water use efficiency and will continue to implement a comprehensive set of programs intended to reduce customer demands and support sustainable use of regional water supplies.

4.2.4 Water Use for Lower Income Households

Senate Bill 1087 requires water use projections in an UWMP include the projected water use for single-family and multi-family residential housing for lower income households as identified in the housing element of any city, county, or city and county in the service area of the supplier.

Based on SCAG's 6th cycle final regional housing needs allocation (RHNA), it is estimated that the percentage of very-low and low-income households in the City of Redlands service area is 45 percent. These demands have been included in the future demand projections in **Table 4-5**.

4.2.5 Climate Change Considerations

A topic of growing concern for water planners and managers is climate change and the potential impacts it could have on California's future water supplies.

Recent climate change modeling for the SAR watershed suggests that a changing climate will have multiple effects on the Region. Adaptation and mitigation measures will be necessary to account for these effects. **Part 1 Chapter 2** includes an assessment of the potential impacts of climate change.

4.3 SBX7-7 Baseline and Targets

With the adoption of SBX7-7, also known as the Water Conservation Act of 2009, the State of California was required to reduce urban per capita water use by 20% by 2020. This section summarizes the past targets the City developed and demonstrates that compliance by 2020 was achieved.

Water use targets were developed in terms of gallons per capita per day, or GPCD, which is calculated by dividing the total water from all customer categories by the population.

DWR has prepared standardized tables to record and document the calculations required for this section. The standardized tables for Redlands' calculations are included in **Part 4 Appendix D-7**.

4.3.1 Baseline and Target

Redlands' baseline and 2020 target was calculated in the 2015 RUWMP and has not changed for this plan. More details on the development of the baselines and target can be found in the 2015 RUWMP and **Part 4 Appendix D-7**. Redlands' calculated water use target for 2020 is 285 GPCD.

4.3.2 2020 Compliance Daily Per-Capita Water Use (GPCD)

Through the implementation of its active water conservation program, Redlands has met its Confirmed Water use Target for 2020 of 285 GPCD, as shown in **Table 4-7**. To maintain this level of water use that occurred in 2019 when the target was met, Redlands intends to continue its current level of outreach and programs for the foreseeable future.

Table 4-7: SBX 7-7 2020 Compliance

2020 WATER USE TARGET GPCD	ACTUAL 2020 GPCD	SUPPLIER ACHIEVED TARGETED REDUCTION IN 2020?
285	279	Yes

4.4 Water Supply

Redlands' water supply is comprised primarily of surface water from the Santa Ana River (SAR) and Mill Creek and supplemented by groundwater extracted from the Bunker Hill Basin (part of the San Bernardino Basin) and Yucaipa Basin and a small amount of imported water when needed. More information about local groundwater basins is included in Part 1, Chapter 3 of the 2020 IRUWMP.

4.4.1 Purchased or Imported Water

Imported water from the State Water Project (SWP) is available for the City to purchase from Valley District when needed. The City has purchased supplemental SWP water only in years when surface water flows have not been able to meet demands and on occasion when surface water supplies are turbid and require blending or for other operational purposes. The City will continue to request SWP water in these situations however, during SWP outages or extended dry periods the City will prioritize use from other sources.

If SWP water is not available in a future year, the City will shift to increase groundwater production and may implement conservation measures to reduce demands if needed. The City contributes to regional efforts to recharge the Bunker Hill groundwater basin with SWP water and local surface water in wet years when available so that storage is available for use in dry years when other supplies may be limited.

4.4.2 Groundwater

Redlands extracts groundwater from the Bunker Hill Subbasin (also known as San Bernardino Basin or SBB) and Yucaipa Subbasin. Redlands' historical production for the past five years is shown in **Table 4-8**. Extractions shown include both potable and non-potable water.

Table 4-8. DWR 6-1R Groundwater Volume Pumped (AF)

GROUNDWATER TYPE	LOCATION OR BASIN NAME	2016	2017	2018	2019	2020
Alluvial Basin	Bunker Hill (part of SBB)	11,442	13,512	14,466	11,434	13,619
Alluvial Basin	Yucaipa	59	16	20	246	297
	TOTAL:	**11,501**	**13,527**	**14,485**	**11,680**	**13,916**

4.4.3 Surface Water

The City receives its surface water from the following sources:

- **Mill Creek Watershed:** Water from the Mill Creek watershed is treated at Henry Tate (Tate) Surface Water Treatment Plant (SWTP).
- **Santa Ana River Watershed:** Water from the Santa Ana River watershed is treated at the Horace P. Hinckley SWTP.

The City has ownership in a variety of private and mutual water companies to supply water to the City's Tate and Hinckley SWTP's. For decades, the City has increased its ownership in these companies in an effort to increase its access to a reliable local source of water. The City's founders were wise to realize the value of this commodity and sought ownership of water rights in the surrounding tributaries and from local water companies and water right owners. Based on a 10-year average, surface water totals 38% of the City's annual water production, including potable, non-potable, and recycled water.

As discussed in **Section 4.4.1**, the City sometimes supplements surface water supplies with SWP water, which is then treated at Tate or Hinckley SWTP and distributed for potable use.

4.4.4 Stormwater

Redlands is participating in regional project planning efforts to capture additional stormwater for purposes of groundwater recharge to increase sustainability of the basins Redlands produces water from. These regional projects are discussed in **Part 1 Chapter 3**.

4.4.5 Wastewater and Recycled Water

The City is a sewering agency that treats approximately 5.9 million gallons of wastewater daily as of 2020. The City's Wastewater Treatment Plant (WWTP) has the capability of treating 9 million gallons a day (MGD) to a secondary level. Of that, 7.2 MGD can be treated to a Title 22-Recycled Water level.

The City utilizes all wastewater collected and treated at its WWTP in its service area for:

- Distribution to customers
- Percolation into Bunker Hill

Treated wastewater distributed to customers is tertiary treated, known as Title 22-Recycled Water. The City's recycled water customers include Southern California Edison (SCE) Company, a landfill and recycled/non-potable water customers located in the 1350 pressure zone. SCE uses recycled water as cooling water at its Mountain View Power Plant and recycled/non-potable water customers use recycled water for irrigation when supply is available. All remaining wastewater is treated to a secondary level and released into spreading basins located east of the WWTP for recharge back into Bunker Hill basin. Based on 2020 volumes,

approximately 1.6 MGD of treated wastewater was used as recycled water supply for customers, and 3.4 MGD was used for recharge. The remaining water was used within the WWTP or accounted for as losses through the process, meter inaccuracies or evaporation.

> It is estimated that approximately 97% or 5.7 MGD of the wastewater collected at the City of Redlands WWTP was generated within Redlands' water service area in 2020.

Information about wastewater collected and treated is presented in **Table 4-9** and **Table 4-10**.

4.4.5.1 Potential, Current, and Projected Recycled Water Uses

The expansion of the recycled water system is limited by its supply, as well as infrastructure development and the Title 22-Recycled Water permitting process. However, because the City requires new commercial development to provide dual metering for irrigation systems, to accommodate the use of recycled/non-potable water, all recycled water may be utilized for distribution to recycled/non-potable water customers in the 1350 zone and eventually the 1570 pressure zone, as demand and infrastructure increases. The City's Capital Improvement Plan includes the design and construction of two recycled water reservoirs that will total up to a volume of 2,000,000 gallons of storage, a 1,500 gallons per minute booster pump station, and 9,400 linear feet of pipeline. Construction of these facilities will increase the use of recycled water in the 1350 and 1570 pressure zones by 826 AFY.

Table 4-9. DWR 6-2R Wastewater Collected within Service Area in 2020 (AF)

Percentage of 2020 service area covered by wastewater collection system (optional):

Percentage of 2020 service area population covered by wastewater collection system (optional):

WASTEWATER COLLECTION	RECIPIENT OF COLLECTED WASTEWATER					
NAME OF WASTEWATER COLLECTION AGENCY	WASTEWATER VOLUME METERED OR ESTIMATED	WASTEWATER VOLUME COLLECTED FROM UWMP SERVICE AREA IN 2020	NAME OF WASTEWATER AGENCY RECEIVING COLLECTED WASTEWATER	WASTEWATER TREATMENT PLANT NAME	WASTEWATER TREATMENT PLANT LOCATED WITHIN UWMP AREA	WWTP OPERATION CONTRACTED TO A THIRD PARTY
City of Redlands	Metered	6,421	City of Redlands	Redlands Wastewater Treatment Facility	Yes	No

Table 4-10. DWR 6-3R Wastewater Treatment and Discharge within Service Area in 2020 (AF)

							2020 VOLUMES				
WASTEWATER TREATMENT PLANT NAME	DISCHARGE LOCATION NAME OR IDENTIFIER	DISCHARGE LOCATION DESCRIPTION	WASTEWATER DISCHARGE ID NUMBER	METHOD OF DISPOSAL	PLANT TREATS WASTEWATER GENERATED OUTSIDE THE SERVICE AREA	TREATMENT LEVEL[1]	WASTEWATER TREATED	DISCHARGED TREATED WASTEWATER	RECYCLED WITHIN SERVICE AREA	RECYCLED OUTSIDE OF SERVICE AREA	INSTREAM FLOW PERMIT REQUIREMENT
Redlands Wastewater Treatment Facility	Spreading Basins	8 basins located 1,100 ft east of WWTP		Percolation ponds	Yes	Secondary, Disinfected -23	6,620	3,813	1,806		
						TOTAL:	**6,620**	**3,813**	**1,806**	**-**	**-**

Notes:

1. Discharged Treated Wastewater is treated to Secondary, Disinfected-23 standards, but Recycled Water used within the service area is treated to Tertiary standards.
2. Secondary, Disinfected-23 indicates Recycled Water that has been oxidized and disinfected per California Code of Regulations Title 22, S60301.225.
3. Tertiary indicates Recycled Water that has been oxidized, filtered, and disinfected per California Code of Regulations Title 22, S60301.230.

4.4.6 Water Exchanges and Transfers

Redlands exchanges water with Valley District and local water companies through various agreements.

4.4.6.1 Emergency Interties

Redlands has two interties with neighboring water agencies, Western Heights Water Company, and the City of Loma Linda.

4.4.6.2 Future Water Projects

The City is in the process of updating their Water Master Plan and their Non Potable/Recycled Water Master Plan to identify necessary upgrades to its distribution systems. These plans are intended to identify projects needed to increase the reliability of the City's systems; they are not intended to create new sources of supply.

Additionally, the City is currently undergoing a seismic assessment of its water infrastructure that will identify projects to strengthen the infrastructure to further enhance reliability during a catastrophic earthquake.

4.4.7 Summary of Existing and Planned Sources of Water

Redlands' water supply is comprised primarily of surface water from the Santa Ana River (SAR) and Mill Creek and supplemented by groundwater extracted from the Bunker Hill Basin (part of the San Bernardino Basin) and Yucaipa Basin and a small amount of imported water when needed. This same mix of supplies is anticipated to be used in the future.

The City's use of the Yucaipa Basin is solely used for non-potable water for irrigation as the sources are high in nitrates.

As discussed in **Part 1 Chapter 5**, Redlands is applying a Reliability Factor of 15% to their supply reliability analysis to account for uncertainties in supply and demand projections. The 15% value is recommended in a study by the RAND Corporation that evaluated uncertainty factors in the regional supplies and demands, including population growth, per capita water use, climate change impacts on supplies and demands, SWP project supplies and local surface water supplies. **See Part 1 Chapter 5** for more details on how the Reliability Factor was established.

For the purposes of supply projections in this 2020 IRUWMP, Redlands is using the 15% Reliability Factor to establish a Total Supply Target of 15% more than total projected demand. It is assumed that any additional supply needed will be produced from the San Bernardino Basin.

The volume of water utilized from each source in 2020 is summarized in **Table 4-11** and projected supply by source is summarized in **Table 4-12**.

Table 4-11. DWR 6-8R Actual Water Supplies in 2020 (AF)

		2020		
WATER SUPPLY	ADDITIONAL DETAIL ON WATER SUPPLY	ACTUAL VOLUME	WATER QUALITY	TOTAL RIGHT OR SAFE YIELD
Groundwater (not desalinated)	Bunker Hill (part of SBB)	12,088	Drinking Water	
Groundwater (not desalinated)	Bunker Hill (part of SBB)	1,531	Other Non-Potable Water	
Groundwater (not desalinated)	Yucaipa	297	Other Non-Potable Water	
Surface water (not desalinated)	Santa Ana River (part of SBB)	5,796	Drinking Water	
Surface Water (not desalinated)	Mill Creek (part of SBB)	6,045	Drinking Water	
Purchased or Imported Water	SWP - Direct Deliveries	535	Drinking Water	
Recycled Water	Recycled Water - Direct	1,806	Recycled Water	
	TOTAL:	**28,098**		

Table 4-12. DWR 6-9R Projected Water Supplies (AF)

		PROJECTED WATER SUPPLY				
		2025	2030	2035	2040	2045
WATER SUPPLY	ADDITIONAL DETAIL ON WATER SUPPLY	REASONABLY AVAILABLE VOLUME	REASONABLY AVAILABLE VOLUME	REASONABLY AVAILABLE VOLUME	REASONABLY AVAILABLE VOLUME	REASONABLY AVAILABLE VOLUME
Groundwater (not desalinated)	Bunker Hill (part of SBB)	12,973	13,922	14,861	15,677	16,484
Recycled Water	Bunker Hill - Recycled Water Recharge	3,766	4,015	4,275	4,513	4,760
Groundwater (not desalinated)	Yucaipa	1,000	1,000	1,000	1,000	1,000
Surface water (not desalinated)	Santa Ana River (part of SBB)	5,000	5,000	5,000	5,000	5,000
Surface water (not desalinated)	Mill Creek (part of SBB)	5,500	5,500	5,500	5,500	5,500
Purchased or Imported Water	SWP - Direct Deliveries	700	700	700	700	700
Recycled Water	Recycled Water - Direct	2,100	2,100	2,100	2,100	2,100
	TOTAL:	**31,039**	**32,238**	**33,436**	**34,490**	**35,544**

Supplies shown in this table are planned pumping or diversions, except supplies from San Bernardino Basin are increased to meet the Total Supply Target with 15% Reliability Factor.

Table 4-13. DWR 7-2R Normal Year Supply and Demand Comparison (AF)

	2025	2030	2035	2040	2045
Supply Totals From Table 6-9R	31,039	32,238	33,436	34,490	35,544
Demand Totals From Table 4-3R	26,991	28,033	29,075	29,991	30,908
DIFFERENCE:	**4,049**	**4,205**	**4,361**	**4,499**	**4,636**

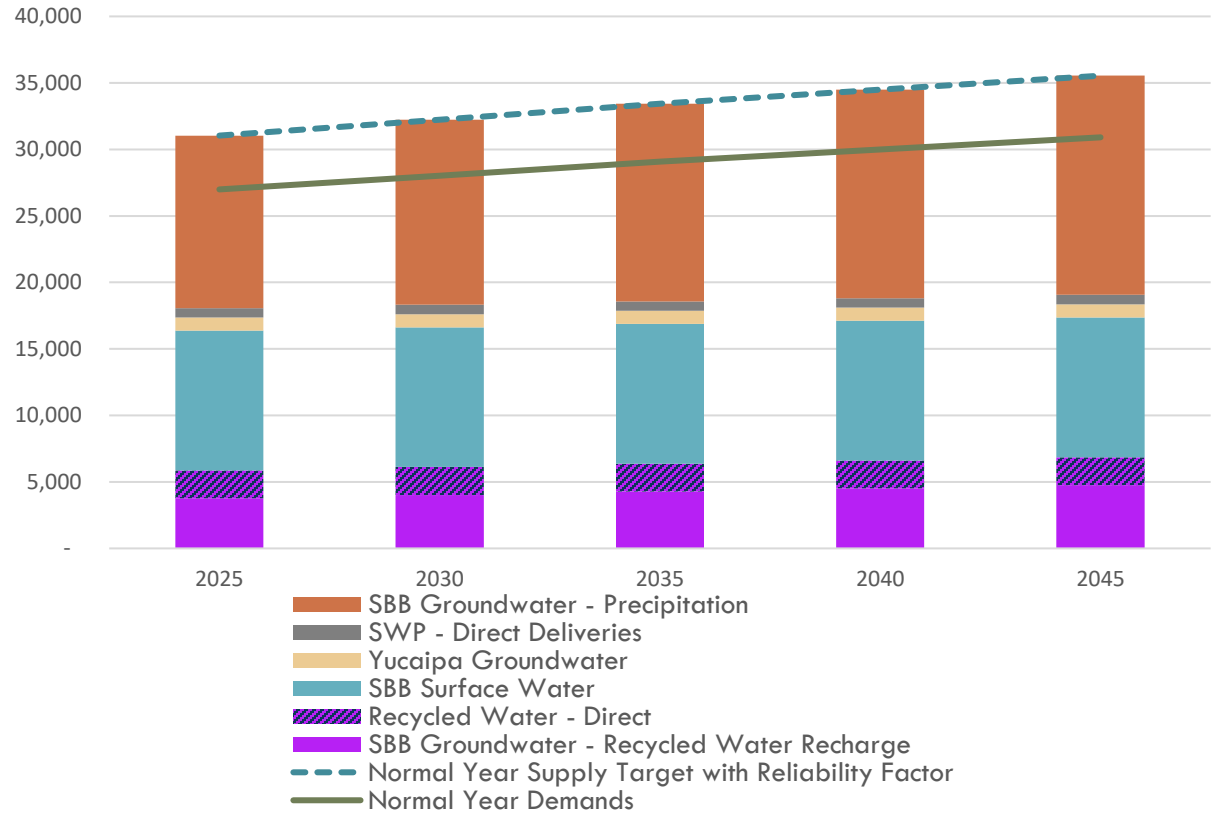

Figure 4-5: City of Redlands Projected Supply and Demand Comparison (AF)

4.4.8 Energy Intensity

Reporting water energy intensity has many benefits for water utilities and their customers including:

- Identifying energy saving opportunities as energy consumption is often a large portion of the cost of delivering water.
- Calculating energy savings and greenhouse gas (GHGs) emissions reductions associated with water conservation programs.
- Potential opportunities for receiving energy efficiency funding for water conservation programs.
- Informing climate change mitigation strategies.
- Benchmarking of energy use at each water acquisition and delivery step and the ability to compare energy use among similar agencies.

In 2020, Redlands consumed of 421.2 kWh of energy on water facilities per AF of water delivered.

4.5 Water Service Reliability Assessment

This section considers Redlands' water supply reliability during normal years, single dry years, and up to 5 consecutive dry water years. The supply reliability assessment discusses factors that could potentially limit the expected quantity of water available from Redlands' current source of supply through 2045.

4.5.1 Constraints on Water Sources

Regular monitoring of groundwater contaminants is performed to meet the Environmental Protection Agency and State Water Resources Control Board- Division of Drinking Water's regulatory requirements set due to the industrial and commercial industries within the watershed. Based on the results from these samples, increased monitoring or treatment may be necessary if resources are impaired, in order to meet all drinking water standards.

4.5.2 Year Type Characterization

In general, groundwater is no less vulnerable to seasonal and climatic changes than surface water (i.e., local and imported) supplies. The Western-San Bernardino Watermaster, in collaboration with the BTAC, monitor groundwater levels and implement supplemental recharge to maintain long term sustainability of local groundwater sources. Further discussion of regional water resource management is included in **Part 1, Chapter 3**.

Per UWMP requirements, Redlands has evaluated reliability for an average year, single dry year, and a 5 consecutive dry year period. The UWMP Act defines these years as:

- **Normal Year:** this condition represents the water supplies a supplier considers available during normal conditions. This could be a single year or averaged range of years that most closely represents the average water supply available.
- **Single Dry Year:** the single dry year is recommended to be the year that represents the lowest water supply available.
- **Five-Consecutive Year Drought:** the driest five-year historical sequence for the Supplier, which may be the lowest average water supply available for five years in a row.

4.5.3 Water Service Reliability

The results of the reliability assessment are summarized in the tables below.

Under single dry and consecutive dry year conditions, the assessment assumes that demands will increase by as much as 10% due to increased outdoor water use. Although water use may decrease in the later years of a multiple year drought due to implementation of conservation measures and drought messaging, the assessment is based on a 10% increase throughout the 5-year drought to be conservative.

As described in **Part 1 Chapter 3**, the effects of a local drought are not immediately recognized since the region uses the local groundwater basins to simulate a large reservoir for long term storage. If surface water flows and SWP supplies are reduced in dry years, the City will shift to increase groundwater production in Bunker Hill and increase conservation measures to reduce demands if needed. The City contributes to regional efforts to recharge the Bunker Hill groundwater basin with SWP water and local surface water in wet years when available so that storage is available for use in dry years. As a result, Redlands' total supplies are not reduced in dry years so 2020 is considered the base year for all year types. Based on the analysis, Redlands does not anticipate any shortage due to single or consecutive dry years. Even though localized drought conditions should not affect supply, Redlands participates in several ongoing water conservation measures and regional recharge projects to optimize and enhance the use and reliability of regional water resources. Redlands also has a water shortage contingency plan to put into action as appropriate to reduce the demand during critical drought years or other supply emergencies.

A summary of the basis of water year data is presented in **Table 4-14**. The percent of average supply increases in drought years because Redlands's groundwater production will increase to meet an assumed increase in demands.

Table 4-14. Basis of Water Year Data

YEAR TYPE	BASE YEAR	AVAILABLE SUPPLY IF YEAR TYPE REPEATS AS PERCENT OF AVERAGE SUPPLY
Average Year	2020	100%
Single-Dry Year	2020	110%
Consecutive Dry Years 1st Year	2020	110%
Consecutive Dry Years 2nd Year	2020	110%
Consecutive Dry Years 3rd Year	2020	110%
Consecutive Dry Years 4th Year	2020	110%
Consecutive Dry Years 5th Year	2020	110%

The projected supply and demand during a normal year are shown in **Table 4-13**.

The projected supply and demand during a single dry year are shown in **Table 4-15**. Redlands' demands in single dry years are assumed to increase by 10% above normal year demands. The local groundwater basins Redlands produces water from have storage for use in dry years so Redlands can produce the volume of water needed to meet 100% of demands in single dry years. Redlands' supplies are 100% reliable during single dry years.

Table 4-15. DWR 7-3R Single Dry Year Supply and Demand Comparison (AF)

	2025	2030	2035	2040	2045
Supply Totals	34,143	35,461	36,780	37,939	39,098
Demand Totals	29,690	30,836	31,982	32,990	33,998
DIFFERENCE:	**4,453**	**4,625**	**4,797**	**4,949**	**5,100**

The projected supply and demand during five consecutive dry years are shown in **Table 4-16**. Redlands' demands in multiple dry years are assumed to increase by 10% above normal year demands. The local groundwater basins Redlands produces water from have storage for use in dry years so Redlands can produce the volume of water needed to meet 100% of demands in multiple dry years. Redlands's supplies are 100% reliable during multiple dry years.

Table 4-16. DWR 7-4R Multiple Dry Years Supply and Demand Comparison (AF)

-	-	2025	2030	2035	2040	2045
First	Supply Totals	34,143	35,461	36,780	37,939	39,098
Year	Demand Totals	29,690	30,836	31,982	32,990	33,998
-	**DIFFERENCE:**	**4,453**	**4,625**	**4,797**	**4,949**	**5,100**
Second	Supply Totals	34,143	35,461	36,780	37,939	39,098
Year	Demand Totals	29,690	30,836	31,982	32,990	33,998
-	**DIFFERENCE:**	**4,453**	**4,625**	**4,797**	**4,949**	**5,100**
Third	Supply Totals	34,143	35,461	36,780	37,939	39,098
Year	Demand Totals	29,690	30,836	31,982	32,990	33,998
-	**DIFFERENCE:**	**4,453**	**4,625**	**4,797**	**4,949**	**5,100**
Fourth	Supply Totals	34,143	35,461	36,780	37,939	39,098
Year	Demand Totals	29,690	30,836	31,982	32,990	33,998
-	**DIFFERENCE:**	**4,453**	**4,625**	**4,797**	**4,949**	**5,100**
Fifth	Supply Totals	34,143	35,461	36,780	37,939	39,098
Year	Demand Totals	29,690	30,836	31,982	32,990	33,998
-	**DIFFERENCE:**	**4,453**	**4,625**	**4,797**	**4,949**	**5,100**

4.6 Drought Risk Assessment

The Drought Risk Assessment (DRA) is a new analysis required for the 2020 UWMP, with a focus on the five-year consecutive drought scenario beginning in 2021. Because Redlands has access to groundwater basins with significant storage, total available supplies do not vary on a monthly or seasonal basis, so this analysis is conducted on an annual basis. Projected demands and supplies from 2021-2025 are shown in **Table 4-17**.

Demands for 2021 – 2025 were assumed to increase at a uniform rate between the 2020 actual use and 2025 projected use and were then increased by 10% to reflect higher anticipated demands during dry years. This DRA uses the same water supply reliability assumptions used in the Water Service Reliability Assessment described in **Section 4.5** and the 15% Reliability Factor is also applied to supplies in this DRA, therefore, this analysis shows a 15% supply surplus for Redlands. Redlands can produce additional groundwater to meet any increases in demand in dry years. As shown in Part 1 Chapter 5, the region as a whole has sufficient supplies to meet demands plus the 15% Reliability Factor, even in a 5-year drought. As shown in Part 1 Chapter 5 Figure 5-1, the SBB had over 4.8 million acre-feet in storage as of 2020 due to regional efforts to store water in wet years for use during dry years.

Although projections in this Plan show that the regional water supplies are sufficient to meet the demands of Redlands and the Region as a whole, even during a 5-year drought (see Part 1 Chapter 5), Redlands remains committed to water conservation and to being a good steward of regional water resources to preserve supplies for the future due to the possibility of experiencing more severe droughts than anticipated in this Plan.

Table 4-17: Five-Year Drought Risk Assessment (AF)

2021	Gross Water Use	29,598
	Total Supplies	34,037
	Surplus	4,440
2022	Gross Water Use	29,621
	Total Supplies	34,064
	Surplus	4,443
2023	Gross Water Use	29,644
	Total Supplies	34,090
	Surplus	4,447
2024	Gross Water Use	29,667
	Total Supplies	34,117
	Surplus	4,450
2025	Gross Water Use	29,690
	Total Supplies	34,143
	Surplus	4,453

4.7 Water Shortage Contingency Plan

The Water Shortage Contingency Plan (WSCP) is a strategic plan that Redlands uses to prepare for and respond to foreseeable and unforeseeable water shortages. A water shortage occurs when water supply available is insufficient to meet the normally expected customer water use at a given point in time. A shortage may occur due to a number of reasons, such as water supply quality changes, climate change, drought, regional power outage, and catastrophic events (e.g., earthquake). Additionally, the State may declare a statewide drought emergency and mandate that water suppliers reduce demands, as occurred in 2014. The WSCP serves as the operating manual that Redlands will use to prevent catastrophic service disruptions through proactive, rather than reactive, mitigation of water shortages. The WSCP provides a process for an annual water supply and demand assessment and structured steps designed to respond to actual conditions. The level of detailed planning and preparation provide accountability and predictability and will help Redlands maintain reliable supplies and reduce the impacts of any supply shortages and/or interruptions.

The WSCP was prepared in conjunction with the 2020 IRUWMP and is a standalone document that can be modified as needed. Redlands' WSCP is attached as **Part 4 Appendix D-9**.

4.8 Demand Management Measures

The City of Redlands is committed to an effective water conservation program and has had a program in place since 1997. The Demand Management Measures (DMM) section provides a comprehensive description of the water conservation programs that Redlands has implemented for the past five years, is currently implementing, and plans to implement in order to maintain reliability of its water supplies.

4.8.1 Existing Demand Management Measures

Consistent with the requirements of the CWC, this section describes the required demand measurement measures (DMM) that have been implemented in the past five years and will continue to be implemented into the future.

4.8.1.1 Water Waste Prevention Ordinances

Since 1991, a water waste prevention ordinance has been in place to address water waste and shortages (see Part 4, Appendix D-9). The ordinance outlines conservation stages to be implemented based on water supply availability and increasing prohibitions on actions that waste water. However, Stage I requires only voluntary conservation from June 1-October 1 and does not require any specific prohibition of water waste. As State mandates on water use practices increase, the City intends to modify the Ordinance by adding additional stages as well as require specific prohibitions of water waste at all times.

4.8.1.2 Metering

The City water distribution system is fully metered. Since 2008, the City has had a meter replacement and maintenance plan in place. Previously meters smaller than 2" were replaced every 15-20 years and meters over 2" were calibrated to ensure accuracy. In 2020, the City initiated a random selection of meters throughout the City to conduct meter accuracy tests on an annual basis. As a result of this meter accuracy study, the City has developed a 5-year water meter replacement capital improvement project to ensure all inaccurate meters are replaced in this time period.

4.8.1.3 Conservation Pricing

The City currently uses a traditional tiered rate structure that promotes water conservation at an accurate price for the service provided. The traditional tiered rate structure has two components, a service charge, which is based on meter size, and a commodity charge. The commodity charge is based on the amount of water delivered and increases as the amount of water delivered increases, based on the cost of providing the additional amounts of water. This increase is due to the City utilizing its least expensive sources first before using more costly sources. The amount of water available within each of the three tiers is based on a 10-year average of water utilized from each source. Regardless of the customer type, each customer receives the same amount of water from each tier throughout the year.

4.8.1.4 Public Education and Outreach

Due to the efforts in response to SB X7-7, and the effects due to the recent drought, the City established programs that further decrease water demand and assist to ensure a sustainable water supply for future generations. Efforts including the City's tiered water rate structure and water audit program have helped to make the City's water conservation efforts known, however starting in 2010, efforts to reach customers increased significantly. The renewed focus often pointed to customer accountability, while offering City support through programs promoting conservation. This changed focus, aided by the publicity of recent drought, has engaged City customers to take water conservation seriously which can be seen in the City's ability to meet its 2020 water reduction requirement.

The following programs/efforts have increased engagement with customers:

- Water Efficiency Rebate Program which provides incentives for:
  - Weather Based Irrigation Controllers (WBIC's)
  - Drought Tolerant Lawn Conversions
  - Synthetic Turf Replacement
  - Water Efficient Clothes Washers
  - High Efficiency Sprinkler Nozzles

  - High Efficiency Toilets
- Top 10% Highest Water User Letter: Contact efforts
- Design and construction of four demonstration gardens
- Participation in regional marketing campaign
- Educational outreach events

In addition to use of bill stuffers, the City advertises water conservation programs and restrictions through use of the following:

- Bill messages and water use comparison charts
- Bulk postcard mailings
- Consumer Confidence Report advertisements
- Newspaper advertisements
- Electronic signboards
- Event presence
- Street banners
- Social media
- Smartphone app

Additionally, the City offers free water saving products to customers to assist in water conservation. These products have included:

- Hose nozzles
- Toilet leak detection tablets
- Lawn/plant moisture meters
- Low water use plants (at local events)
- Shower timers
- Faucet aerators
- Water efficiency educational collateral

In 2017, the City created an educational program focused on educating children on water waste and efficiency outdoors. The program is built on the story of sibling alligators--Ira the irriGATOR and Eva the investiGATOR, who go on adventures to teach children about proper outdoor irrigation techniques for turf and low water use plants and how to identify water waste. Approximately 70% of water use in Redlands is attributed to outdoor irrigation. This campaign expects to yield long term water savings as its focus assists to shift mindsets to view water efficiency and water saving landscapes as the “new normal” for California.

As budgets allow, the City plans to continue the programs/efforts listed above, as well as implement new programs. Future plans include removal of turf from the remaining City-owned

medians and conversion of 200+ City-operated irrigation controllers to weather based irrigation controllers connected to a centralized system. Currently, City staff manually turns off all controllers during rain events. Significant water savings are anticipated from this conversion as these controllers control the irrigation for large areas of City-owned right of way, trails, facilities, parks, and community fields.

4.8.1.5 Programs to Assess and Manage Distribution System Water Loss

Since 2007 the City has replaced approximately 71 miles of pipeline in order to maintain reliability of the distribution system. However, in years prior, the City failed to replace the amount of pipeline when needed; creating a backlog of aged pipe that required extensive maintenance and repair. As a result of the aggressive water pipeline replacement program, water main leaks have reduced from 600 leaks to less than 200 per year. Additionally, the recent requirement to conduct annual water loss audits has resulted in the City's ability to identify areas needing improvement and develop plans to further reduce our water loss.

4.8.1.6 Water Conservation Program Coordination and Staffing Support

The City's water conservation program currently staffs two full-time employees and two part-time employees. One full-time staff person has been dedicated to water conservation since 2007. Since 2015, one additional full-time staff person and two part-time water waste investigators have been added to assist with implementing and enforcing water conservation mandates.

Efforts to implement these DMM's have been both significant and successful. Since implementation of State restrictions in 2014, the City has nearly tripled its water conservation budget. From 2015 to 2020, over $700,000 in rebates has been given to nearly 1000 customers. These incentives have allowed customers to convert over 7,000 high efficiency sprinkler heads, 350 high efficiency toilets, 200 WBIC's, 100 high efficiency washers and nearly 600,000 square feet of lawn. Additionally, since 2015 the City has had watering restrictions in place with active enforcement by our water waste investigators, which has resulted in the issuance of over 17,000 violations.

4.9 Adoption, Submittal, and Implementation

This section describes Redlands' process for adopting, submitting, and implementing the 2020 IRUWMP and Redlands' WSCP.

4.9.1 Notice of Public Hearing

A joint notice was provided on behalf of all agencies whose 2020 UWMPs are part of the 2020 IRWUMP to all cities and counties and other stakeholders within the region that the 2020 IRUWMP is being prepared. This notice was sent at least 60 days prior to Redlands' public hearing. The recipients are identified in **Part 1 Chapter 1** and include all cities and counties within Redlands' service area. A second notice was provided to these cities and counties with the date and time of the public hearing and the location where the report was available for review.

Redlands provided notice to the public through its website and published announcements of the public hearing in a newspaper on two occasions before the hearing. Copies of the proof of publication are included in **Part 4 Appendix D-2**.

4.9.2 Public Hearing and Adoption

Redlands held a public hearing on June 15, 2021 to hear public comment and consider adopting this 2020 IRUWMP and Redlands' WSCP.

As part of the public hearing, Redlands provided information on their baseline values, water use targets and compliance, and implementation plan required in the Water Conservation Act of 2009. The public hearing on the 2020 IRUWMP took place before the adoption of the Plan, which allowed Redlands the opportunity to modify the 2020 IRUWMP in response to any public input before adoption. After the hearing, the Plan was adopted as prepared or as modified after the hearing.

Redlands' adoption resolution for the 2020 IRUWMP and Redlands' WSCP is included in **Part 4 Appendix D-9**.

4.9.3 Plan Submittal

Redlands will submit the 2020 IRUWMP and Redlands's WSCP to DWR, the State Library, and cities and counties within 30 days after adoption. The 2020 IRUWMP submittal to DWR will be done electronically through WUEdata, an online submittal tool.

4.9.4 Public Availability

No later than 30 days after filing a copy of its Plan with DWR, Redlands will make the plan available for public review during normal business hours in the City's Municipal Utilities and

Engineering Department located at 35 Cajon Street, Suite 15 A, Redlands, California 92373, and by posting the plans on the City's website for public viewing.

4.9.5 Amending an Adopted UWMP or Water Shortage Contingency Plan

If the adopted 2020 IRUWMP or Redlands' WSCP is amended, each of the steps for notification, public hearing, adoption, and submittal will also be followed for the amended plan.