City of Santa Monica

2020 Urban Water Management Plan

June 2021

2020 URBAN WATER MANAGEMENT PLAN

JUNE 2021

City of
Santa Monica®

City of Santa Monica

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List of Acronyms

1,2,3-TCP	1,2,3-Trichloropropane
Act	Urban Water Management Planning Act
ADU	Accessory Dwelling Unit
AF	Acre-Feet
AFY	Acre-Feet Per Year
AMI	Advanced Metering Infrastructure
AWTF	Advanced Water Treatment Facility
BMP	Best Management Practice
CBI	Clean Beaches Initiative
CIS	Coastal Interceptor Sewer
CRA	Colorado River Aqueduct
CTC	Carbon Tetrachloride
DCUs	Data Collector Units
DDW	Division of Drinking Water
DRA	Drought Risk Assessment
DWR	California Department of Water Resources
GAC	Granular Activated Carbon
GLAC IRWM	Greater Los Angeles County Integrated Regional Water Management
GPCD	Gallons Per Capita Per Day
GPF	Gallons Per Flush
GRRP	Groundwater Replenishment Reuse Project
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
MAF	Million Acre-Feet
MG	Million Gallon
MGD	Million Gallons Per Day
MOU	Memorandum of Understanding
MTBE	Methyl Tertiary Butyl Ether
MTUs	Meter Transmission Units
MWD	Metropolitan Water District of Southern California
NAICS	North American Industry Classification System
NRC	National Resource Council
PCE	Tetrachloroethylene
RHNA	Regional Housing Needs Assessment
RO	Reverse Osmosis
SBX7-7	Senate Bill X7-7, Water Conservation Act of 2009
SCAG	Southern California Association of Governments
SGMA	Sustainable Groundwater Management Act
SMBGSA	Santa Monica Basin Groundwater Sustainability Agency

SMGB	Santa Monica Groundwater Basin
SMMC	Santa Monica Municipal Code
SMURRF	Santa Monica Urban Runoff Recycling Facility
SWIP	Sustainable Water Infrastructure Project
SWMP	Sustainable Water Master Plan
SWP	State Water Project
TCE	Trichloroethylene
UWMP	Urban Water Management Plan
VOCs	Volatile Organic Compounds
WCU	Water Conservation Unit
WELIS	Water Efficient Landscape and Irrigation Standards
WSCP	Water Shortage Contingency Plan
WSRP	Water Shortage Response Plan
WTP	Water Treatment Plant
WUA	Water Use Allowance

1 INTRODUCTION

The California Legislature first enacted the Urban Water Management Planning Act (Act) in 1983. The Act requires urban water suppliers that provide water for municipal purposes to more than 3,000 customers or who supply more than 3,000 acre-feet (AF) of water annually, to prepare and adopt an Urban Water Management Plan (UWMP). UWMPs must be filed with the California Department of Water Resources (DWR) every five years describing and evaluating water use (also referred to as water demand), water supplies, and conservation activities (See Water Code § 10631). This UWMP for the City of Santa Monica (City) has been prepared in compliance with the Act, which has been codified in the California Water Code provided in Appendix A.

Declarations and policies set forth in the Act can be found in §10608 and §106010 of the California Water Code. Among them are the following: that waters of the state are a limited and renewable resource subject to ever increasing demands; that the conservation and efficient use of urban water supplies are of statewide concern; that successful implementation of plans is best accomplished at the local level; that conservation and efficient use of water shall be actively pursued to protect both the people of the state and their water resources; that conservation and efficient use of urban water supplies shall be a guiding criterion in public decisions; and that urban water suppliers shall be required to develop water management plans to achieve conservation and efficient use.

1.1 NEW UWMP REQUIREMENTS

The Act has been amended several times since its initial passage in 1983. Many of the amendments made since the 2015 UWMP were a result of the drought California experienced from 2012 to 2016. Some of the significant new requirements include:

- A reliability assessment of the City's ability to provide water to meet its water use over five consecutive dry years (Section 7);
- A Drought Risk Assessment (DRA) that examines water supplies, water uses, and the resulting water supply reliability under a drought from 2021 to 2025 (Section 7);
- Estimating water service energy intensity (Section 6);
- A Water Shortage Contingency Plan (WSCP), which serves as an action plan for the City during an actual or predicted drought or catastrophic water supply shortage (Section 8 and Appendix B); and
- Coordination with the local Groundwater Sustainability Agency (GSA).

1.2 OVERVIEW

The UWMP aids water providers in analyzing past, current, and future water demands on their systems and assessing their ability to reliably serve customers. Specifically, the UWMP takes an in depth look at how water is used by different sectors in the City and how

factors such as climate, population, conservation programs, and the economy, influence water usage. It also examines existing water supplies and how potential impacts such as regulatory changes, climate change, and aging infrastructure, may affect those supplies. Water providers are then able to use this information to plan water supply projects and conservation programs to help ensure reliable water service to their customers.

The analysis performed for this 2020 UWMP found that the City continues to enhance its water service reliability and resiliency through on-going efforts at the local level. In 2015, the City established a Water Conservation Unit (WCU) to implement new conservation programs throughout the city. Water customers responded by reducing demand by approximately 20% and have sustained these levels despite Governor Brown declaring an end to the drought emergency in 2017.

With regards to water supply, the City has continued to develop local water resources and reduce its reliance on imported water supplies from Metropolitan Water District of Southern California (MWD). From 2016 to 2020, approximately 65% of the water supply was from local water resources and 35% was imported, compared to 55% and 45%, respectively, from 2010 to 2015. Because much of Southern California relies heavily on imported water, the continued development of local water resources provides water service reliability and resiliency to the City and the region. A summary of the City's water supply make-up from 2010 through 2020 is provided in Table 1-1.

Table 1-1. Summary of Santa Monica's Water Supply Make-Up from 2010-2020

TIME PERIOD	MWD (AF) % OF TOTAL	GROUND (AF) % OF TOTAL	RECYCLED (AF) % OF TOTAL
2016-2020	35%	64%	1%
2010-2015	45%	54%	1%

While the city is completely built out, population growth is expected in the near- and long-term. Over the last 5 years, the City has managed to offset water demand increases typical of population growth through conservation measures, including the City's Water Neutrality Ordinance. As conservation programs become more established, however, the City understands that a multifaceted approach is needed to help ensure water service reliability. This point is further emphasized when considering other factors that have the potential to impact water supply, including climate change, aging infrastructure, and evolving regulations.

To face these challenges, the City recently updated its Sustainable Water Master Plan (SWMP) that was adopted by City Council in November 2018. The intent of the 2018 SWMP update was to refine the pathway from the 2014 SWMP effort for the City to reach its goal

of becoming water self-sufficient on local water resources and reducing its use of imported water. The refined pathway to achieve water self-sufficiency by 2023 in the 2018 SWMP also considered impacts of on-going drought conditions as well as new regulations that required additional treatment for restoring local groundwater supplies. The SWMP builds on the City's previous successes by continuing to develop projects and programs at the local level to enhance the reliability and resiliency of the City's water supply.

When fully implemented, the projects outlined in the 2018 SWMP will provide a diversified, drought-resilient water supply portfolio that leverages all available water resources to the City. The key components of the SWMP are listed below and shown in Figure 1-1.

Component 1 – Increasing water conservation efforts to permanently reduce water demand.

Component 2 – Developing sustainable and drought resilient alternative water supplies.

Component 3 – Expanding local groundwater production within sustainable yield limits.

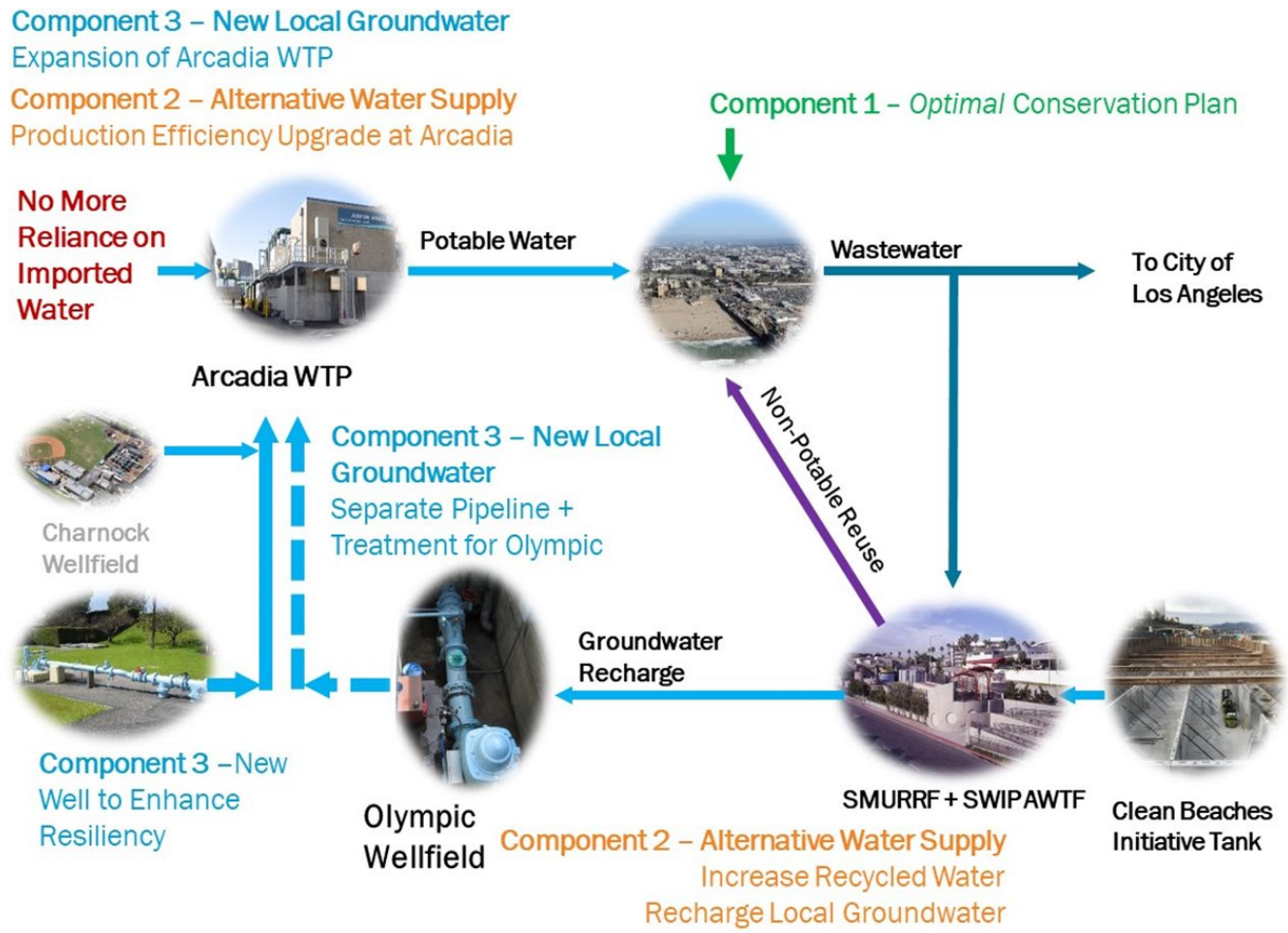


Figure 1-1. Overview of Key Components in the City's 2018 Sustainable Water Master Plan Update

As part of the reliability assessments performed in Section 7, water supply availability was established for three scenarios: normal, single-dry, and five consecutive dry years. The period from 2010 through 2020 was selected for the assessment period since it is more representative of the City's water supply reliability and drought risk going forward with the completion of the Charnock Well Field Restoration Project in 2010. In addition, the 2010-2020 time period also included one of the most severe single-year drought as well as five-consecutive-year drought conditions in the Southern California region.

The assessment found that even under a five consecutive dry year scenario, the City maintains adequate water supplies to meet projected water demand through 2040. A summary of the five consecutive dry year scenario is provided in Table 1-2. Details regarding the assessment are provided in Section 7.2.

Table 1-2. Water Supply Availability and Demand for Five Consecutive Dry Years (Acre-Feet)

		2025	2030	2035	2040
FIRST YEAR	Supply totals	17,640	17,640	17,640	17,640
	Demand totals	12,631	13,442	13,517	13,602
	Difference	5,009	4,198	4,123	4,038
SECOND YEAR	Supply totals	16,787	16,787	16,787	16,787
	Demand totals	12,631	13,442	13,517	13,602
	Difference	4,156	3,345	3,270	3,185
THIRD YEAR	Supply totals	16,893	16,893	16,893	16,893
	Demand totals	12,631	13,442	13,517	13,602
	Difference	4,262	3,451	3,376	3,291
FOURTH YEAR	Supply totals	17,000	17,000	17,000	17,000
	Demand totals	12,631	13,442	13,517	13,602
	Difference	4,369	3,558	3,483	3,398
FIFTH YEAR	Supply totals	15,508	15,508	15,508	15,508
	Demand totals	12,631	13,442	13,517	13,602
	Difference	2,877	2,066	1,991	1,906

1.3 ORGANIZATION OF 2020 URBAN WATER MANAGEMENT PLAN

The City's 2020 UWMP is organized into the following sections:

Section 1 - Introduction

Section 1 describes the UWMP Act and updates since 2015. It also provides an overview of the City's 2020 UWMP, including a lay description of the factors considered in the development of the UWMP and reliability assessments.

Section 2 – Plan Preparation

Section 2 describes the process used to prepare the UWMP. Plan development included coordination and outreach to local and regional stakeholders, notifications to the public of plan preparation, and a City Council meeting hearing to solicit comments from the public.

Section 3 – System Description

This section provides a description of the City's service area and other characteristics that influence the water system including climate and population.

Section 4 – Water Use Characterization

Section 4 describes past, current, and projected future water use within the City's service area. Water use trends in the City are analyzed and factors considered to project future water use are discussed.

Section 5 – SBX7-7 Baseline and Targets

This section addresses requirements of the Water Conservation Act of 2009 (referred to as SBx7-7). In particular, information in this section demonstrates the City's compliance with the Water Conservation Act of 2009, which requires a 20 percent reduction in urban per capita water use by 2020.

Section 6 – Water Supply Characterization

Section 6 describes the City's past, current, and projected future water supply. This section also discusses water supply challenges and actions the City is taking to enhance supply reliability and resiliency.

Section 7 – Water Service Reliability and Drought Risk Assessment

This section presents an assessment of the reliability of the City's water supplies by performing two assessments: a Water Service Reliability assessment and a Drought Risk Assessment (DRA). The Water Service Reliability assessment compares projected future water demands from Section 4 with expected water supplies from Section 6 under three different hydrologic conditions: a normal year; a single dry year; and multiple dry years.

The DRA looks at the City's water supply reliability under drought conditions for the years 2021 to 2025. Findings from the assessment concludes that if projected imported and local supplies are developed or maintained as anticipated, no water shortages are anticipated in the City's service area during the planning period.

Section 8 – Water Shortage Contingency Plan

Section 8 provides an overview of the City's Water Shortage Contingency Plan (WSCP). The WSCP serves as the City's action plan for actual or anticipated water shortage conditions. The WSCP is a standalone document, included as Appendix B of this UWMP.

Section 9 – Demand Management Measures

This section describes the City's current and future conservation efforts to reduce water demand.

2 URBAN WATER MANAGEMENT PLAN PREPARATION

California Water Code Section 10617 requires urban water suppliers providing water for municipal purposes to more than 3,000 customers or serving more than 3,000 AF annually to prepare and adopt an UWMP every five years. The City currently provides over 10,500 AF of water annually to approximately 18,400 service connections and therefore must meet this requirement (Table 2-1). The most recent UWMP was submitted by the City in June 2016.

Table 2-1. Retail – Public Water Systems

PUBLIC WATER SYSTEM NUMBER	PUBLIC WATER SYSTEM NAME	NUMBER OF MUNICIPAL CONNECTIONS 2020	VOLUME OF WATER SUPPLIED 2020
CA1910146	SANTA MONICA-CITY, WATER DIVISION	18,398	10,514

2.1 LOCAL AND REGIONAL COORDINATION

While this UWMP is specific to Santa Monica, the City recognizes the importance of regional coordination and collaboration. As such, the City has encouraged broad participation in the development of the 2020 UWMP. Please refer to Table 2-2 for a summary of regional coordination in preparing this UWMP. Copies of the City's draft plan were made available for public review at City Hall and on the City's Public Works/Water Resources website. The City also presented UWMP findings to the Task Force on the Environment, established by the Santa Monica City Council to advise City Council on environmental program and policy issues.

The City noticed a public hearing to review and accept comments on the draft plan with more than 7 weeks in advance of the hearing. The notice of the public hearing was published in the local press on May 12, 2021 and May 20, 2021 and mailed to the City Clerk. On June 8, 2021, the City held a noticed public hearing to review and accept comments on the draft plan.

Following the public hearing, the City adopted the 2020 UWMP on June 8, 2021. A copy of the City Council resolution approving the 2020 UWMP is included in Appendix C.

As required by the Act, the 2020 UWMP is being provided by the City to DWR, the California State Library, and the public within 30 days of the City's adoption. The 2020 UWMP is available to the public at the City's Public Works/Water Resources office and on its website.

Table 2-2. Summary of Regional Coordination for Development of the 2025 UWMP

	NOTIFIED OF PLAN PREPARATION	CONTACTED FOR ASSISTANCE	COMMENTED ON DRAFT	NOTIFIED OF PUBLIC HEARING	ATTENDED PUBLIC HEARING
City Water Resources Division	x	x	x	x	x
City Public Works Department	x	x	x	x	x
City Task Force on the Environment	x			x	
City Manager's Office	x			x	x
Santa Monica City Council	x			x	x
The Metropolitan Water District of Southern California	x	x		x	
Santa Monica Basin Groundwater Sustainability Agency (SMBGSA)	x	x	x	x	
CA Department of Water Resources		x			
Los Angeles Department of Water and Power	x			x	
Los Angeles County	x			x	
Santa Monica Neighborhood Organizations	x			x	
Interested General Public	x			x	x

3 SYSTEM DESCRIPTION

3.1 GENERAL DESCRIPTION

The City of Santa Monica was founded in 1875 on the site of a land grant by Don Francisco Sepulveda and occupies 8.3 square miles (5,312 acres). The City started primarily as a seaside resort (see photo in Figure 3-1) and gradually became integrated into the Los Angeles Metropolitan Area as development in the Los Angeles Basin grew. During the first half of the twentieth century, Santa Monica's population (along with most of California) grew quickly. To meet the needs of the expanding population, the City of Los Angeles constructed aqueducts to bring water from the Owens Valley to supply the needs of Los Angeles. Much of the western Los Angeles area was unincorporated around the early part of the twentieth century, which prompted the City of Los Angeles to offer a reliable water supply as an incentive for annexation to the City of Los Angeles. For many areas, this was a welcomed opportunity; however, the City desired to remain independent and purchased several existing small water purveyors, such as the Arcadia Water Company and the Venice Water Company, to create its own water supply and administrative agency in 1916.

Figure 3-1. City of Santa Monica (Circa 1920)

The City, along with 12 other local governments, formed the Metropolitan Water District of Southern California (MWD) in 1928. MWD was originally created to build the Colorado River Aqueduct to supplement the water supplies of the original founding members in Southern California. Water was first delivered to the City in 1941 via the Colorado River Aqueduct. In 1972, MWD augmented its supply sources to include deliveries from the State Water Project via the California Aqueduct. Today, MWD serves more than 145 cities and 94 unincorporated communities across Southern California. The City continues to purchase MWD water to supplement its local water supply. From 1960 to 1980, Santa Monica's

population growth slowed dramatically, with the City experiencing a small decline in population from 1980 to 1990. This slow growth rate was largely due to Santa Monica's limited size and the limited availability of land to be developed (see photo of Santa Monica today in Figure 3-2).

Figure 3-2. City of Santa Monica Today

3.2 SERVICE AREA BOUNDARY MAPS

The City is an urban coastal community, bordered to the west by the Pacific Ocean and the City of Los Angeles to the north, east, and south. The City's water service area consists entirely of the City of Santa Monica with limited service in the City of Los Angeles (Figure 3-3).

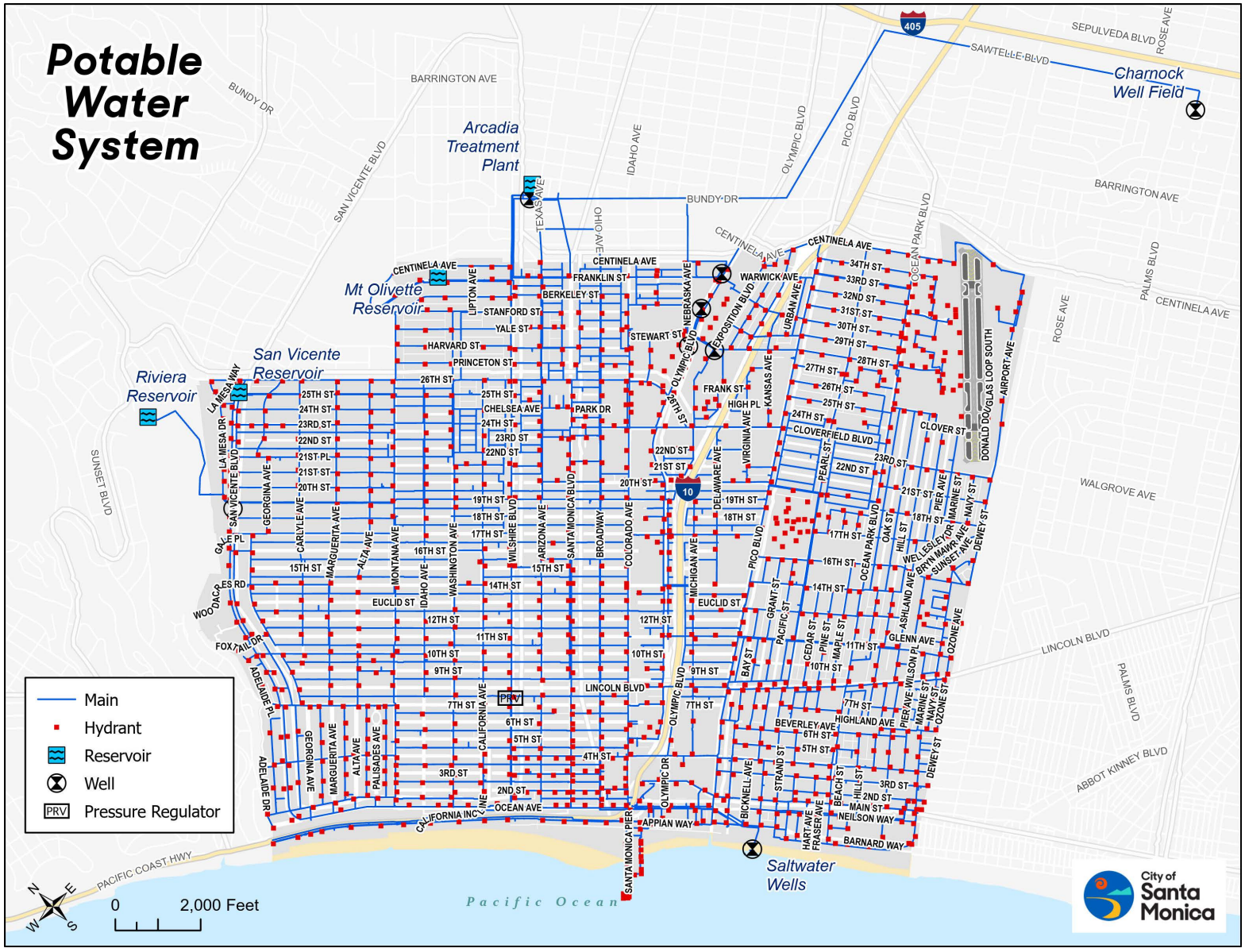


Figure 3-3. City of Santa Monica Potable Water System

3.3 SERVICE AREA CLIMATE

The City experiences a Mediterranean climate, ranging from warm and generally dry summers to cool, relatively wet winters. Water usage in the City varies with changes in temperature and rainfall throughout the year. Historical weather information for the City was obtained from the National Oceanic and Atmospheric Administration (NOAA) Network ID: GHCND:USW00093197. Summaries of the City's monthly climate and rainfall from 2010 to 2020 are provided below in Table 3-1 and Table 3-2, respectively.

Table 3-1. City of Santa Monica Average High Temperature, 2010-2020 (Degrees Fahrenheit)

MONTH	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	AVERAGE
January	68	68	69	66	72	71	64	63	70	68	66	68
February	65	63	66	65	67	71	74	62	66	61	67	66
March	69	65	65	66	71	75	68	69	65	67	63	68
April	66	68	68	69	72	72	71	71	67	69	67	69
May	67	69	69	72	78	68	68	68	67	66	71	69
June	70	69	70	73	74	72	74	72	71	70	73	72
July	71	74	72	74	79	75	77	77	79	75	73	75
August	72	74	79	74	78	79	76	77	81	76	78	77
September	72	73	80	77	80	82	77	78	78	78	79	78
October	71	72	77	73	79	81	75	79	78	78	77	76
November	70	68	70	73	75	72	74	73	76	69	69	72
December	64	64	63	70	67	66	66	71	70	64	69	67

Table 3-2. City of Santa Monica Precipitation, 2010-2020 (Inches of Rainfall)

MONTH	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	AVERAGE
January	5.2	0.8	1.2	1.5	0.0	1.2	2.3	7.8	1.5	6.3	0.5	2.6
February	5.1	2.4	0.1	0.1	3.5	0.3	0.6	4.2	0.1	5.0	0.1	2.0
March	0.3	4.6	1.2	1.0	0.5	2.6	1.9	0.2	4.1	2.5	4.6	2.1
April	1.2	0.0	1.4	0.0	0.3	0.2	0.2	0.2	0.0	0.1	2.2	0.5
May	0.1	0.7	0.0	0.2	0.0	0.4	0.1	0.1	0.1	1.4	0.2	0.3
June	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
July	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0
August	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
September	0.1	0.1	0.0	0.0	0.0	2.2	0.0	0.1	0.0	0.1	0.0	0.2
October	1.8	1.2	0.1	0.2	0.3	0.0	0.4	0.0	0.6	0.0	0.0	0.4
November	0.7	1.6	1.5	0.2	0.4	0.1	0.9	0.1	1.9	1.5	0.1	0.8
December	9.6	0.7	2.9	0.1	3.5	1.1	4.2	0.0	2.1	4.7	1.3	2.7
Totals	24.1	12.1	8.4	3.3	8.5	8.6	10.6	12.7	10.4	21.4	8.9	11.7

From 2010 to 2020, the City's warmest months were generally from July through October. It is common for water demand to increase as the days get warmer and decrease as the weather cools down. During warmer months, the increase in water usage arise primarily from outdoor irrigation but swimming pools and consumption also plays a factor. A typical water usage pattern through the year, by month is given in Figure 3-4. Historical weather information was obtained from the NOAA and shows the correlation in demand and temperature.

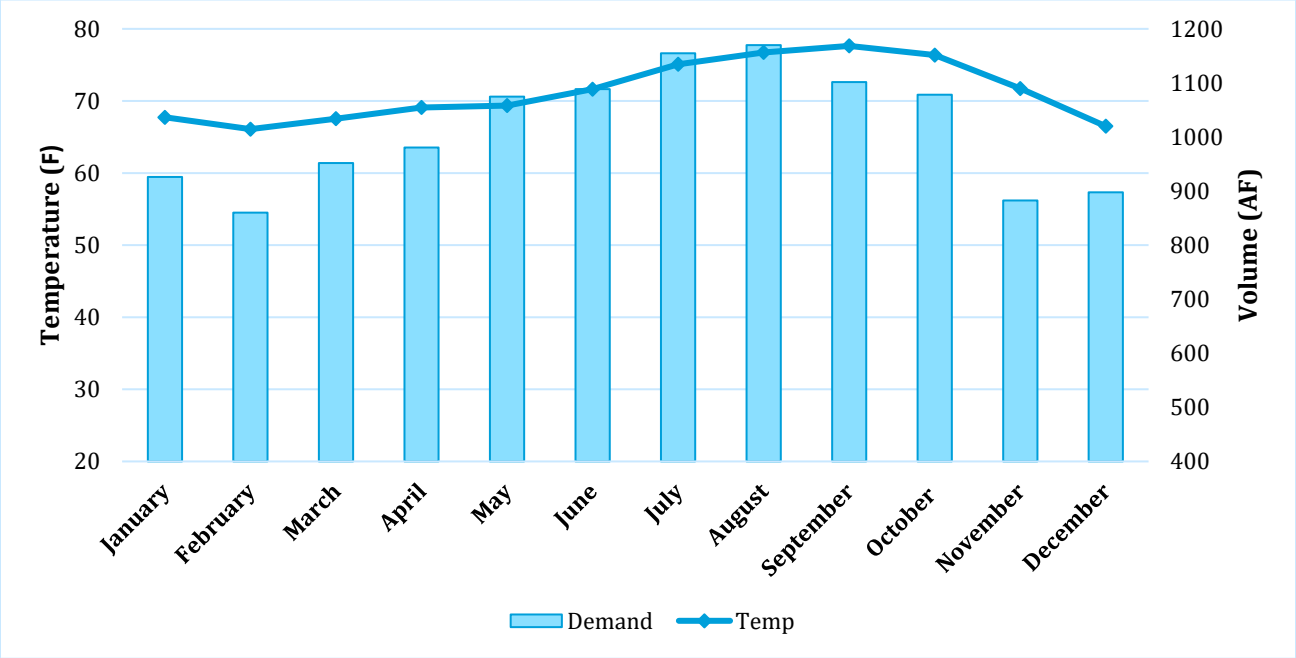


Figure 3-4. Typical Average Monthly Temperature and Water Use

Like temperature, rainfall also affects water usage. During rainy periods users tend to use less water, particularly for outdoor irrigation, thereby reducing water use during these times. From 2010 to 2020, the City received most of its rainfall during the months of November through March. During these wetter months, water usage in the City was less, on average, compared to other months as indicated in Figure 3-5.

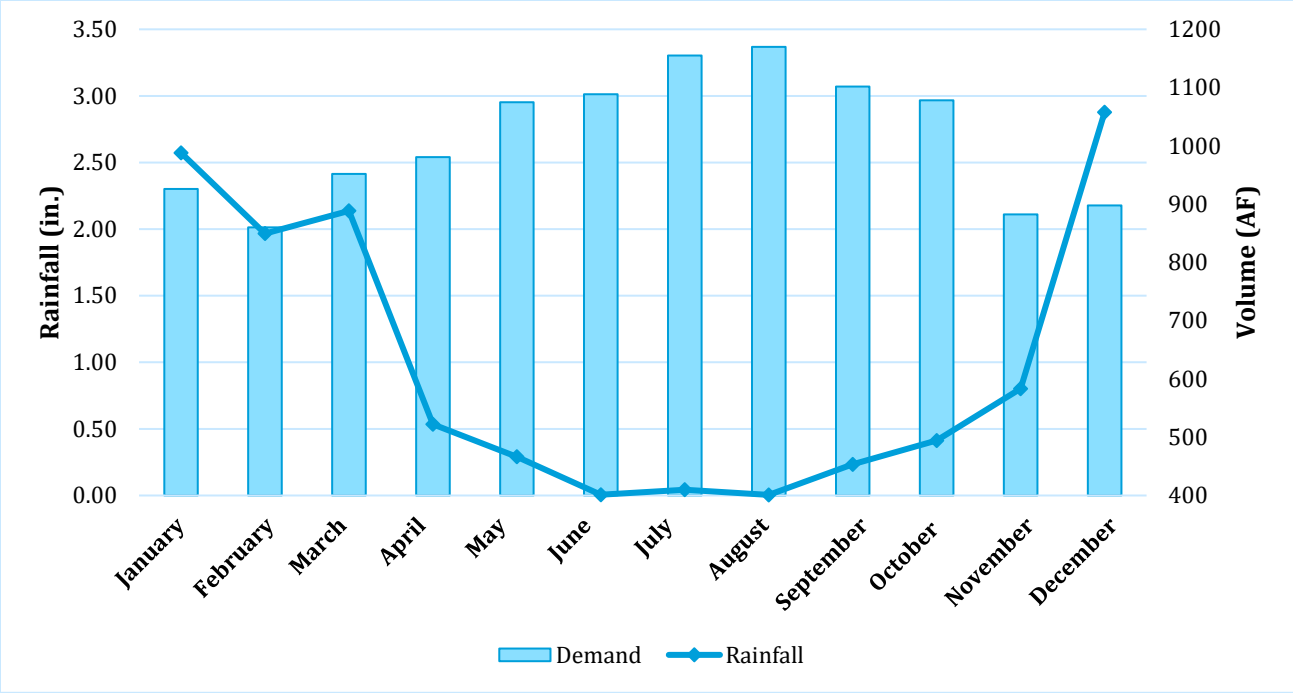


Figure 3-5. City of Santa Monica Average Monthly Water Use and Average Monthly Rainfall

3.4 CLIMATE CHANGE INFLUENCES

Climate change models for Southern California forecast continued increases in ambient temperature, with a possible shift in precipitation events towards later in the regional wet season of October to April. Sea level and storm wave run up are also predicted to increase, with 12 – 61 cm (5-24 inches) of sea level rise expected by 2050 along the southern California coast. Knowing these factors will affect long-term water resource planning and existing coastal water infrastructure vulnerability, the City has implemented a review of climate change factors for new water utility capital projects. To further refine its evaluation of potential climate change impacts to its water supply, the City is exploring robust decision-making methods to model a focused suite of likely climate change scenarios, developed in consultation with the City's Office of Sustainability and Environment and recognized climate change experts with local knowledge.

The City, along with other members of the Santa Monica Basin Groundwater Sustainability Agency (SMBGSA), is also preparing a Groundwater Sustainability Plan (GSP) to comply with the California Sustainable Groundwater Management Act (SGMA) of 2014. As part of the GSP development, various climate change scenarios, based on DWR guidance, will be modeled for the Santa Monica Groundwater Basin. These scenarios will be utilized to assess how to best ensure the sustainability and resiliency of the City's water supply.

3.4.1 Climate Change Vulnerability

Climate change in the coming decades is expected to test the City's ability to sustainably manage its water resources, in particular its groundwater supply. However, along with

these challenges come the opportunities for the City to apply innovative thinking and solutions to mitigate those components of climate change that most directly affect having a sustainable water supply. Chief among these are greenhouse gas emissions/energy, drought, temperature rise, sea level rise, saltwater intrusion/water quality, and flooding/storm surges that are discussed below.

3.4.1.1 Greenhouse Gas Emissions/Energy

Water, and especially imported water from the State Water Project or the Colorado River, is a carbon intensive resource. In 2010, the Santa Monica City Council adopted the objective of the City achieving water sustainability by eliminating its dependence on environmentally costly imported water for use as a potable supply. Currently, the City produces approximately 60 to 70 percent of its water supply from local groundwater. By using local groundwater, the City is offsetting the energy and emissions typically associated with water imported from Northern California and the Colorado River. To further reduce its water-related carbon footprint, the City has implemented various water conservation programs all designed to permanently reduce demand.

The City has audited its water infrastructure to ensure it is energy efficient by upgrading equipment and selecting energy efficient pumps. In addition, the City is applying innovative approaches to water and wastewater infrastructure such as below grade construction of critical treatment facilities to allow for alternative uses for surface areas such as parks, and the inclusion of solar panels to projects in order to reduce energy consumption.

3.4.1.2 Drought and Temperature Rise

As previously discussed, increased seasonal temperatures and cyclical periods of drought of varying duration are expected to have a measurable influence on the City's water supply strategy and long-term demand. As currently evident in summer months, warmer temperatures typically give rise to increased water demands. Accordingly, further city-wide reductions in water demand through water conservation programs will greatly assist the City in maintaining its water use at levels which will support water self-sufficiency. Further assistance in meeting this challenge is the City's broadening of its water supply portfolio to include alternative water supplies to enhance reliability and resiliency.

The City is currently developing additional local water supplies with advanced treatment facilities for dry weather runoff, stormwater, municipal wastewater, and impaired/contaminated groundwater sources. By not relying on any one source of water and reducing its reliance on imported water supplies, the City will lower its vulnerability to drought and other natural disasters as it moves to meet its sustainability goal of becoming water self-sufficient.

3.4.1.3 Sea Level Rise

Per the recommendations of the 2015 California Coastal Commission Sea Level Policy Guidance, the City considered the findings of the National Resource Council (NRC) 2012

report, Sea-Level Rise for the Coasts of California, Oregon, and Washington: Past, Present and Future. According to the 2012 NRC report, for the California coast south of Cape Mendocino, and the separate projections for the Los Angeles region, sea level rise is expected to be on the order of 12 - 61cm (5 - 24 inches) by 2050, and 42-167 cm (1.4 ft. - 5.5 ft.) by 2100. The projection for the Los Angeles coast is 29 ± 9 cm (11 ± 4 inches) by 2050 and 93 ± 25 cm (3 ft. ± 10 inches) by 2100. Other recent studies propose alternative sea level rise with the average rise for the Pacific Coast estimated to be between 0.6 - 1.0 m (2.0 - 3.3 ft.) by 2100. If sea level rises as predicted by the currently available studies, the City would have ample time to adapt to the potential risk to any water-related infrastructure near the beach by implementing mitigation measures such as natural dune barriers, engineered hardening of some infrastructure, or by implementing adaptive retreat from areas of higher risk whereby infrastructure would be relocated landward.

3.4.1.4 Saltwater Intrusion/Water Quality

If current NRC sea level projections are proven to be accurate, saltwater intrusion may be expected to change the quality of the shallow groundwater zones immediately adjacent to the coast and those low-lying areas where wave run-up would likely be higher. A recent 2017 exploratory boring drilled at Santa Monica City Hall, located approximately 1,200 feet northeast of the Santa Monica Pier, determined that highly brackish-saline groundwater conditions do not occur at that location until approximately 540 feet below ground surface.

Future changes to water quality from the groundwater zones the City currently pumps from are not expected through 2050. This is primarily because the City's principal water supply wellfields are located inland and remote from the coast. Overall, salinity intrusion due to climate change is expected to be gradual, allowing enough time to adjust groundwater extraction and modify the City's reverse osmosis (RO) treatment facility in response. As part of the City's participation in the SMBGSA, the GSP being developed will also model the potential of seawater intrusion, as a function of climate change and pumping practices, into the groundwater basin and develop sustainability criteria to prevent seawater intrusion. Therefore, vulnerability to saltwater intrusion is considered to be low as various sustainable management strategies and adaptive engineering measures are available for the local groundwater basin.

3.4.1.5 Flooding/Storm Surges

With increases in sea level, an increased vulnerability to flooding and storm surges can be expected. Along the coast, flooding and storm surge can be exacerbated by sea level rise attributed to poor drainage conveyance systems, melting continental and sea ice, and volume expansion of the oceans due to thermal warming, winds, and tides. To assess for such vulnerability, the City consulted the USGS Coastal Storm Modeling System 3.0 (CoSMoS 3.0) during its Sustainable Water Master Plan development process. The CoSMoS 3.0 has generated a series of figures showing potential impact to various coastal areas, including the Santa Monica Beach and Pier, caused by varying increases in sea level rise

and a coinciding 100-year storm event. As with the general effects of expected sea level rise, the City can adapt to the potential increase in storm surge or flooding attributable to the predicted gradual rise of sea level by implementing engineering mitigation measures. Based on this intrinsic ability, City topography, and the CoSMoS 3.0 modeling output, the risk of flooding or a storm surge adversely impacting water related infrastructure, including the Clean Beaches Initiative (CBI) Project and the Sustainable Water Infrastructure Project (SWIP), is considered to be low. However, the City simultaneously recognizes that large rogue storm events are possible.

3.5 SERVICE AREA POPULATION

Figure 3-6 shows the City's population from 2010 to 2020. The population data was obtained from the State of California Department of Finance. From 2010 to 2017, the City's population grew from 89,736 to 92,995 and leveled off at an average of about 92,600 from 2018 to 2020. Typically, population growth increases water demand, however, new water conservation programs and policies implemented by the City's Water Conservation Unit in 2015 have managed to offset the potential for impact by population growth as shown in Figure 3-6.

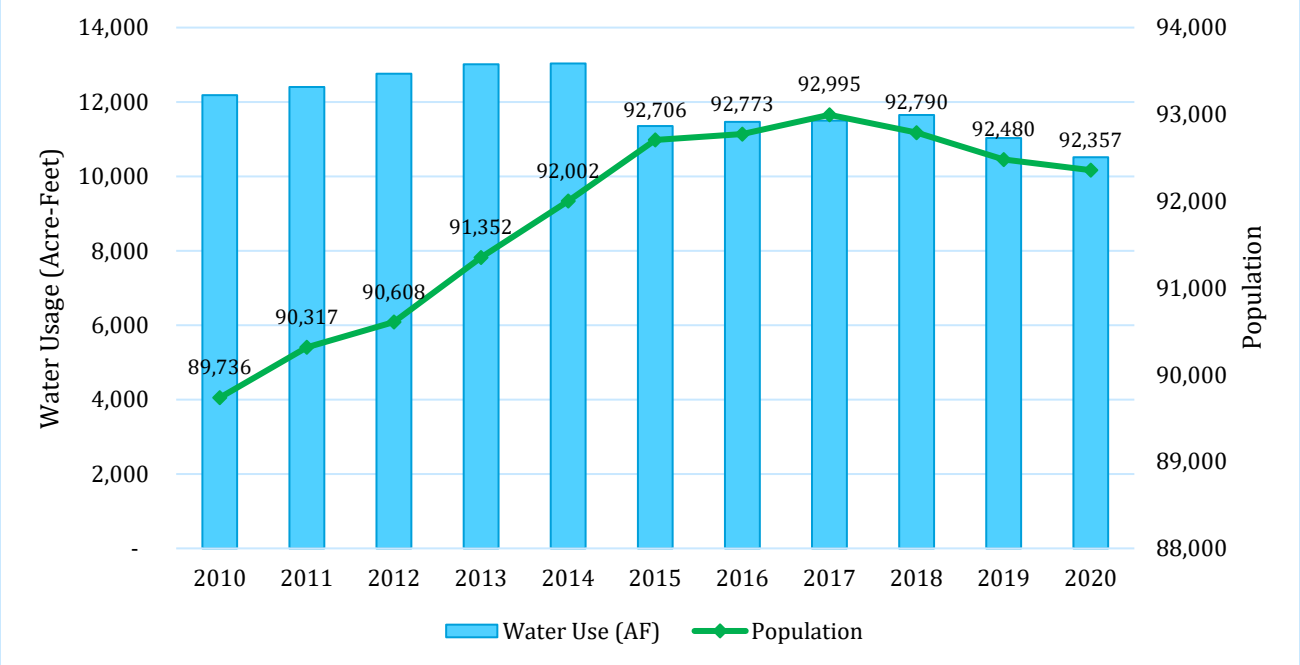


Figure 3-6. City of Santa Monica Annual Water Use and Population (2010-2020)

It is important to note that as the City's water conservation programs become more established, there will be correspondingly fewer opportunities for further conservation-based savings. In effect, future population growth may result in a measurable increase in water demand. To mitigate increases in water demands resulting from new developments,

the City recently enacted a Water Neutrality Ordinance [1] in May 2017 where new developments are to maintain water neutral from its previous baseline water demand (average potable water use from the previous five years).

A recent development that was not included in the City's 2018 SWMP is the Regional Housing Needs Assessment (RHNA) targets set by the Southern California Association of Governments (SCAG) in 2020. The RHNA targets require the City to plan for 8,873 new housing units over the 2021 to 2029 planning period. After 2029, the City is expected to experience minimal population growth as the City will be considered built out.

Based on the average household size of 1.9, the expected population with the additional housing units over the next 20 years is summarized in Table 3-3.

Table 3-3: City of Santa Monica Population Projection, 2020-2040

	2020	2025	2030	2035	2040
Population	92,357	100,305	109,243	109,573	109,903

Notes: Population data from City Planning Department, consistent with 2018 Sustainable Water Master Plan (City of Santa Monica - Water Resources Division, 2018)

3.5.1 Other Social, Economic, and Demographic Factors

It is not unusual, during poor economic conditions and increased unemployment rates, to see a reduction in water demand. When the economy recovers and employment levels increase, there is generally a rebound in water use.

The City's average annual unemployment rates and corresponding water demands from 2010 to 2020 are summarized in Figure 3-7. Unemployment rates were obtained from the United States Bureau of Labor and Statistics. In 2010, average annual unemployment in the City was 10.7 percent following the recession from 2007 to 2009. As the economy recovered from 2011 to 2014, the economy improved (based on unemployment), and annual water demand increased.

[1] https://www.qcode.us/codes/santamonica/view.php?topic=7-7_16-7_16_050&frames=on

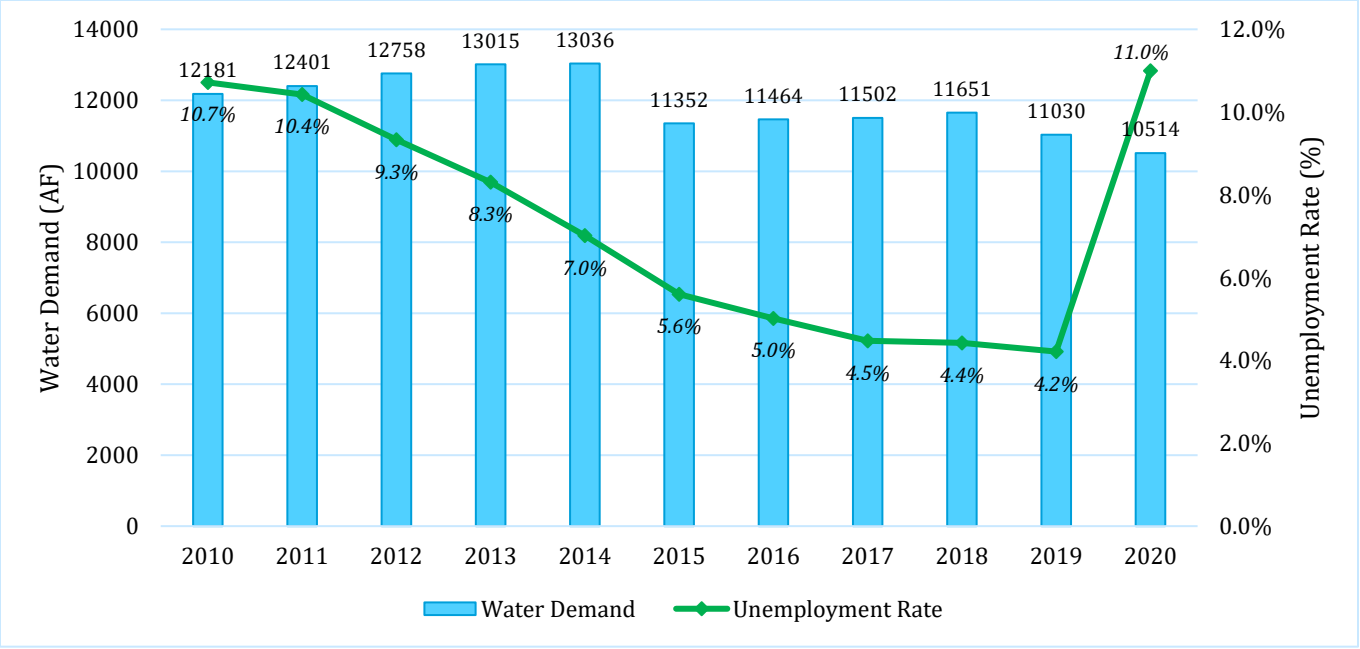


Figure 3-7. City of Santa Monica Yearly Water Use and Unemployment Rate

As mentioned previously, the noticeable decrease in water demand starting in 2015 was due to the establishment of the City's Water Conservation Unit. From 2016 to 2019 water use continued to stay below 2015 levels, and the community continued to conserve even with the improving economy, suggesting a sustained behavioral change in the City with regards to water conservation.

The relationship between water use and economic activity is also illustrated by considering the effect of the COVID-19 pandemic that started in early 2020. In 2020 unemployment jumped to 11% due to the pandemic. Overall water used in 2020 was approximately 10,514 AF, the lowest of the years analyzed (2010 to 2020) despite lower than average rainfall and about average temperature and population compared to 2015 to 2019. Under normal circumstances, these factors would typically result in higher water usage. Instead, water use dropped by 8% when compared to the previous five-year average (2015-2019) indicating the decrease was likely due to economic impacts of the pandemic as the City has a strong tourism economy.

3.5.2 Land Uses within Service Area

Land use in the City is principally composed of single and multi-family residences, a centralized business and commercial district, and some institutional and industrial areas. In 2020, 177 multi-family and 252 single-family account were enrolled in the City's low-income assistance program. Since the area is mostly built-out, changes in land use types will result from re-development of existing lots. A districting map from the City's planning department is provided in Figure 3-8.

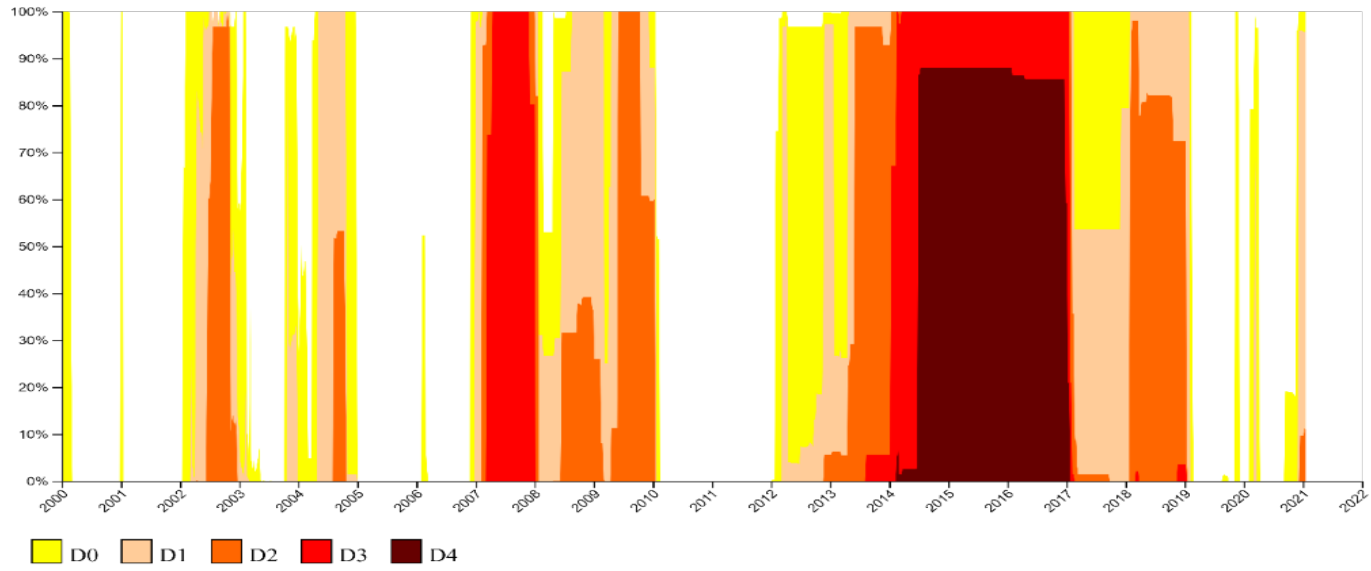
Figure 3-8. City of Santa Monica Official Districting Map

4 WATER USE CHARACTERIZATION

A thorough analysis of historical water use provides valuable insights that are a vital part of water resource planning. This section analyzes water use by sector to gain a more detailed understanding of water use trends in the City. Trends discerned from the analysis are then considered in the context of other factors that affect water usage, such as land use, population change, and conservation, to project future water use. In Section 7, these projections are compared with water supply projections made in Section 6 to assess the reliability of the City's water service.

4.1 OVERVIEW OF PAST WATER USE

Billing data for the period 2010 to 2020 were compiled to analyze past water use in the City. This time frame was chosen to understand recent historical water use patterns in the City. It also includes water use data during one of the most severe droughts in the state's history, which allows some understanding of usage during multi-year drought conditions (see Figure 4-1 for drought periods from the past two decades).



Historical Drought Conditions – Los Angeles County; D0-Abnormally Dry; D1-Moderate Drought; D2-Severe Drought; D3-Extreme Drought; D4-Exceptional Drought (Source: https://www.drought.gov/states/california/county/Los%20Angeles)

Figure 4-1. Summary of Drought Conditions from 2000-2020

The period from 2010 to 2020 also provides a useful contrast of water usage just before and after 2015, when the City established its Water Conservation Unit (WCU) and entered Stage 2 of its Water Shortage Response Plan (WSRP). Stage 2 of the WSRP established mandatory water use restrictions including a Water Use Allowance (WUA) for each water customer. The WUA is calculated as a percentage of the baseline year's (calendar year 2013) water usage. The calculated WUA for Stage 2 is 20 percent of calendar year 2013's usage. Since groundwater is a big part of the City's water supply and the effects of drought

are long term, the City continues to remain in Stage 2 despite Governor Brown declaring an end to the drought in April 2017.

4.1.1 Water Use Sectors

The City categorizes water billing data by different uses. By doing so, billing data provides valuable water use information including which sectors consume the most water and how policies, such as implementation of water conservation programs, affect usage. The sectors analyzed are consistent with those found in the State's Water Code and are defined below. Some sectors listed in the Water Code, such as agricultural, are not used in the City but are described for clarification, rather than being left out of this UWMP. The complete list of water use sectors can be found in Section 10631(d) of the Water Code.

Water use sectors listed in the Water Code include the following:

- **Single-Family Residential.** A single-family dwelling unit. A lot with a free-standing building containing one dwelling unit that may include a detached secondary dwelling. This is a retail demand.
- **Multi-Family.** Multiple dwelling units contained within one building or several buildings within one complex.
- **Commercial.** A water user that provides or distributes a product or service.
- **Industrial.** A water user that is primarily a manufacturer or processor of materials as defined by the North American Industry Classification System (NAICS) code sectors 31 to 33, inclusive, or an entity that is a water user primarily engaged in research and development. It should be noted that the industrial sector makes up a very small percentage of water use in the City (less than 1.5 % of total commercial use). As a result, industrial and commercial usage were combined for the purposes of analysis and discussion in this UWMP update.
- **Institutional.** 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 nonprofit research institutions.
- **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.** These are water sales made to another agency. The City does not sell water to any other agency.
- **Groundwater Recharge**. The managed and intentional replenishment of natural groundwater supplies using man-made conveyances such as infiltration basins or

injection wells. The City currently does not perform groundwater recharge but plans to in the near future.

- **Saline Water Intrusion Barriers.** Injection of water into a freshwater aquifer to prevent the intrusion of saltwater. The City does not use water for saline water intrusion barriers.
- **Agricultural Water**. Water used for commercial agricultural irrigation. There are no agricultural water users in the City.
- **Distribution System Losses.** Water losses from the water distribution system.
- **Other (Fire).** Water used for the maintenance and testing of fire suppression systems, hydrant flushing, etc.

4.1.2 Past Water Use by Sector (Potable)

Water usage for the City is tracked by six of the water sectors described above, including Single Family Residential, Multi-Family Residential, Commercial/Industrial, Institutional, Landscape, and Other (Fire). Trends for these sectors from 2010 to 2020 are shown in Figure 4-2.

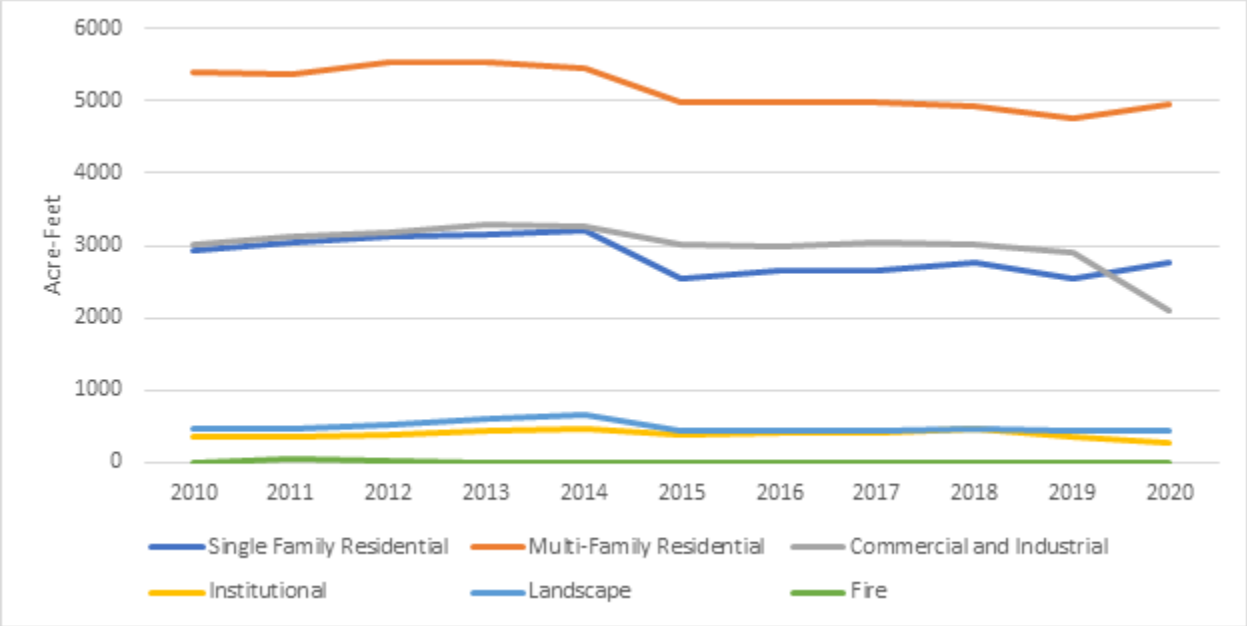


Figure 4-2. Summary of Water Use Trends by Sector in the City of Santa Monica

The predominate water usage within the City is by residential users, which account for more than two-thirds of the City's total water consumption. Total water usage in the Multi-Family Residential category is about double compared to the Single-Family Residential. Over the last five years, there was a significant decrease in usage when compared to the period prior to 2015, which illustrates residents' response to calls for conservation during

the prolonged drought from 2012 to 2016. Over the last five years, water usage for Multi-Family and Single-Family Residential users remained static from 2016 to 2017, however, Single-Family usage went up slightly in 2018. This slight uptick, which was common across the state, was likely due to the announcement ending the drought emergency in April 2017 and lower rainfall experienced in 2018. In 2019, the City received abnormally high rainfall, which resulted in a noticeable decrease in residential water usage. This was followed by a slight increase in usage in 2020 due to the COVID-19 pandemic which resulted in individuals working from home and following stay at home orders. Overall, while there were moderate fluctuations in water use since 2015, residents have sustained conservation reductions despite the end of the drought emergency in 2017.

Commercial/Industrial water consumption is similar in magnitude to the Single-Family Residential sector and is approximately 25% of the total water usage within the City. The water usage by the Commercial/Industrial sector also saw a noticeable decrease after 2015 and was relatively static from 2016 to 2019. During 2020, however, the City saw a substantial decrease of about 30% by Commercial/Industrial users compared to 2016 to 2019. This was attributed to the COVID-19 pandemic which included mandated business closures and many employees working from home.

The Landscape sector accounts for about 4% of water use in the City. Like Single-Family Residential, the Landscape sector usage increased slightly in 2018, followed by a decrease in 2019, and slightly below average use in 2020.

Institutional water use accounts for approximately 3% of total water usage in the City. Similar to the Commercial/Industrial sector, the Institutional sector was relatively static from 2016 to 2019 and saw a significant decrease of about 34% in 2020, due to mandated closures resulting from COVID-19.

The fire use sector includes water used for the maintenance and testing of fire suppression systems and hydrant flushing. This sector makes up less than 1% of the total water use in the City and has remained about the same over the last five years.

Overall water usage in 2020 totaled 10,542 AF, the lowest in the last five years. When compared to the average use from 2016 to 2019, 2020 water use was about 8% lower. As discussed in Section 3, 2020 saw less than average rainfall, experienced about average temperature, and the population was about average compared to 2015 to 2019 levels. Under normal circumstances, these factors tend to result in higher water usage. As described above, this indicates that the significant decrease in water usage seen in 2020 was likely due to impacts related to the COVID-19 pandemic. A summary of the water consumption by sector from 2016 through 2020 is provided in Table 4-1.

Table 4-1. Summary of Water Use by Sector in Santa Monica (2016-2020)

SECTOR	2016	2017	2018	2019	'16 – '19 AVERAGE	2020
Single Family Residential	2,656	2,641	2,773	2,556	2,657	2,756
Multi-Family Residential	4,970	4,987	4,917	4,752	4,906	4,944
Commercial/Industrial	2,974	3,030	3,028	2,914	2,986	2,100
Institutional	414	399	474	356	411	273
Landscape Irrigation	447	440	456	450	448	438
Fire	3	5	3	3	3	2
Total	**11,464**	**11,502**	**11,651**	**11,030**	**11,431**	**10,513**

4.1.3 Non-Potable Water Use

The City has a dedicated recycled water system that provides service to 30 metered locations. The primary use of recycled water is for landscape irrigation, but it is also used for street sweeping, sewer jetting, and for lavatories at two facilities. Recycled water is distributed from the Santa Monica Urban Runoff Recycling Facility (SMURRF), which captures and treats urban runoff from the storm drain system. Prior to SMURRF operations, the runoff discharged to Santa Monica Bay and adversely impacted water quality.

The SMURRF has a treatment capacity of up to 560 AFY, however, production is currently limited due to scarce runoff supply to the facility. Non-potable use from 2016 to 2020 is provided in Table 4-2.

Table 4-2. Summary of Non-Potable Water Produced at SMURRF (2016-2020)

	2016	2017	2018	2019	2020
Non-Potable Use (AF)	89	98	95	71	57

Construction of the City's Sustainable Water Infrastructure Project (SWIP) commenced in 2020 and will increase available recycled water supply to the City. Details regarding the SWIP are provided in Section 6.

4.1.4 Distribution System Water Losses

Distribution system water loss, defined as the difference between water supplied to the system less authorized consumption, has declined linearly during this entire reporting period. The City meets the Water Loss Audit Standard through its participation in annual water audits. The audits are validated by an independent third-party according to American Water Works Association (AWWA) standards. In 2015 the total water loss was 3.8% and in 2016 it was 1.6%. Subsequent years to date have yielded water consumption exceeding water supplied (Appendix F, Table 4-4).

The discrepancy has been attributed to several factors. First, there is a timing issue with the manual meter reading. The City maintains a 60-day billing cycle so there is a lag in consumption data relative to source water entering the system. Second, the metering of the source water entering the City's distribution system are in multiple locations. The City's water system has four sources entering the system; two MWD feeder services, Santa Monica Well 1 and the Arcadia Water Treatment Plant. MWD's two feeder service lines both have meters and are maintained by MWD. Santa Monica Well 1 has a dedicated magmeter. The Arcadia Water Treatment Plant does not have a single flowmeter for the potable water produced. Rather, potable water effluent flow from the Arcadia Water Treatment Plant is a composite of multiple internal plant flowmeters. These internal flows originate from internal bypass flows and reverse osmosis product flows. It is likely that the discrepancies in reporting are due to variations in accuracy from the various flow meters.

4.2 PROJECTED WATER USE CONSIDERATIONS

The previous sections in this Section detailed historical water consumption, which serves as the basis for understanding water use patterns in the City. While historical data provides valuable insight into water use trends, additional factors including anticipated changes in land use, climate, and water use codes, standards, and ordinances are also important factors that should be considered when projecting future water use.

To this end, the City's Planning Division was consulted to incorporate land use planning data such as population growth into future water use projections. The City's WCU provided projections of how conservation programs, and water use codes, standards, and ordinances may impact future water consumption in the City. The Water Resources Division also aligned climate change assumptions used for this UWMP with those used for a GSP being developed for the Santa Monica Groundwater Basin (SMGB).

4.2.1 Coordination with Planning Division

The City's Planning Division is currently working on a Housing Element Update for 2021-2029, which requires the City to plan for 8,873 new housing units in the 8-year period. The housing unit allocation is based on the 2020 Regional Housing Needs Assessment (RHNA), developed by the Southern California Association of Governments (SCAG). Based on the average household size of 1.9, the City estimates that the additional units will result in a total population of 109,497 people in 2030 or an increase of 15-20% from the population projections in the 2018 SWMP.

Most of this growth envisioned will be multifamily residential units, 69% of which would be affordable units. The City also anticipates that a very small percentage of the additional units (about 500-800 units) will be Accessory Dwelling Units (ADUs), while the single-family residential sector will likely remain unchanged.

The City is completely built out with very little (less than 0.05%) undeveloped area. These undeveloped areas are limited to the beach and public open spaces, such as parks. It is

likely that much of the residential growth will occur within existing developed properties near transit, including downtown and major boulevards. To accommodate this growth, existing commercial/industrial land uses would likely be redeveloped into residential or mixed uses. Hence, only minimal to moderate growth is anticipated for the commercial/industrial water use sectors.

4.2.2 Water Use Ordinances, Codes, Standards, and Conservation Programs

The City has a long history of promoting water conservation. In 2002, the City initiated its Water Efficiency Strategic Plan and in 2004 began implementing various conservation programs including the No Water Waste and Green Building Ordinances. In 2014, City Council authorized the significant expansion of staffing and funding to augment the City's water conservation efforts to address the state-wide drought and help the City meet its self-sufficiency goal. This contributed to a water demand reduction of approximately 20 percent from 2015–2020, which equates to savings of approximately 2,500 AFY. Current water conservation programs and ordinances in the City are provided in Table 4-3.

Table 4-3. Summary of Santa Monica's Water Conservation Program and Ordinances

CURRENT WATER CONSERVATION PROGRAMS *(See* Section *9 for Additional Details)*
2015 - Ongoing
• Water Use Allowances
• Water Use Allowance Exceedance Citations
• Water School
• Water Use Consultations
• Enhanced Landscape Rebate Program
• Landscape Consultations
• Sustainable Landscape Trainings
• Enhanced Water Waste Patrols
• Enhanced MWD Water Conservation Rebate Incentive Program
• Free Water Saving Items
• Marketing and Outreach (see Section 9.2.4)
• Customer Support
2015-2018
• Multi-Family Toilet Direct Install Program
2016 – Ongoing
• Water Efficient Landscape and Irrigation Standards (WELIS) (SMMC 8.108)
2017-2020
• School District (K-12) Memorandum of Understanding (MOU) to Fund Water Conservation
2017 – Ongoing
• Water Neutrality Ordinance (SMMC 7.16.050)
• Water Neutrality Direct Install Program
2018 – 2019
• School Education Pilot Program

2020 – Present
- Spray to Drip Irrigation Conversion Rebate

The City evaluated the potential for further water efficiency and conservation in all customer sectors as part of its 2018 SWMP. This included an assessment of the current level of water fixtures, as well as identifying where the greatest opportunities for reducing water consumption existed. Based on this analysis, a plan was developed to reach the City's long-term objectives via existing and new conservation programs. City staff modeled three conservation plans: Optimal, Enhanced, and 90 gallons per capita per day (GPCD). Staff met with industry experts to review and receive input on the modeling effort and the proposed conservation programs. A panel of outside experts supported both the Optimal and Enhanced conservation plans and the proposed programs that comprise them.

Based on the assessment, the City selected the Optimal conservation plan, which continues the successful ongoing programs and increases water conservation in untapped areas summarized in Table 4-4. These areas include funding of retrofits in Santa Monica-Malibu Unified School District facilities and landscapes, commercial sector fixture retrofits and enhanced rebates, coin-operated laundry machine retrofits, increase in Water Neutrality offsets and direct installation of water efficient fixtures, rebates for new technologies, enhanced water conservation education and enforcement, additional sustainable landscape conversions, additional outreach to assist customers, new marketing and outreach programs, and incorporating limited-term employees as part of the water conservation team. The Optimal Conservation Plan was revised and its timeline updated to reflect the impacts that the COVID-19 pandemic has had on staffing levels to administer the water conservation program as well as available funding.

Table 4-4. Key Components of the Optimal Conservation Program

OPTIMAL WATER CONSERVATION PLAN: FUTURE, ADDITIONAL PROGRAMS Revised due to COVID-19 staff and budget reductions *(See* Section *9 for Additional Details)*
2021 – 2025 (Pending budget approvals)
• Develop Water Conservation Programs Master Plan
• Marketing/Messaging Program for "Conservation as a Way of Life" and Potential Drought Resurgence
• Targeted Commercial Sector Programs: Expanded School Education Program
• Performance Pays
• School District Retrofits via Water Neutrality Direct Install Program
• Greywater System Permitting Guidebook
• Flow Measuring and Irrigation Controller Devices Incentives
• Clothes Washer Incentive for Multi-Family
• Irrigation System Audit and Repair

Implementation of the existing conservation programs with the addition of supplemental conservation efforts is expected to continue water demand reductions through 2040.

Conservation will play a critical role in the City's march toward water self-sufficiency by continuing to reduce overall use even in the face of demand from new housing and from the commercial and institutional sectors of the local economy.

4.2.3 Climate Change

Climate change considerations for the 2020 UWMP were aligned with those being used to develop the GSP for the SMBGSA. The GSP is using climate change datasets provided by DWR that were originally developed for the Water Storage Investment Program (DWR 2018). These datasets were derived from a collection of 20 global climate projections. The central tendency of each of the 20 projections was used to establish projected climate conditions.

Using DWR climate change factors, temperature in the Santa Monica Groundwater Subbasin is expected to increase, while average annual precipitation is projected to remain relatively constant. The timing of the precipitation is, however, projected to change with more precipitation received in January and February, and less precipitation received in October, November, and December. Overall, evapotranspiration is projected to increase relative to historical rates, which reflects the projected increases in temperature.

4.3 PROJECTED WATER USE

Projected water use in five-year increments up to 2040 are summarized in Table 4-5 and shown in Figure 4-3. These projections reflect the City's estimated water use by sector considering the analysis and considerations described in the previous sections. It should be noted that although there is a Water Neutrality Ordinance in place for the City, as a conservative planning approach, the water use projections do not assume water neutrality for the projected increase in housing units from the 2020 Regional Housing Needs Assessment.

Table 4-5 Summary of Water Use Projections for Santa Monica (2025 – 2040 in 5 Year Increments)

	2025	2030	2035	2040
Population	100,305	109,243	109,573	109,903
Single Family Residential	2,646	2,646	2,646	2,646
Multi-Family Residential	5,533	6,261	6,288	6,324
Commercial and Industrial	2,992	3,036	3,081	3,126
Institutional and Governmental	409	409	409	409
Landscape	446	446	446	446
Other (Fire)	3	3	3	3
Subtotal	12,029	12,802	12,874	12,954
Distribution Loss (Estimated 5%)	601	640	644	648
Total	**12,631**	**13,442**	**13,517**	**13,602**
Total w/Additional Conservation	**11,867**	**11,809**	**11,711**	**11,650**

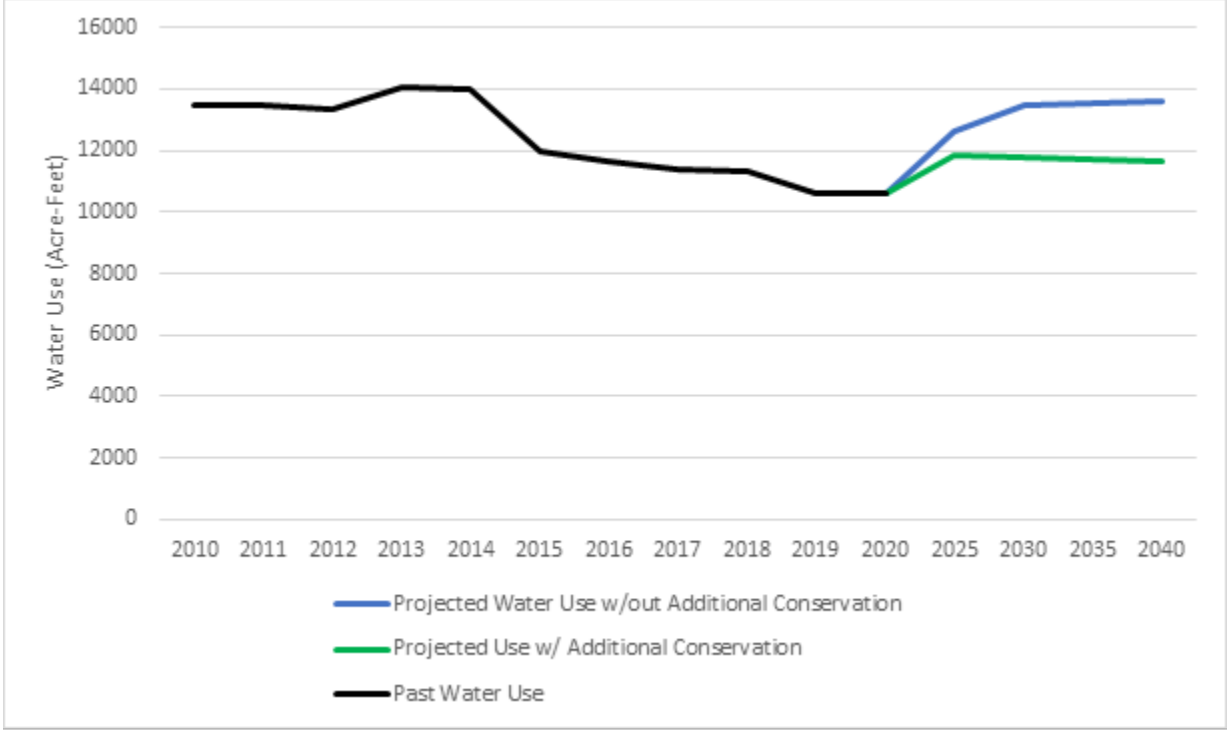


Figure 4-3. Projected Water Use Trends (2025 – 2040 in 5 Year Increments)

5 SBX7-7 BASELINE AND TARGETS

5.1 INTRODUCTION

With the adoption of the Water Conservation Act of 2009, also known as the SBX7-7, the State of California required urban per capita water use be reduced by 20 percent by the year 2020. To meet this objective, each retail urban water supplier was required to develop and meet an urban water use target for the year 2020.

The City of Santa Monica has achieved its water use reduction target and the 2020 UWMP provides the Verification and Compliance forms (Appendix D and Appendix E, respectively) demonstrating the agency's compliance with SBX7-7.

5.2 BASELINES AND TARGETS (SBX7-7 VERIFICATION FORM, APPENDIX D)

The City determined its SBX7-7 baseline and target in the 2015 UWMP and is not revising these calculations for demonstrating compliance in the 2020 UWMP.

The State provided multiple methodologies to achieve compliance. In the 2015 UWMP, the City chose the most aggressive water conservation method (Target Method 1), which requires a 20% reduction from a ten-year baseline (measured in GPCD). The baseline for the City for the ten-year period 1996-2005 is 154 GPCD (see SBX7-7 Table 5 in Appendix D SBX7-7 Verification Form). As a result, the 2020 Target is 123 GPCD. (see SBX7-7 Table 7-A in Appendix D, SBX7-7 Verification Form).

The data and calculations used in the 2015 UWMP for Target Method 1 are reproduced in the applicable tables that comprise the SBX7-7 Verification Form (see Appendix D). A summary of the Verification Form is provided below in Submittal Table 5-1. (Note: All retail suppliers are required to submit the standardized tables in the SBX7-7 Verification Form with their 2020 UWMPs. These standardized tables were available in 2015 and are required again in 2020 to demonstrate compliance with SBX7-7).

SUBMITTAL TABLE 5-1 BASELINES AND TARGETS SUMMARY
FROM SB X7-7 VERIFICATION FORM *(RETAIL SUPPLIER OR REGIONAL ALLIANCE ONLY)*

Baseline Period	Start Year *	End Year *	Average Baseline GPCD*	Confirmed 2020 Target*
10-15 year	1996	2005	154	123
5 Year	2003	2007	148	

**All cells in this table should be populated manually from the supplier's SBX7-7 Verification Form and reported in Gallons per Capita per Day (GPCD)*
Notes: Please see Appendix D for the complete SBX7-7 Verification Form.

5.3 COMPLIANCE (SBX7-7 COMPLIANCE FORM, APPENDIX E)

In the 2020 UWMP, each retail supplier must demonstrate compliance with SBX7-7 by determining the actual 2020 GPCD from the gross water volume of water into the distribution system and the population served in 2020. These values and calculations are summarized in Table 5 of the SBX7-7 Compliance Form (see Appendix E) which has been copied below for convenience.

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**
10,662	92,357	103

Notes: See Table 3 and Table 4 in the Compliance Form for details.

In similar fashion to the SBX7-7 Verification Form, all retail suppliers are required to submit the applicable standardized tables of the SBX7-7 Compliance Form with their 2020 UWMPs. Please see Appendix E for the City's completed Compliance Form. A summary of the Compliance Form is provided below in Submittal Table 5-2.

SUBMITTAL TABLE 5-2: 2020 COMPLIANCE FROM SB X7-7 2020 COMPLIANCE FORM *(RETAIL SUPPLIER OR REGIONAL ALLIANCE ONLY)*				
2020 GPCD			2020 Confirmed Target GPCD*	Did Supplier Achieve Targeted Reduction for 2020? Y/N
Actual 2020 GPCD*	2020 TOTAL Adjustments*	Adjusted 2020 GPCD* *(Adjusted if applicable)*		
103	0	103	123	YES
**All cells in this table should be populated manually from the supplier's SBX7-7 2020 Compliance Form and reported in Gallons per Capita per Day (GPCD)*				

NOTES: Please see Appendix E for the complete SBX7-7 Compliance Form.

6 WATER SUPPLY CHARACTERIZATION

6.1 WATER SUPPLY ANALYSIS OVERVIEW

The City supplies potable water through a combination of local groundwater from the Santa Monica Groundwater Basin (SMGB) and water purchased from the Metropolitan Water District of Southern California (MWD) that is imported from the Colorado River or the State Water Project. The City's local groundwater supply provides, on average, approximately 60-70 percent of the total water supply and is supplemented by imported water purchased from MWD to meet the City's water demands, approximately 30-40 percent of the total water supply. A small amount of non-potable water, less than 1 percent of the total water supply, is available to the City.

The City's local groundwater is replenished by percolation from precipitation and mountain front recharge from the Santa Monica Mountains. Groundwater supply has historically been impacted by third-party contamination that limited groundwater production. In recent years, groundwater usage has also been limited by aging infrastructure, particularly groundwater production wells operating beyond the typical useful life. To help ameliorate these impacts, the City conducts extensive groundwater monitoring programs and is working to proactively replace aging infrastructure.

MWD imports water from Northern California and the Colorado River, which depend heavily on hydrologic conditions (e.g., snowpack in the Sierra Nevada in Northern California). Varying hydrologic conditions have led to wide variability in MWD's water storage reserves in recent years. For instance, the recent drought from 2012 to 2016 depleted MWD's dry year storage reserves. This was followed by the wettest year on record in 2017 and another wet year in 2019 that filled up MWD's storage reservoirs. As a result, MWD ended 2019 with a record 3.1 million acre-feet (MAF) in dry year storage reserves (Metropolitan Water District of Southern California, 2020) [2], however, 2020 saw the return of another dry year. The City is working towards reducing its reliance on imported water supplies by developing local water resources. These projects are described in detail in Section 6.3.6.

A small amount of non-potable water (less than one percent of total water supply) is available from the City's Santa Monica Urban Runoff Recycling Facility (SMURRF). The SMURRF provides non-potable water for uses such as irrigation, toilet flushing, and street sweeping. Additional projects are currently in progress to expand the City's use of recycled water and increase local supply to help achieve the City's goal of water self-sufficiency. A brief summary of the City's water supply components is provided in Table 6-1 and anticipated supply availability from each source is summarized in Table 6-2. The City used

[2] http://www1.mwdh2o.com/DocSvcsPubs/mwd_newsletter/Jan2020/email.html

the time period between 2010 and 2020 to establish the Normal, Single Dry, and Five-Consecutive Year drought for available treated water supply. This time period is more representative of the City's water supply reliability and drought risk going forward as 2010 established the new baseline for local water supplies when the City restored its major groundwater well field back to full production. In addition, the time period also includes one of the single worst drought year in recorded history in 2014 where it registered as the hottest year in California in 1,200 years according to the National Weather Service.

Table 6-1. Summary of Existing Water Supplies

WATER SUPPLY	DESCRIPTION
Local Groundwater Basins	**Charnock, Arcadia, and Olympic Sub-basins** Major sources of local groundwater is provided through ten (10) groundwater wells. Five groundwater wells at the Charnock Well Field (Charnock 13, 16, 18, 19 and 20), three groundwater wells in the Arcadia Well Field (Arcadia 4, Arcadia 5, and Santa Monica 1), and two groundwater wells in the Olympic Well Field (Santa Monica 3 and Santa Monica 4). The local groundwater treatment facilities currently consist of: **Charnock Treatment Unit** - Provides biological granular activated carbon (GAC) treatment for contaminated wells, followed by additional treatment at Arcadia. **Arcadia Water Treatment Plant (WTP)** - Provides reverse osmosis (RO) treatment to soften the City's groundwater supply. **Other Sub-basins** The Coastal sub-basin will be maintained as a water supply reliability reserve. Initial exploration and investigation efforts to quantify water quality and yield for the Coastal sub-basin is being conducted. **Key Considerations** From 1997 – 2010, the City's largest groundwater wellfield, Charnock wellfield, was shut down due to third party contamination. An agreement with the responsible parties provided settlement funds, which to date have funded an upgrade to the Arcadia WTP and new treatment facility at Charnock. Production from the Olympic Sub-basin is currently limited due to contamination by a third party.
Imported Water	**MWD Connections** The City receives imported water at two connections with MWD, turnouts capable of delivering up to 100 percent of the local water needs. **Key Considerations** Imported surface water supply from MWD is used to supplement the City's local water supplies in order to meet overall water demands in the City. The Tier 1 allotment for the City is approximately 7,406 AFY.

WATER SUPPLY	DESCRIPTION
Conservation	**Local Conservation Efforts** In response to state-wide drought conditions in 2015, the City implemented various water conservation measures that resulted in a permanent water demand reduction of approximately 18 percent or approximately 2,500 acre-feet per year (AFY). The average annual water consumption was reduced from 140 gallons per capita per day (GPCD) to 110 GPCD.
Recycled Water	**Recycled Water (Alternative Water supply)** The City currently captures and treats dry weather urban runoff at the SMURRF to produce non-potable water that is used for irrigation and toilet flushing to offset potable water demand.

Table 6-2. Summary of Treated Water Supply Availability for Each Water Supply

SOURCE	NORMAL YEAR1	SINGLE DRY YEAR	AVERAGE FIVE-YEAR CONSECUTIVE DROUGHT
Local Groundwater	7,121 AFY	5,181 AFY	7,203 AFY
Imported Water Supply	7,406 AFY[2]	7,406 AFY[2]	7,406 AFY[2]
Total	14,527 AFY	12,587 AFY	14,609 AFY

[1]The normal year is estimated using the average of total water supply available from 2010 through 2020
[2]Lowest MWD Tier 1 allotment was assumed

6.2 WATER SUPPLY CHARACTERIZATION

A detailed description for each water supply available to the City currently is provided in this section and organized as follows:

- Local Groundwater
- Purchased/Imported Water
- Non-Potable Water

6.2.1 Groundwater

Groundwater from the SMB is the primary source of water supply for the City. The basin is unadjudicated and encompasses an area of 50.2 square miles in western Los Angeles County and overlies the entire City of Santa Monica, Culver City, Beverly Hills, and portions of western Los Angeles. Currently the City is the sole municipal-supply producer of groundwater from the SMB. The only other existing groundwater withdrawals are from one privately-owned residential irrigation well, and irrigation wells at three golf courses, namely the Brentwood Country Club, the Riviera Country Club, and the Los Angeles Country Club. To comply with the Sustainable Groundwater Management Act of 2014, the City along with the City of Beverly Hills, Culver City, City of Los Angeles, and the Los

Angeles County has formed the SMBGSA to develop a Groundwater Sustainability Plan to manage the SMB.

The SMB is bounded by impermeable rocks of the Santa Monica Mountains to the north, the Ballona Escarpment to the south, the Newport-Inglewood fault to the east, and the Pacific Ocean to the west. In 2007, MWD published a study describing the numerous groundwater basins within its large service area. In that study, MWD delineated five separate sub-basins within the SMB, namely the Arcadia, Charnock, Coastal, Crestal, and Olympic sub-basins as indicated in Figure 6-1 (Metropolitan Water District of Southern California, 2007).

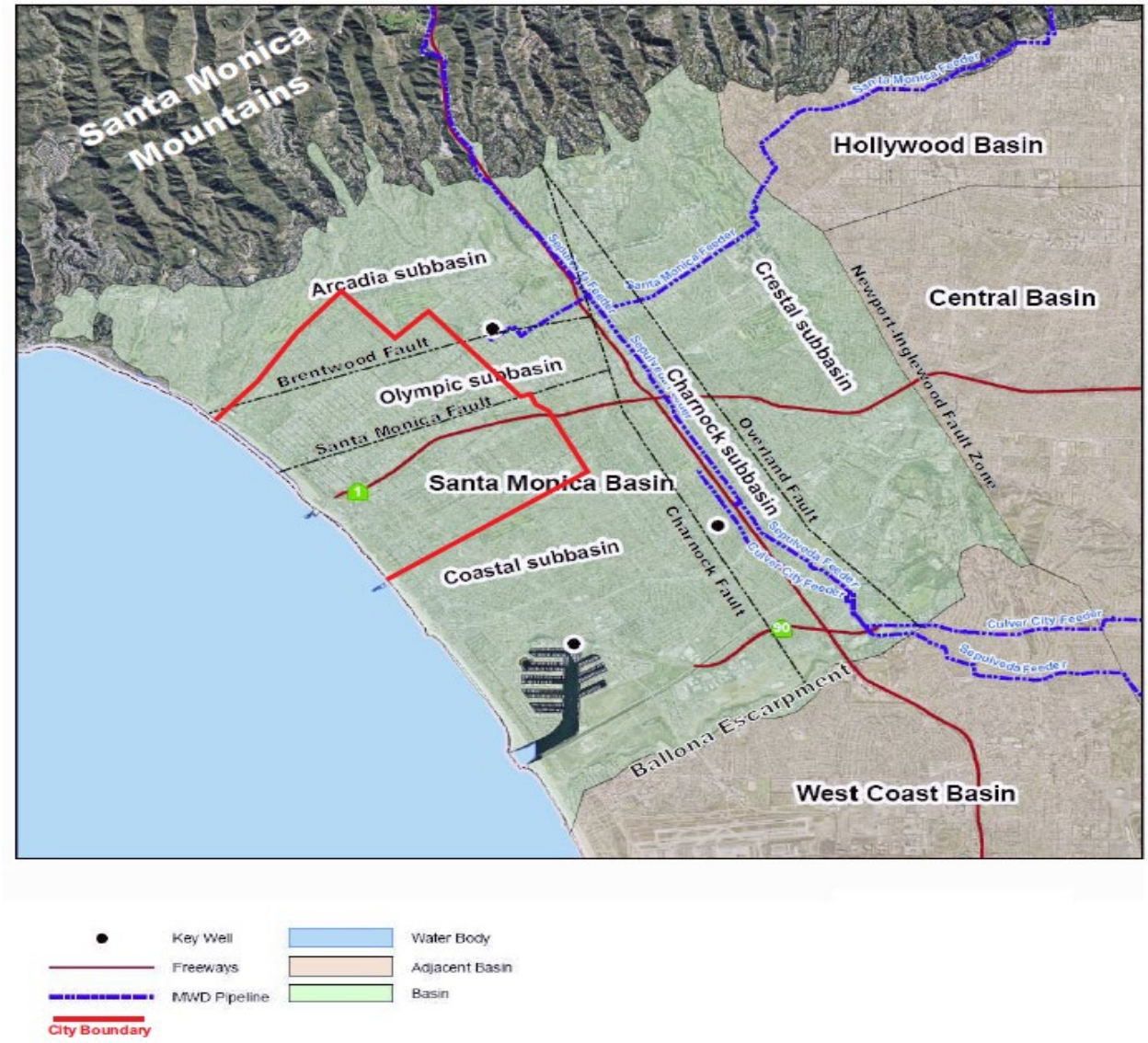


Figure 6-1. Santa Monica Basin and Sub-Basin Boundaries

Currently, the City obtains its local groundwater via the Charnock, Olympic, and Arcadia sub-basins. Table 6-3 below provides the total raw groundwater pumped from the

respective sub-basins from 2016 to 2020. Please note the groundwater production figures summarized in Table 6-3 are for raw groundwater extracted for treatment. A brief description of each groundwater sub-basin is provided in the subsequent sections below.

Table 6-3. Summary of Groundwater Volume Pumped (Acre-Feet)[1]

GROUNDWATER SUB-BASIN	2016	2017	2018	2019	2020
Arcadia	698	707	514	697	366
Charnock	8,311	7,585	7,993	7,882	5,442
Olympic	1,992	1,720	1,487	1,463	568
Total	**11,001**	**10,013**	**9,994**	**10,042**	**6,400[2]**

[1]Numbers summarized below are for raw groundwater extracted for treatment at the City's water treatment facility, which has a recovery of 75-80 percent.

[2]Local groundwater production in 2020 was impacted by unforeseen outages in four groundwater wells that accounted for approximately 40% of the total capacity and supply chain issues as a result of the COVID-19 pandemic.

6.2.1.1 Charnock Sub-basin (Charnock Well Field)

The Charnock well field, located in the Charnock Sub-basin, consists of five groundwater wells: Charnock 13, Charnock 16, Charnock 18, Charnock 19, and Charnock 20. The well field is the most productive of the City's three well fields and majority of the current operating groundwater wells were installed in the 1980s, with the exception of Charnock 20 which was replaced in 2012. The Charnock Well Field is located in the City of Los Angeles and is the site of the Windward School, a private school which leases the property from the City of Santa Monica. Under normal operating conditions, groundwater production from the Charnock well field averages approximately 8,000 AFY. Minimum and maximum groundwater withdrawals have been: 0 AFY in the 13-year period 1997-2009, inclusive, which was caused by problems relating to third party groundwater contamination at and near this well field; and 8,377 AF in 2014.

In the mid-1990s, while testing its groundwater, the City discovered contamination of its groundwater in the form of the gasoline additive Methyl Tertiary Butyl Ether (MTBE). Years earlier, MTBE had been added to gasoline as part of the state of California's Clean Air Act. As a result, in 1996 the City shut down its Charnock wells while an investigation into MTBE began.

After some investigation, the City discovered that MTBE added to gasoline had leaked from underground storage tanks at gas stations and from gasoline pipelines. Many gas stations and pipelines surrounded the City's water wells, which provided numerous potential sources for MTBE leaks. Once it escaped, MTBE readily traveled through soil and into the groundwater aquifers where it bonded almost completely with the water. Under natural

conditions, MTBE biodegrades slowly, if at all. Eventually, MTBE was banned as a gasoline additive in California at the end of 2002.

In 2006, the City reached an agreement with the parties responsible for the MTBE contamination to restore the Charnock well field so that it could once again be a viable drinking water source. This restoration came in 2010 in the form of a new Charnock Water Treatment Facility and upgrades to the City's existing Arcadia Water Treatment Plant. The Charnock Water Treatment Facility uses greensand filtration and granular activated carbon (GAC) to treat water from three contaminated wells and blended with the two non-contaminated wells in the Charnock well field. Treated water from the Charnock Water Treatment Facility is then sent approximately 3.5 miles through a pipeline to the Arcadia Water Treatment Plant for additional treatment including RO and aeration as part of the multi-barrier treatment process to produce high quality drinking water. The City continues to monitor water quality in the Charnock well field through a groundwater monitoring program under the oversight of the Division of Drinking Water (DDW).

Since 2016, the average groundwater extracted from the Charnock well field was about 7,440 AFY, below the average 8,000 AFY under normal operating conditions. This decrease was due to groundwater wells being placed offline for maintenance. Four out of the five wells are over 30 years old, two of which have liners installed to prevent sand migration into the wells which adversely impacts water quality. While effective in keeping sand out of the well, installation of a screen also decreases a well's pumping capacity. To help increase groundwater production capacity from the well field, the City is considering replacing two of the wells to provide added supply reliability and resiliency in the near future.

6.2.1.2 Olympic Sub-basin (Olympic Well field)

The Olympic well field is located in the Olympic Sub-basin along Olympic Boulevard at the eastern end of the City. There are currently two groundwater production wells operating in the well field: Santa Monica 3 (SM-3) and Santa Monica 4 (SM-4). The well field is the second most productive of the City's three well fields. Under normal operating conditions, groundwater production from the Olympic well field averages about 2,500 AFY. The minimum annual groundwater production from this well field was 385 AF in 2004, when it was limited due to third-party contamination; its largest annual production volume was 3,176 AF in 1995.

Like Charnock, the Olympic well field has also experienced periods of regulatory limitations and mechanical problems which have affected groundwater production rates and volumes. The well field is in an area previously occupied by several industries. Many of these industries used chlorinated solvents and other industrial chemicals. Releases from these industrial operations resulted in the presence of volatile organic compounds (VOCs) and other organic compounds, including trichloroethylene (TCE), tetrachloroethylene (PCE), and carbon tetrachloride (CTC), which have limited groundwater usage in the well field. Examples of operational limitations include restricted production in 2003-2004 due to

nearby leaking underground fuel storage tanks. More recently, new regulations adopted in December 2017 for 1,2,3-trichloropropane (1,2,3-TCP) and notification levels for 1,4 Dioxane have also limited groundwater extractions from the well field. Since 2016, the average groundwater extracted from the Olympic well field was about 1,450 AFY, well below the 2,500 AFY average during normal operating conditions.

6.2.1.3 Arcadia Sub-basin

The Arcadia sub-basin has historically been the least productive of the three sub-basins utilized by the City. There are currently three groundwater production wells in the Arcadia sub-basin: Arcadia 4, Arcadia 5, and Santa Monica 1 (SM-1). Arcadia 4 and 5 are located and treated at the Arcadia Water Treatment Plant. SM-1 is located in a median along San Vicente Boulevard and is sent directly into the distribution system after it is disinfected at the well head site. Under normal operating conditions, groundwater production from the Arcadia sub-basin averages about 700 AFY. By way of comparison, the normal operating averages for the Charnock and Olympic sub-basins are 8,000 and 2,500 AFY, respectively.

6.2.1.4 Coastal Sub-basin

The Coastal sub-basin is not currently utilized by the City for its water supply and the available supply here is a part of the City's groundwater resiliency reserves. The City completed an exploratory water supply well in the Coastal sub-basin at the Santa Monica Airport (Airport 1). The estimated production rate of this well is approximately 300 gpm. The exploratory well is not yet equipped for production and is undergoing water quality investigations and feasibility analysis. The City currently does not have a timeline to develop this sub-basin.

6.2.1.5 Crestal Sub-basin

There are currently no plans to explore the Crestal sub-basin as it lies entirely outside of City limits, and the City does not have ownership or access to any potential well locations.

6.2.2 Sustainable Groundwater Management Act of 2014

Prior to 2014, there have been several scientific literature reviews performed to assess potential groundwater sustainable yield levels. In 2018, an Updated Preliminary Study of the Sustainable Yield of the Groundwater Sub-basins Within the Santa Monica Basin (Richard C. Slade & Associates LLC, June 2018) was performed utilizing additional data obtained from recently constructed wells and exploratory borings completed by the City. The study estimated the sustainable yield of the SMGB to be between 11,800 AFY and 14,725 AFY (see Table 6 4).

Table 6-4. 2018 Sustainable Yield Estimate (Richard C. Slade & Associates LLC, June 2018)

GROUNDWATER SUBBASIN	LOWER LIMIT (AFY)	UPPER LIMIT (AFY)	PREVIOUS STUDIES (AFY)
Arcadia	870	920	2,000
Charnock	6,410	8,080	4,420 to 8,200
Olympic	2,360	3,145	3,275
Coastal	1,160	1,450	4,225
Crestal	NA	NA	2,000
Subtotals:	*10,800*	*13,595*	*15,920 to 19,700*
ICF Recharge Factor:	1,000	1,130	NA
Total:	*11,800*	*14,725*	*15,920 to 19,700*

In May 2017, the Cities of Santa Monica, Los Angeles, Beverly Hills, Culver City, and Los Angeles County signed a Memorandum of Understanding (MOU) to form the SMBGSA. The SMBGSA is tasked with implementing an ongoing sustainable groundwater management program for the SMGB in conformance with California's Sustainable Groundwater Management Act (SGMA) of 2014. A key piece of this program is the development of a GSP. The GSP will be the first comprehensive groundwater assessment and management plan specific to the SMB, which has been identified as a medium-priority groundwater basin by the California DWR. The SMBGSA is required to provide a description of the sustainable management criteria that will be used for the basin. As part of the GSP development, sustainable management criteria (e.g., sustainable yield) and interfaces with neighboring groundwater basins (e.g., West Coast Basin and Central Basin) for the SMB will be assessed. The GSP will provide the City with a road map to refine sustainable management practices and identify future studies for the SMB. The SMBGSA must submit its GSP to the DWR by January 31, 2022.

Even before the GSP effort began, the City realized the importance of having a strategy to provide a sustainable water supply. The City Council directed the development of a Sustainable Water Master Plan (SWMP) in 2011 and completed in 2014. The SWMP was recently updated in 2018 that refined the pathway for the City to achieve water self-sufficiency by leveraging conservation, alternative water supplies, and local groundwater supplies in a sustainable manner. The City is in the process of implementing various water supply projects identified in the 2018 SWMP that would provide additional water supply through a combination of alternative water resources and advanced treatment technologies. Additional details of these projects in provided in the Future Projects section below.

6.2.3 Imported Water Supply

The City currently purchases imported water from MWD to supplement its local water supplies. The City is one of the founding members of MWD and has access to imported water from the Colorado River and the Sacramento-San Joaquin River Delta in Northern California. These two water systems, own and operated by MWD, provide Southern California with over 2 MAF of water annually. A brief discussion on each of these two imported water sources and its delivery network is provided below.

As a wholesale agency, MWD distributes imported water to its 26 member agencies throughout Southern California. MWD also works with member agencies to utilize various management tools including water exchanges, transfers and conjunctive use programs for local groundwater basins. The City is one of 15 Retail agencies served by MWD and receives imported water at two locations: the Arcadia WTP and the Charnock WTP. Both of these connections are 24 inches in size and are capable of serving 100 percent of the City's water needs. The connections maintain a hydraulic grade capable of direct service to all three (3) pressure zones within the City's service area. The City's Tier 1 limit from MWD is 7,406 AFY for the past five years (2016-2020) and the City has been well under this limit in the past 10 years since the Charnock Well Field Restoration Project was completed in 2010 to restore local groundwater supplies. A brief overview of the source of the imported water supplies is provided below.

6.2.3.1 Colorado River

The Colorado River supplies several states with a valuable source of water, including Colorado, Utah, Nevada, Arizona, & California. Approximately 40 million people are dependent on water from the Colorado River for agricultural, industrial, or domestic needs. From a State legislative act in 1929, California's allotment from the Colorado River is about 4.4 MAF annually and is used for agricultural and urban uses with approximately 3.85 MAF used for agriculture in Imperial and Riverside Counties. The remaining unused portion, about 600,000 - 800,000 AF, is used for urban purposes in MWD's service area. MWD was established to obtain an allotment of Colorado River water, and its first mission was to construct and operate the Colorado River Aqueduct.

The Colorado River Basin has been experiencing a prolonged drought since 2000. During this time, the Colorado River Basin has experienced its lowest 16-year period inflow in over 100 years and storage in the system has declined from full to about half of capacity. While flows returned to near normal conditions during 2008-2010, drought returned in 2012 with flows in 2012 being among driest years in history.

6.2.3.2 Bay Delta

In addition to the Colorado River, the Sacramento-San Joaquin River Delta provides a significant amount of supply annually to Southern California. The Delta is located at the

confluence of the Sacramento and San Joaquin Rivers east of the San Francisco Bay and is the West Coast's largest estuary.

The Delta is often considered the nexus of California's statewide water system. About half the total river flow in the state passes through this region, from which water is exported to the San Joaquin Valley, Southern California and portions of the Bay area to supply some 1,130,000 acres of farmland and 23 million people in central and Southern California. The Delta provides an estimated 7 MAF of water per year, of which about 100,000 AF are exported to the San Francisco Bay Area, 1.7 MAF are used locally, and over 5 MAF are exported to the San Joaquin Valley, coastal Central and Southern California via the State Water Project.

6.2.4 Aqueduct Systems

In order to provide Southern California imported water, two separate aqueduct systems (one for each source of supply) are utilized to obtain supplies. These two aqueduct systems convey water from each source into separate reservoirs whereupon the water is pumped to one of several treatment facilities before entering MWD's distribution system. One of these aqueduct systems is known as the Colorado River Aqueduct (CRA), and the other is known as the California Aqueduct or the State Water Project (SWP). The CRA is managed by MWD and the SWP is managed by DWR.

The idea for the CRA initially began in the early 1920s. As a result of the growing water needs of the Los Angeles area, MWD was formed in 1928. The CRA was considered to be the first order of business shortly after MWD's incorporation. MWD initially considered eight different routes for the CRA, but ultimately the existing route was chosen since it was the safest and most economical. Construction began in 1933 after a $220 million bond was approved in 1931. The CRA is 242 miles long and consists of open channels, tunnels, pipeline, two reservoirs, and five pumping stations. At the pumping stations, water is lifted in some cases by over 400 feet in order to account for the elevation differences. The CRA carries water from the Colorado River at the Parker Dam to Lake Matthews.

In addition to the CRA, MWD receives water from Northern California via the SWP. Operated by DWR, the SWP is 444 miles long water storage and delivery system of reservoirs, aqueducts, power-plants and pumping plants and carries water from the Delta to Southern California and is operated by DWR. Its main purpose is to store water and distribute it to 29 urban and agricultural water suppliers, also known as "contractors" in Northern California, the San Francisco Bay Area, the San Joaquin Valley, the Central Coast, and Southern California. Of the contracted water supply, 70 percent goes to urban users and 30 percent goes to agricultural users.

The State of California DWR and MWD signed the first water supply contract in 1960. The first SWP water deliveries were made in 1962, two years after construction began. Today 29 agencies have long-term water supply contracts with DWR. The service areas of these

long-term water supply contractors vary widely in size, location, climate, and population. The contractors' uses for SWP water also differ. In the San Joaquin Valley, SWP water is used primarily for agriculture; in the Feather River area, San Francisco South Bay, the North Bay areas, and in Southern California, SWP water is used primarily for urban and industrial needs. Today, the SWP includes 34 storage facilities, reservoirs and lakes; 20 pumping plants; 4 pumping-generating plants; 5 hydroelectric power plants; and about 701 miles of open canals and pipelines.

The previously mentioned aqueducts supply Southern California with a significant amount of its water and are crucial to its sustainability. In addition to these two water systems, there are also several other aqueducts that are vital to the State, including the Los Angeles Aqueduct (managed by the Los Angeles Department of Water and Power).

6.3 OVERVIEW OF WASTEWATER COLLECTION SYSTEM AND RECYCLED WATER SUPPLY

The City's current non-potable water supply is provided through dry weather urban runoff captured and treated at the SMURRF. The City is currently expanding its recycled water supply through the implementation of the Sustainable Water Infrastructure Project (SWIP) that will leverage municipal wastewater, dry weather urban runoff, and stormwater as supplies. A description of the City's wastewater collection system, SMURRF, SWIP, recycled water distribution, and recycled water coordination efforts is provided below.

6.3.1 Wastewater Collection System

The City's wastewater system includes approximately 152 miles of pipelines, two flow monitoring and sampling stations and one 26 million gallon per day (MGD) pumping station. Net City flows average 12 MGD with total flow (including City of Los Angeles pass-through) averaging 15 MGD. Wastewater generated in the City is currently conveyed to the City of Los Angeles' Hyperion Treatment Plant for treatment, please refer to Table 6-5 for wastewater collected within the City's service area for 2020. The wastewater treatment system at the Hyperion Treatment Plant consists of primary sedimentation and high-purity oxygen secondary treatment and is operated by the City of Los Angeles, Bureau of Sanitation. A small tertiary treatment system is available at the Hyperion Treatment Plant that provide reuse water for in-plant use. The City of Los Angeles is currently working on upgrading the Hyperion Treatment Plant to recycle 100% of treated water by 2035.

Table 6-5. Wastewater Collected Within Service Area in 2020

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?
Add additional rows as needed						
City of Santa Monica	Metered	11,064 AFY	City of Los Angeles	Hyperion Treatment Plant	No	No
Total Wastewater Collected from Service Area in 2020:		11,064 AFY				

6.3.2 Santa Monica Urban Runoff Recycling Facility

In 2001, the City began operating the SMURRF and treat dry-weather urban runoff that was previously discharged into Santa Monica Bay from the Pier and Pico-Kenter storm drains. The SMURRF was funded by the cities of Santa Monica and Los Angeles, a State Water Resources Control Board loan, the Metropolitan Water District Local Resources Program, and federal ISTEA and Los Angeles County Proposition "A" grants. It is operated by Santa Monica, though operating costs and revenues are shared jointly with the City of Los Angeles, as a Best Management Practice (BMP) facility. Treated water from SMURRF is sent through a City-wide non-potable water distribution system that serves parks, medians, Woodlawn Cemetery, and dual-plumbed buildings for toilet flushing. The non-potable water is also used by City operations for street sweeping, sewer jetting, and pressure washing.

The non-potable water supply produced by SMURRF from 2016 to 2020 is summarized in Table 6-6. On average, the SMURRF provides about 95 AF of non-potable supply. Because SMURRF largely supplies non-potable water for landscape irrigation, lower usage in 2019 was likely due to higher than normal rainfall that year (over 21 inches), while the lower usage in 2020 was probably due to COVID-19 impacts.

Table 6-6. Summary of Non-Potable Water Use from SMURRF (2016-2020)

	2016	2017	2018	2019	2020
Non-Potable Water Use (AF)	89	98	95	71	57

To further improve beach water quality near the Santa Monica Pier, the City recently completed a 1.6 million gallon (MG) stormwater harvesting tank to capture urban and stormwater runoff from the Pier storm drainage area in 2018. The tank, known as the CBI

tank, is designed to capture up to an 85th percentile rain event. As a result, the CBI tank also allows for the beneficial reuse of stormwater that was previously wasted to the ocean and used as an additional source of supply to the SMURRF. Beneath the tank, there is also a network of brackish groundwater infiltration gallery that could provide additional supplemental source of supply to the SMURRF to maintain production capacity when urban and stormwater runoff is unavailable.

With a maximum annual average production capacity of 560 AFY, the SMURRF has been operating well below capacity over the last five years due to limited and inconsistent urban and stormwater runoff supplies (see Table 6-7 for comparison). As the community has become more conscious about water use over the years and the City has stepped up its water waste enforcement, the amount of dry-weather urban runoff from activities such as over irrigation that supplies the SMURRF has also decreased. To help address this issue, the City has begun upgrades at the facility, including the addition of a reverse osmosis skid, as part of the SWIP described below. The reverse osmosis addition at SMURRF would provide treatment for the brackish groundwater beneath the CBI tank, thereby providing a consistent source of supplemental supply when dry weather runoff or stormwater is not available. Initially, treated water from the upgraded SMURRF would continue to be distributed for non-potable uses. Ultimately, the SMURRF would produce treated water to meet diluent water requirements outlined under Title 22 for a Groundwater Replenishment Reuse Project (GRRP) and would be injected to augment local groundwater supplies.

Table 6-7. 2015 UWMP Recycled Water Use Projection Compared to 2020 Actual

USE TYPE	2015 UWMP PROJECTION FOR 2020	2020 ACTUAL USE
Landscape irrigation (excludes golf courses)	560	57
Total	560	57

Notes: Upgrades to the SMURRF are in progress, which will increase SMURRF usage. The upgrades are anticipated to be completed in 2022.

6.3.3 Sustainable Water Infrastructure Project (SWIP)

In 2020, the City began construction of the Sustainable Water Infrastructure Project (SWIP). The SWIP has three basic elements all designed to function as a cohesive and integrated system for the harvesting, treatment and conjunctive reuse of alternative water resources available to the City including stormwater, brackish groundwater, and municipal wastewater. The three SWIP elements include:

- **SWIP Element 1:** upgrade the above-mentioned SMURRF with a reverse osmosis unit capable of treating both captured stormwater and brackish groundwater from the CBI tank for non-potable and future potable reuse (diluent water per Title 22 Groundwater Replenishment Reuse Project requirements).

- **SWIP Element 2** is a new below ground 1 MGD Advanced Water Treatment Facility (AWTF). The AWTF would treat municipal wastewater and urban runoff, when available and up to 30% contribution to the feed water. Treatment will include membrane bioreactors, cartridge filtration, reverse osmosis, ultraviolet advanced oxidation process with chlorine, and chlorine disinfection.
- **SWIP Element 3** is a 1.5 MG stormwater harvesting tank located below ground adjacent to the SWIP AWTF. The tank would capture both dry-weather and stormwater runoff from up to an 85th-percentile rain event. Captured runoff which would then be blended with wastewater for treatment at the SWIP AWTF (Element 2).

The SWIP AWTF will be the City's first wastewater treatment facility and will be able to produce up to 1 million MGD of advanced treated recycled water on average (approximately 10 percent of the City's total wastewater flow). The SWIP AWTF would be a scalping plant that would treat, on average, 1.5 MGD of wastewater to produce advanced treated recycled water. The capacity of the SWIP AWTF is limited by available night-time wastewater flows to maintain production, which could fall under 1 MGD.

The SWIP is anticipated to begin operations toward the end of 2022. Initially, advanced treated recycled water would be used to meet non-potable reuse demands. Ultimately the advanced treated recycled water would also be used to augment the groundwater aquifer at the Olympic well field, providing up to 1,100 AF of recharge capability to the City's groundwater supply. A summary of the City's plans to expand recycled water use is provided in Table 6-8. The City is also exploring the potential for direct potable reuse in the future when regulatory guidelines are available in 2023.

Table 6-8. Methods to Expand Future Recycled Water Use

NAME OF ACTION	DESCRIPTION	PLANNED IMPLEMENTATION YEAR	EXPECTED INCREASE IN RECYCLED WATER USE
New construction	Construction of a new 1 MGD SWIP AWTF	2022	1,100 AFY
Facility upgrade	Upgrade to the existing SMURRF	2022	450 AFY[1]
Total			1,550 AFY

NOTES:

[1] The upgrades at SMURRF will provide a reliable raw water supply for consistent production at the facility's original design capacity (560 AFY).

6.3.4 Recycled Water Distribution System

The City's existing non-potable water distribution system consists of approximately 2.5 miles of recycled water pipeline, which varies from 4 to 12 inches in size. Treated urban runoff from the SMURRF is currently the City's only source of non-potable water and is

used for irrigation at various public parks, including Tongva Park, Memorial Park and Palisades Park, as well as at landscaped areas on City-owned properties, such as Woodlawn Cemetery, City Hall, and various street medians and parkways. Besides irrigation, SMURRF recycled water is also used for toilet flushing at the City's only dual-plumbed building, the Public Safety Facility. In addition, there are four locations used as fill stations for street sweepers, pressure washers and sewer jetting trucks. These fill stations are only available to the City's Operations staff.

The non-potable water distribution will be expanded in the future once the SWIP is completed and more recycled water customers could be added as the SWIP will be operating under a Regional Water Quality Control Board Permit for Waste Discharge and Water Reclamation. At which point, the advanced treated recycled water and diluent water from SMURRF will be used for non-potable and potable reuse – groundwater augmentation via direct injection.

6.3.5 Recycled Water Coordination

The City's existing SMURRF is a joint project between the City and the City of Los Angeles where both parties share the operation cost as well as revenue. The City is also a part of the Greater Los Angeles County (GLAC) Integrated Regional Water Management (IRWM) Group. As part of the GLAC IRWM Plan, the SWIP also serves as a regional project for stormwater capture and treatment as it captures water from a larger tributary area beyond Santa Monica. The SWIP's stormwater harvesting tank would capture urban runoff/stormwater to reduce discharges and improve water quality in the Santa Monica Bay.

The City is also a contracting agency to the City of Los Angeles and with plans to increase recycled water production at the Hyperion Treatment Plant, there could be the potential for the City to coordinate with the City of Los Angeles on future recycled water use from the Hyperion Treatment Plan.

6.3.6 Future Water Projects

On January 25, 2011, Santa Monica City Council directed City staff to develop a SWMP with the goal of meeting 100% of Santa Monica's water demand using local water sources to achieve water self-sufficiency. Recognizing that the City's existing local water source is 100% groundwater and the need to develop a sustainable management strategy, the original 2014 SWMP highlighted the need to develop alternative water supplies in order to manage its groundwater supply in a sustainable manner. The SWMP Update in 2018 refined the pathway to achieve water self-sufficiency and identified various alternative water supply projects to diversify the City's water supply portfolio. To achieve water self-sufficiency, the SWMP proposes replacing imported water purchases through three key components:

Component 1 – Increasing water conservation efforts to permanently reduce water demand.

Component 2 – Developing sustainable and drought resilient alternative water supplies.

Component 3 – Expanding local groundwater production within sustainable yield limits.

With respect to water supply projects (Component 2 and 3 in the SWMP), the following projects are currently being implemented to increase local water supply.

Alternative Water Supply Projects (Component 2)

- **Increase Recycled Water Production.** Upgrade the existing SMURRF as part of the SWIP project to increase recycled water production for non-potable uses in the City and offset imported water purchases from MWD.
- **Recharge Local Groundwater Aquifers.** The SWIP project will provide a sustainable and drought resilient water supply by providing advanced treated recycled water (approximately 1,100 AFY) through a new AWTF to recharge local groundwater aquifers. In return, the aquifer recharge that will be provided by the SWIP will allow the City to maximize groundwater pumping, within sustainable yield limits, from the Olympic Sub-basin.
- **Production Efficiency Enhancement at Arcadia WTP.** Increase overall treated water production through implementation of new high recovery reverse osmosis technology to increase treatment efficiency to greater than 90 percent, adding up to an additional 1,200 AFY of potable water. This will also result in a reduction of RO concentrate discharge to the sewer system.

Expanding Local Groundwater (Component 3)

- **Olympic Well Field Restoration**. The Olympic sub-basin will be restored to full pumping capacity with a new well head treatment system to remove contaminants (e.g., 1,2,3-TCP, 1,4 Dioxane, TCE, and PCE) that are limiting current production. The Olympic Well Field Restoration consists of: 1) equipping two new groundwater wells, 2) construction of a new pipeline to convey the groundwater to the well head treatment facility, and 3) construction of a new Olympic AWTF to remove contaminants from the Olympic Well Field before it is sent to the City's Arcadia WTP.
- **Arcadia WTP Expansion**. The City's Arcadia WTP is a brackish groundwater desalter that currently has a rated raw water treatment capacity of 11,300 AFY or 10 MGD and produces approximately 9,900 AFY (8.9 MGD) of treated water. To accommodate the production efficiency enhancement project and additional groundwater flows from the Olympic Well Field Restoration Project, the Arcadia WTP will be expanded to its ultimate raw water treatment capacity of 14,700 AFY or approximately 13 MGD.

These local water supply projects, as outlined in the 2018 SWMP Update, were intended to replace imported water use within the City and is not to increase the overall water supply.

A summary of the expected increase in water supply from these projects are summarized in Table 6-9 and total supply availability is summarized in Table 6-10.

In addition to the water supply projects summarized in Table 6-9, other considerations on future water supply projects are listed below.

- Direct Potable Reuse. The City will be assessing the feasibility of implementing direct potable reuse – raw water augmentation in the future once guidelines from the Division of Drinking Water is made available in 2023.
- Seawater Desalination. Although the City is in close proximity to seawater, the City does not have any plans currently for seawater desalination.
- Climate Change Impact Analysis. One of the key objectives in the City's SWMP was to develop a diverse and drought resilient water supply to address climate change impacts on the City's water supply. In addition to the SWMP, the City is currently refining its sustainable yield analysis and climate change impact analysis on its groundwater supply through the GSP effort discussed previously in this Section.

Table 6-9. Expected Future Water Supply Projects or Programs

NAME OF FUTURE PROJECTS OR PROGRAMS	JOINT PROJECT WITH OTHER SUPPLIERS?	DESCRIPTION	PLANNED IMPLEMENTATION YEAR	PLANNED FOR USE IN YEAR TYPE	EXPECTED INCREASE IN WATER SUPPLY TO SUPPLIER
SWIP	No	Advanced treated recycled water from the SWIP will be used for non-potable and potable reuse - groundwater augmentation via direct injection.	2022	All Year Types	1,100 AFY
Olympic Well Field Restoration	No	A new advanced water treatment facility will allow for increased production from the Olympic Well Field. Total production will be approximately 3,100 AFY.	2023	All Year Types	1,000 AFY[1]
Production Efficiency Enhancement of Arcadia WTP	No	New high recovery reverse osmosis retrofit will increase the overall production efficiency of the brackish groundwater desalter from about 80% currently to 90% or greater.	2023	All Year Types	900 – 1,200
Arcadia WTP Expansion	No	Existing treatment equipment will be upgraded to increase the treatment capacity of the Arcadia Water Treatment Plant.	2023	All Year Types	N/A[2]

Notes:

1 The Olympic Well Field Restoration Project will increase overall pumping to 3,200 AFY. The City currently pumps approximately 1,100 AFY and the increase in water supply is partially captured in the SWIP groundwater recharge.

2 Increase in total water supply has already been accounted for in the Olympic Well Field Restoration and Production Efficiency Enhancement Projects

Table 6-10: Summary of Projected Available Water Supply

WATER SUPPLY	ADDITIONAL DETAIL ON WATER SUPPLY	PROJECTED WATER SUPPLY (ACRE-FEET)			
		2025	2030	2035	2040
		REASONABLY AVAILABLE VOLUME	REASONABLY AVAILABLE VOLUME	REASONABLY AVAILABLE VOLUME	REASONABLY AVAILABLE VOLUME
Groundwater (not desalinated)	SM-1	400	400	400	400
Desalinated Water - Groundwater	Arcadia, Charnock, Olympic	10,260	10,260	10,260	10,260
Purchased Imported Water	MWD	7,406	7,406	7,406	7,406
Recycled Water	SMURRF	560	560	560	560
Total		18,626	18,626	18,626	18,626

Notes:The Purchased Imported Water supply is the City's Tier 1 allotment with the Metropolitan Water District of Southern California and is available to supplement the local water supply as needed (e.g., groundwater contamination, drought years, etc.). However, the City intends to maximize its local supplies first to be water self-sufficiency to the extent possible and minimize reliance on imported water supplies.

6.4 ENERGY INTENSITY

The City of Santa Monica is using the Total Utility Approach (B) to report the energy intensity of its potable water production operations using the 2019 calendar year as the Reporting Period.

In 2019, the City's electricity meters that serve the City's water system totaled 16,015,500 kWh. Energy dedicated to potable water production totaled 14,924,506 kWh with 13,061 AF of water entering the potable water production process and being distributed for use. The estimated Energy Intensity is approximately 1,142.7 kWh/AF. Please see refer to Table 6-11 and Table 6-12 as well as narratives provided below for details on the City's water supply Energy Intensity.

Table 6-11. Summary of Energy Intensity for Santa Monica (Appendix F, Table 0-1B)

Urban Water Supplier:	City of Santa Monica
Water Delivery Product	Retail Potable Deliveries

(If delivering more than one type of product use Table O-1C)

TABLE O-1B: RECOMMENDED ENERGY INTENSITY - TOTAL UTILITY APPROACH

Start Date for Reporting Period	1/1/2019	**Urban Water Supplier Operational Control**		
End Date	12/31/2019			
		Sum of All Water Management Processes	**Non-Consequential Hydropower**	
		TOTAL UTILITY	**HYDROPOWER**	**NET UTILITY**
Volume of Water Entering Process (AF)		13061	0	10647
Energy Consumed (kWh)		14924506	0	14924506
Energy Intensity (kWh/AF)		**1142.7**	**0.0**	**1142.7**

Quantity of Self-Generated Renewable Energy

0 kWh

Data Quality *(Estimate, Metered Data, Combination of Estimates and Metered Data)*

Metered Data

Data Quality Narrative:

See Section 6.4.1 below.
DWR guidance: Provide brief narrative documenting the source and quality of the data entered in Table 0-1B. List assumptions and methods used to complete the energy intensity calculations.

Narrative:

See Section 6.4.2 below.
DWR guidance: Provide brief narrative for each water supply describing water management processes in which energy is consumed or produced.

Table 6-12. 2019 Energy Data for Water Production

LOCATION	UTILITY	WATER PRODUCTION PROCESS(ES)	WATER SUPPLY	FACILITY DESCRIPTION	KWH
11375 Westminster Ave	LADWP	Extract & Divert Treatment Conveyance	Local Groundwater: Charnock Sub-basin	Charnock: 5 groundwater wells with treatment plant	6,319,200
1252 Capri Dr (Riviera Reservoir)	LADWP	Place into Storage	na	Riviera Reservoir: Recirculation pump and valving	178,536
1228 S Bundy A	LADWP	Extract and Divert Treatment Distribution	Local Groundwater: Arcadia Sub-basin + Imported	Arcadia: 2 groundwater wells + Arcadia Water Treatment Plant (brackish groundwater desalination facility with RO)	4,167,840
1228 S Bundy B	LADWP				2,959,057
				LADWP Water System SUBTOTAL	**13,624,633**

KWH	UTILITY	WATER PRODUCTION PROCESS(ES)	WATER SUPPLY	FACILITY DESCRIPTION	
Ocean/Pacific	SCE	Extract & Divert	na	SM Well Salt Water: Pump station (no longer in operation but still connected to the grid)	2,158
1880 San Vicente Blvd.	SCE	Extract & Divert Distribution	Local Groundwater: Arcadia Sub-basin	Well SM-1: Pump station + fluoride station	163,935
Centinela/Olympic	SCE	Extract & Divert Conveyance	Local Groundwater: Olympic Sub-Basin	Well SM-3: Pump station + chlorine dosing	372,139
2930 Olympic Blvd.	SCE	Extract & Divert Conveyance	Local Groundwater: Olympic Sub-Basin	Well SM-4: Pump station + chlorine dosing	761,641
1898 Ocean Front Walk	SCE	Extract & Divert	Recycled Runoff: SMURRF NON-POTABLE	Pico Kenter Storm Drain: Pump station, stormwater diversion to SMURRF.	33,414
1623 Appian Way	SCE	Treatment Distribution	Recycled Runoff: SMURRF NON-POTABLE	Moss Ave. Pump Station: Wastewater (70%) + SMURRF (30%).	1,057,580
				SCE Water System SUBTOTAL	**2,390,867**
				Water System: Total Energy	**16,015,500**
				Less Non-Potable (Pico Kenter & Moss Ave.)	-1,090,994
				POTABLE Water System: Total Energy	**14,924,506**

6.4.1 Energy Intensity Data

- **Volume of Water Entering the Process (AF):** The source of the water data entered in Table 6-11 is from flowmeter data recorded in operator logs and well reports for locally supplied groundwater. Please note the number presented represents the raw

groundwater that is pumped and treated, some of which is not recovered as it makes its way through the multi-barrier treatment processes provided at the Charnock and Arcadia Water Treatment Plants. Imported water data was obtained for MWD invoices for purchased water. The total volume entered is a combination of Santa Monica's local extracted groundwater volume (prior to entering the Arcadia treatment process) and imported water purchased from MWD for the calendar year 2019.

- **Energy Consumed:** The sources of the energy data entered in Table 6-11 are from the monthly invoices for 2019 sent to the City by two power utility providers: the Los Angeles Department of Water and Power (LADWP) and Southern California Edison (SCE). See Table 6-12 above for details. Having two power providers is the result of some production facilities located outside of Santa Monica (e.g., Arcadia Water Treatment Plant) and within the City of Los Angeles. The power consumed is measured by meters located at each of the water production facilities and read by their respective utility providers. Power meter numbers and account ID's can be provided upon request.

6.4.2 Water Supply / Water Management Processes Consuming Energy

Below is a summary of each water supply and their respective energy sources. Please see Section 6.2 in this Section for details of each water supply.

6.4.2.1 Groundwater

- **Charnock Sub-basin (Charnock Well Field):** The Charnock well field, located in the Charnock sub-basin, consists of five groundwater wells and is in the City of Los Angeles. Thus, power is provided by LADWP. Associated water management operations that require power include Extract and Divert, Treatment, and Conveyance (to the Arcadia Treatment Plant). Since 2016, the average groundwater extracted from the Charnock well field was about 7,440 AFY, below the average 8,000 AFY under normal operating conditions. This decrease was due to groundwater wells being offline for maintenance.
- **Olympic Sub-basin (Olympic Well field):** The Olympic well field is in the Olympic Sub-basin along Olympic Boulevard at the eastern end of the City. There are currently two groundwater production wells operating in the well field: Santa Monica 3 (SM-3) and Santa Monica 4 (SM-4). Water management operations requiring power (provided by SCE) include Extract and Divert, and Conveyance (to the Arcadia Treatment Plant). The Olympic well field could produce up to 2,500 AFY, but is currently limited due to groundwater contamination.
- **Arcadia Sub-basin:** There are currently three groundwater production wells in the Arcadia sub-basin: Arcadia 4, Arcadia 5, and Santa Monica 1 (SM-1). Arcadia 4 and 5 are located at the Arcadia Water Treatment Plant which is in the City of Los Angeles. Extract and Divert, Treatment, and Distribution operations for these wells and the

treatment plant consume power provided by LADPW. Well SM-1 is located in the City within a median along San Vicente Boulevard and is sent directly into the distribution system after it is disinfected at the well head site. Power consumed is provide by SCE for Extract and Divert and Distribution operations. Under normal operating conditions, groundwater extraction from the Arcadia sub-basin averages about 700 AFY.

6.4.2.2 Imported Water

- **MWD:** The City currently purchases imported water from MWD to supplement its local groundwater supplies. In 2019, the City purchased approximately 3,020 AF of treated water from MWD. The imported water is received at two locations: the Arcadia Water Treatment Plant and the Charnock Well Field.

6.4.2.3 Recycled Water

- **SMURRF:** The City currently captures and treats dry weather urban runoff at the SMURRF to produce non-potable water that is used for irrigation, toilet flushing and City operations (street sweeping, sewer jetting, and pressure washing). Power, provide by SCE, is used to Extract and Divert stormwater from the Pico-Kenter storm drain, and at the SMURRF for Treatment and Distribution. SMURFF power usage is comingled on the same meter as the Moss Ave. Pump Station (MAPS) for wastewater. MAPS is a critical component of the Coastal Interceptor Sewer (CIS), which moves wastewater along the coast from northern Los Angeles, through Santa Monica, and eventually to the City of Los Angeles's treatment plant. Because SMURRF and MAPS do not contribute directly to potable water production, their water volumes and power consumption are not included in the totals for Energy Intensity.

7 WATER SERVICE RELIABILITY

7.1 WATER SERVICE RELIABILITY AND DROUGHT RISK ASSESSMENT

One of the fundamental purposes of preparing an UWMP is to assess a water supplier's ability to reliably serve its customers. To this end, this Section includes two assessments: a Water Service Reliability Assessment and a Drought Risk Assessment (DRA). The Water Service Reliability Assessment looks at the City's service capabilities over a 20-year planning period under three different scenarios: normal, single-dry year, and multiple dry years. In contrast, the DRA assumes a severe drought period lasting for the next five consecutive years (i.e. 2021 to 2025). Both assessments synthesize the analyses performed in previous Sections of the 2020 UWMP including factors affecting water use (Sections 4.1 and 4.2) and those that impact water supply (Sections 6.2.1 and 6.2.2).

7.2 WATER SERVICE RELIABILITY ASSESSMENT

The City completed the 2018 Sustainable Water Master Plan (SWMP) update to enhance reliability and drought resiliency of the City's water supply by developing local water supplies and reducing its reliance on imported water supplies. The water self-sufficiency projects outlined in the 2018 SMWP Update would increase local water supply to replace current imported water purchase (approximately 35% of the City's water supply on average). As originally projected in the 2018 SWMP Update, the City would be able to meet up to 99% of its water demand through local water supplies in 2023 when water self-sufficiency projects are completed. However, a major development since the 2018 SWMP Update was the 2020 Regional Housing Needs Assessment (RHNA) developed by Southern California Association of Governments (SCAG). The RHNA would require the City to plan for approximately 8,873 new housing units in the 8-year period of 2021-2029. The additional new housing units may impact the 2018 SWMP Update goal of achieving 99% water self-sufficiency for the City, due to increased population projects from the new housing units, and is considered below in the water service reliability assessment.

The water service reliability is evaluated by analyzing a water system under the three scenarios below and within the assessment period of 2010 through 2020:

- **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 to the Supplier.
- **Single Dry Year.** The single dry year is the year that represents the lowest water supply available to the Supplier.
- **Five-Consecutive-Year Drought.** The driest five-year historical sequence for the Supplier.

The City obtains its potable water supply from a combination of local groundwater and imported water from MWD. The water service reliability assessment will first consider available imported water from MWD that could be used to supplement the City's local water supplies. As a wholesale water supplier, MWD is also in the process of updating their UWMP, which includes projected water supply and demand.

Based on their analysis, MWD is capable of meeting the City's supplemental water demands for a normal water year, single dry-year, and five consecutive drought years. For the purposes of the Water Service Reliability and Drought Risk Assessments, the lowest MWD Tier 1 allotment (7,406 AFY) available to the City between 2010 and 2020 will be used.

As the City moves towards reducing its reliance on imported water supplies, the City must provide expected water service reliability for a normal year, single-dry year, and five consecutive dry years over a twenty year period for 2025, 2030, 2035, and 2040. For the purpose of the Water Service Reliability and Drought Risk Assessments, the City used the time period of 2010 through 2020 to establish Normal Year, Single Dry-Year, and Multiple Dry-Year to demonstrate its reliability.

Historically, the City's available water supply has been less impacted by drought conditions but more by groundwater contamination. For example, the City's lowest available local groundwater supply occurred in 2004, where only about 544 AF of local groundwater was available due to groundwater contamination at the City's Charnock Well Field that resulted in the entire well field being taken out of production until it was restored in 2010.

The City completed the Charnock Well Field Restoration Project in 2010, which included additional treatment processes such as biological GAC and reverse osmosis. As a result, the local groundwater supply was restored to approximately 8,000 to 10,000 AFY (depending on age and conditions of the wells). Therefore, the period from 2010 through 2020 was selected for the assessments since it is more representative of the City's water supply reliability and drought risk going forward as 2010 established the new baseline for local water supplies. In addition, the 2010-2020 time period also included one of the most severe single-year drought as well as five-consecutive-year drought conditions in the Southern California region.

- Normal Year. The average of the years 2010 through 2020 was used to establish water supply conditions for a normal year.
- Single Dry Year. The year 2020 was used to represent a worst-case single dry year scenario as the groundwater supply available to the City was the lowest annual total during the period of 2010 through 2020.
- Five-Consecutive Dry Years. A running average between 2010 through 2020 was used to establish the five consecutive dry years, which was from 2016 through

2020. The City will use this five-year period for both the Water Service Reliability and Drought Risk Assessments.

A summary of the City's current water supply availability for normal, single-dry, and five-consecutive dry years is provided in Table 7-1. Please note the water supply availability presented in Table 7-1 includes the entire MWD Tier 1 allotment for the City.

Table 7-1. Summary of Current Water Supply Availability for Normal, Single-Dry, and Five-Consecutive Dry Years

YEAR TYPE	BASE YEAR	VOLUME AVAILABLE (ACRE-FEET)	% OF AVERAGE SUPPLY
Normal Year	2010-2020	16,628	100%
Single-Dry Year	2020	12,587	76%
Consecutive Dry Years 1st Year	2016	15,948	96%
Consecutive Dry Years 2nd Year	2017	14,683	88%
Consecutive Dry Years 3rd Year	2018	14,796	89%
Consecutive Dry Years 4th Year	2019	15,034	90%
Consecutive Dry Years 5th Year	2020	12,587	76%

Notes:MWD Tier 1 Allotment was 11,407 AF for 2010-2012, 11,110 AFY for 2013-2014, and 7,406 AFY for 2016-2020.

The City is in the process of implementing additional water supply projects outlined in the 2018 SWMP (see Table 6-9). These projects are scheduled to be completed in 2023 and therefore were included in the water supply reliability assessment for the period 2025 through 2040. For planning purposes, the low-end of the estimated sustainable yield of the Santa Monica Groundwater Basin was also assumed (see Table 6-4). The average supply percentages established in Table 7-1 were then applied to the City's future water supply to determine availability for the normal, single-dry, and multiple dry year scenarios (Table 7-2).

Table 7-2. Summary of Future Water Supply Availability for Normal, Single Dry, and Five Consecutive Dry Years

YEAR TYPE	% OF AVERAGE SUPPLY	GROUNDWATER[1] (ACRE-FEET)	IMPORTED WATER[2] (ACRE-FEET)	TOTAL (ACRE-FEET)
Normal	100%	10,660	7,406	18,066
Single Dry Year	76%	8,102	7,406	15,508
Dry Year 1	96%	10,234	7,406	17,640
Dry Year 2	88%	9,381	7,406	16,787
Dry Year 3	89%	9,487	7,406	16,893
Dry Year 4	90%	9,594	7,406	17,000
Dry Year 5	76%	8,102	7,406	15,508

[1] Includes water loss due to treatment process (i.e. reverse osmosis process at the Arcadia WTP).

[2] MWD Tier 1 Allotment was 11,407 AF for 2010-2012, 11,110 AFY for 2013-2014, and 7,406 AFY for 2016-2020.

Results from the assessment indicate that the City's water supply is capable of meeting potable and non-potable water demand for the normal (Table 7-3), single-dry (Table 7-4), and multiple-dry year scenarios (Table 7-5). A positive value in the "Difference" rows for the three tables indicate sufficient supply is available and a negative "Difference" value indicates a potential supply shortfall compared to demand.

Table 7-3. Projected Water Supply and Demand for Normal Year (Acre-Feet)

	2025	2030	2035	2040
Supply totals	18,626	18,626	18,626	18,626
Demand totals	14,291	15,102	15,177	15,262
Difference	4,335	3,524	3,449	3,364

Table 7-4. Projected Water Supply and Demand for Single Dry Year (Acre-Feet)

	2025	2030	2035	2040
Supply totals	15,508	15,508	15,508	15,508
Demand totals	14,291	15,102	15,177	15,262
Difference	1,217	406	331	246

Table 7-5. Projected Water Supply and Demand for Five-Consecutive Dry Years (Acre-Feet)

		2025	2030	2035	2040
FIRST YEAR	Supply totals	17,640	17,640	17,640	17,640
	Demand totals	14,291	15,102	15,177	15,262
	Difference	3,349	2,538	2,463	2,378
SECOND YEAR	Supply totals	16,787	16,787	16,787	16,787
	Demand totals	14,291	15,102	15,177	15,262
	Difference	2,496	1,685	1,610	1,525
THIRD YEAR	Supply totals	16,893	16,893	16,893	16,893
	Demand totals	14,291	15,102	15,177	15,262
	Difference	2,602	1,791	1,716	1,631
FOURTH YEAR	Supply totals	17,000	17,000	17,000	17,000
	Demand totals	14,291	15,102	15,177	15,262
	Difference	2,709	1,898	1,823	1,738
FIFTH YEAR	Supply totals	15,508	15,508	15,508	15,508
	Demand totals	14,291	15,102	15,177	15,262
	Difference	1,217	406	331	246

7.3 DROUGHT RISK ASSESSMENT

Proper water management is essential for safeguarding current and future water supplies and curbing demand especially with the uncertainties of climate change and recurring droughts. New provisions in the California Water Code require urban water suppliers to prepare a Drought Risk Assessment (DRA). While the DRA is based on historical droughts, other factors that may impact water service in the future, such as climate change and regulatory changes, were also considered for the assessment.

7.3.1 Data, Methods, and Basis for Water Shortage Condition

7.3.1.1 Water Use

To perform the DRA, water billing data from 2010 to 2020 were compiled and analyzed to quantify water consumption trends in the City. This timeframe was chosen because it provides insight into recent water use during one of the most severe droughts in the state's history. It also contrasts water usage just before and after 2015, when the City established its Water Conservation Unit (WCU) and entered Stage 2 of its Water Shortage Response Plan (WSRP), and therefore gives a reasonable understanding of how water customers respond during drought conditions.

As shown in Figure 7-1, water usage declined significantly following drought measures implemented in the City in 2015. Water customers in the City have sustained these lower levels despite higher population and the State declaring an end to the drought emergency in 2017. This suggests that the sustained reduction in demand could be attributed to enlightened behavioral changes regarding water conservation. Therefore, for the DRA, it is assumed that water use reductions observed after 2015 will continue over the next five years (i.e. 2021-2025).

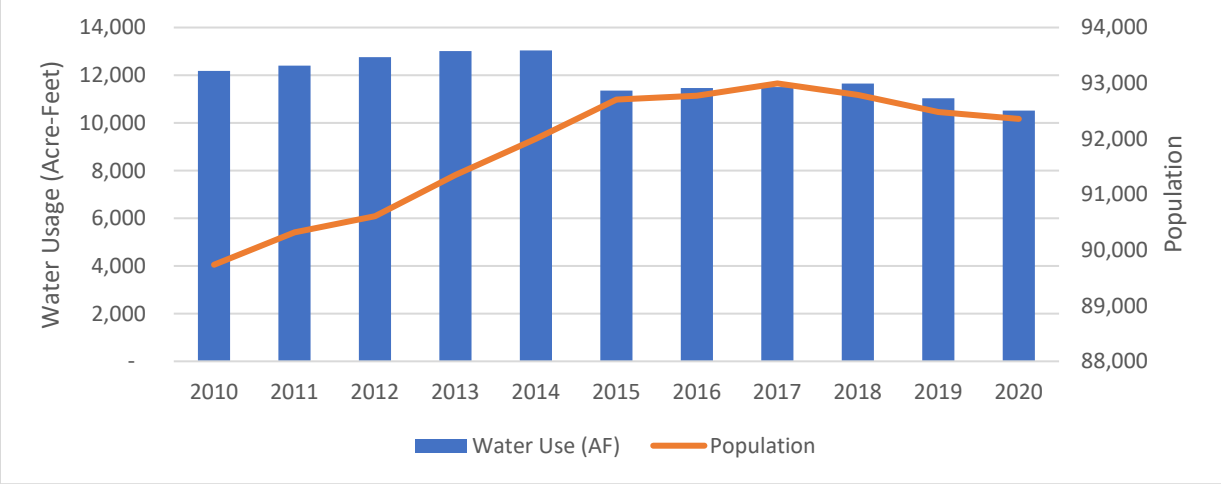


Figure 7-1. Summary of the City's Water Usage Trends from 2010-2020

As recommended by DWR, the City first projected its estimated expected gross water use for the next five years without water shortage actions (known as unconstrained demand). Past water use data shown in Figure 7-1, however, shows that the community is receptive to calls for reductions in water usage. These reductions are accounted as savings benefits in the DRA (Table 7-6).

7.3.1.2 Water Sources

The City's water supply consists of local water resources and imported water from MWD. For the DRA, the lowest MWD Tier 1 allotment for the City from 2010 to 2020, which has remained the same since 2016, is assumed (7,406 AF). This assumption is considered

reasonable due to large reserves MWD has accumulated as a result of regional conservation efforts and several above average wet seasons over the last five years.

For local water resources, the lowest five-year running average for the current water supply from 2010 to 2020, will be used for years 2021-2022 (6,755 AF). This supply is reasonable based on expected operating and groundwater conditions. Starting in 2023, additional water supply from projects that are currently underway and are anticipated to be completed will also be included. For the DRA, the average availability over five dry years will be used (9,359 AF). The additional water supply projects include the following:

- **Recharge Local Groundwater Aquifers.** The Sustainable Water Infrastructure Project (SWIP) will provide a sustainable and drought resilient water supply by providing advanced treated recycled water (approximately 1,100 AFY) through a new AWTF to recharge local groundwater aquifers. In return, the aquifer recharge that will be provided by the SWIP will allow the City to maximize groundwater pumping, within sustainable yield limits, from the Olympic Sub-basin.
- **Production Efficiency Enhancement at Arcadia WTP.** Increase overall treated water production through implementation of new high recovery reverse osmosis technology to increase treatment efficiency to greater than 90 percent, adding up to an additional 1,200 AFY of potable water. This will also result in a reduction of RO concentrate discharge to the sewer system.
- **Olympic Well Field Restoration**. The Olympic sub-basin will be restored to full pumping capacity with a new well head treatment system to remove the contaminants (e.g., 1,2,3-TCP, 1,4 Dioxane, TCE, and PCE) that is limiting current production. The Olympic Well Field Restoration consists of: 1) Equipping two new groundwater wells, 2) construction of a new pipeline to convey the groundwater to the well head treatment facility, and 3) construction of a new Olympic AWTF to remove contaminants from the Olympic Well Field before it is sent to the City's Arcadia WTP.
- **Arcadia WTP Expansion**. The City's Arcadia WTP is a brackish groundwater desalter that currently has a rated raw water treatment capacity of 11,300 AFY or 10 MGD and produces approximately 9,900 AFY (8.9 MGD) of treated water. To accommodate the production efficiency enhancement project additional groundwater flows from the Olympic Well Field Restoration Project, the Arcadia WTP will be expanded to its ultimate raw water treatment capacity of 14,700 AFY or approximately 13 MGD.

7.3.2 Total Water Supply and Use Comparison

As summarized in Table 7-6, the City's water supplies are adequate to meet projected water use under drought conditions over the next five years.

Table 7-6. DRA Projected Water Supplies and Use for 2021- 2025

2021	TOTAL
Gross Water Use	14,345
Total Supplies	14,161
Surplus/Shortfall w/o WSCP Action	(184)
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	2,886
Revised Surplus/(shortfall)	2,702
Resulting % Use Reduction from WSCP action	20%
2022	**TOTAL**
Gross Water Use [Use Worksheet]	15,357
Total Supplies [Supply Worksheet]	14,161
Surplus/Shortfall w/o WSCP Action	(1,196)
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	3,099
Revised Surplus/(shortfall)	1,903
Resulting % Use Reduction from WSCP action	20%
2023	**TOTAL**
Gross Water Use [Use Worksheet]	17,000
Total Supplies [Supply Worksheet]	16,765
Surplus/Shortfall w/o WSCP Action	(235)
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	3,483
Revised Surplus/(shortfall)	3,248
Resulting % Use Reduction from WSCP action	20%
2024	**TOTAL**
Gross Water Use [Use Worksheet]	17,233
Total Supplies [Supply Worksheet]	16,765
Surplus/Shortfall w/o WSCP Action	(468)
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	3,530
Revised Surplus/(shortfall)	3,062
Resulting % Use Reduction from WSCP action	20%

2025	TOTAL
Gross Water Use [Use Worksheet]	17,467
Total Supplies [Supply Worksheet]	16,765
Surplus/Shortfall w/o WSCP Action	(702)
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	0
WSCP - use reduction savings benefit	3,576
Revised Surplus/(shortfall)	2,874
Resulting % Use Reduction from WSCP action	20%

8 WATER SHORTAGE CONTINGENCY PLAN

In addition to the Water Service Reliability and Drought Risk Assessments conducted in Section 7, the City has prepared a Water Shortage Contingency Plan (WSCP) pursuant to legislative changes to the California Water Code's Urban Water Management Planning Act (Section 10632). The City previously prepared a Water Shortage Response Plan, adopted by Santa Monica City Council on January 13, 2015. For consistency with the DWR naming convention, the WSCP replaces the previously adopted Water Shortage Response Plan. New elements required in the WSCP include the following:

- Description of the key components of the City's water supply reliability analysis
- 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
- Locally appropriate "shortage response actions" for each shortage level, with a corresponding estimate of the extent the action will address the gap between supplies and demands. [Water Code Section 10632 (a)(4)]
- Procedures for conducting an annual water supply and demand assessment with prescribed elements. Under Water Code Section 10632.1, urban water Suppliers are required to submit, by July 1 of each year, beginning in the year following adoption of the 2020 UWMP, an annual water shortage assessment report to the California DWR. [Water Code Section 10632 (a)(2)]
- Communication protocols and procedures to inform customers, the public, and government entities of any current or predicted water shortages and associated response actions. [Water Code Section 10632 (a)(5)]
- Monitoring and reporting procedures to assure appropriate data is collected to monitor customer compliance and to respond to any state reporting requirements. [Water Code Section 10632(a)(9)]
- A reevaluation and improvement process to assess the functionality of its WSCP and to make appropriate adjustments as may be warranted. [Water Code Section 10632(a)(10)]

The WSCP is a standalone document and is provided as Appendix B.

9 DEMAND MANAGEMENT MEASURES

9.1 EXISTING DEMAND MANAGEMENT MEASURES

The City has adopted several plans and ordinances to implement water conservation programs and policies including the Sustainable City Plan, the Sustainable Water Master Plan, the Water Shortage Response Plan, the Green Building Ordinance and the Water Conservation Ordinance. The City acknowledges that efficient water use is a vital component of its current and future water planning and operations policies. The following sections describes the conservation programs and policies implemented by the City.

9.1.1 Water Waste Ordinances

Santa Monica has a long-standing (since 1993) "No Water Waste" Ordinance (SMMC 7.16.020) which prohibits irrigation between 10:00 am and 4:00 pm, prohibits the watering down of paved or hard-surfaced areas, prohibits irrigation runoff, prohibits the filling of decorative fountains, prohibits the draining and re-filling of pools, requires water leaks to be repaired immediately, prohibits the washing of vehicles with a running hose, and mandates that restaurants serve water only upon request. The Water Conservation Unit staff (see section 9.2.6) assesses penalties in accordance with provisions of the ordinance and assists residents with voluntary compliance.

In addition, the City has a Bay Saver Fee Ordinance (SMMC 7.12.030), which assesses a conservation incentive fee on residential water bills until water wasting fixtures are replaced with water conserving fixtures. The WCU staff conducts a free water saving assessment to verify Bay Saver compliant water efficient fixtures have been installed prior to removing the fee from the customer's water bill. (SMMC 7.12.030)

Lastly, the City has a Good Housekeeping Ordinance (SMMC 7.10.040), which includes anti-runoff provisions for irrigation and a prohibition of washing down paved areas with potable water.

9.1.2 Metering

The City has all service connections metered which includes residential, commercial, institutional, fire service and dedicated landscape irrigation. The City is fully metered and in compliance with Water Code Section 525. All of the meters are manually read on a maximum 60-day cycle. The City maintains a robust system of meter integrity by individually testing every meter, per AWWA guidelines, before being placed into service. The testing is conducted by the Water Resources Metering Group and all documentation is retained electronically. Any end user has the option of challenging the integrity of their water meter at a nominal cost for testing. In the event the meter is found to be out of specification the testing cost is waived.

The Water Resources Metering Group has evaluated multiple Advanced Metering Infrastructure (AMI) technologies which has included radio and cellular services. One pilot project included the installation of over 500 Aclara meter transmission units (MTU's). The signals were transmitted via Sothern California Gas data collector units (DCU's). The proof of concept showed that radio signals were a viable option and could be transmitted utilizing a shared network. Currently, the City is conducting field evaluations of cellular technology utilizing Badger MTU's.

The City is committed to moving forward with the implementation of AMI. Currently, approximately 25% of the installed meters are AMI ready. All new meters are sourced AMI ready and compatible for either radio or cellular technologies. The City's meter replacement schedule for aging meters is approximately 30 years. The existing AMI compatible meters have been in service for less than six years. The implementation of AMI will accelerate the replacement schedule.

There have been regulations enacted regarding the metering of landscape irrigation. New Residential development projects require dedicated landscape water meters on areas greater than five thousand square feet of irrigated landscape. New Commercial developments require dedicated water meters on landscape areas unless the area is completely contained in a planter(s) or containers. The City has imposed a water meter requirement for all new public landscaped areas.

The City implemented a submetering requirement for all new multi-residential property developments. Currently the City does not monitor the submeters. The intent is to allow property managers the ability to locate and track high usage onsite.

9.1.3 Conservation Pricing

The City adopted its most recent five-year rate structure on January 28, 2020 for years 2020 through 2024. The adopted five-year rate structure for 2020-2024 includes a drought rate structure that could be in effect should conservation increase beyond currently expected levels and the Water Enterprise Fund is still obligated to meet its annual revenue requirements to keep the utility operational and functional. The drought rate structure would only be in effect as directed by City Council when conservation is mandated. The level of conservation mandated will determine the adjusted three-tier water commodity rate structure for the City, which for all customers is summarized in Table 9 1.

Table 9 1. Summary of the City's Drought Rate Structure for 2020-2024.

PERCENT INCREASE TO REV. REQ'T		FY 2019/20	FY 2020/21	FY 2021/22	FY 2022/23	FY 2023/24
		20.00%	18.00%	14.00%	14.00%	14.00%
10%	Tier 1	$3.90	$4.60	$5.24	$5.97	$6.81
	Tier 2	$4.64	$5.48	$6.24	$7.12	$8.11
	Tier 3	$6.80	$8.03	$9.15	$10.43	$11.89
20%	Tier 1	$4.18	$4.93	$5.62	$6.41	$7.31
	Tier 2	$4.98	$5.88	$6.70	$7.64	$8.71
	Tier 3	$7.30	$8.62	$9.82	$11.20	$12.76
30%	Tier 1	$4.55	$5.36	$6.12	$6.97	$7.95
	Tier 2	$5.42	$6.39	$7.29	$8.31	$9.47
	Tier 3	$7.94	$9.37	$10.68	$12.18	$13.88
40%	Tier 1	$5.03	$5.94	$6.77	$7.72	$8.80
	Tier 2	$6.00	$7.08	$8.07	$9.20	$10.49
	Tier 3	$8.79	$10.38	$11.83	$13.49	$15.37
50%	Tier 1	$5.70	$6.75	$7.69	$8.77	$10.00
	Tier 2	$6.81	$8.04	$9.16	$10.45	$11.91
	Tier 3	$9.99	$11.79	$13.43	$15.32	$17.46
60%	Tier 1	$6.74	$7.96	$9.07	$10.34	$11.79
	Tier 2	$8.03	$9.48	$10.81	$12.32	$14.04
	Tier 3	$11.78	$13.90	$15.84	$18.06	$20.59

9.1.4 Public Education and Outreach

A summary of previous and current public education and outreach activities are listed below.

- Conservation Marketing Campaign: An informative, entertaining, and well-received marketing campaign featuring fun, whimsical ways to conserve water (e.g. "Doggy Dishwasher") was created for the most recent drought and was launched in 2015. The campaign promoted the phrase "We Love Santa Monica: Save Water. Show Your Love." on all print and digital collateral, bus banners and outdoor hanging banners. In addition, a water conservation website was created (smgov.net/water) to provide a one-stop online location for water conservation recommendations and all the information for the Sustainable Landscape Rebate program. Elements of this campaign are still in use to continue reinforcement of water conservation.
- Water Use Allowances: Every water customer in the City receives a Water Use Allowance (WUA) uniquely calculated for each billing period. The WUA is clearly indicated in tables and on a graph that compares their usage to the WUA. See Section 9.3.1 for details on the WUA.

- Customer Engagement Online Portal: The City conducted a pilot program with the WaterSmart Customer Engagement online platform from 2017-2020. A new customer engagement portal (Eye on Water) and utility side portal (Badger Beacon) are being deployed as part of the City's AMI pilot of the Badger cellular meter technology.
- Irrigation Reminder Phone Calls: Prior to and during wet weather automatic calls are made to customers encouraging them to turn off their sprinklers.
- Sustainability Digital Newsletters: Water conservation tips, rebates, programs and other water conservation items are communicated regularly through the Office of Sustainability's monthly digital newsletter.
- Social Media: Water conservation is promoted regularly on the City's various social media platforms including Instagram, Facebook, and Twitter.
- City's Seascape Print Newsletters: One issue per year is devoted to Sustainability which highlights water conservation, rebates, programs, etc.
- Print Advertising: Water conservation events, ordinances, and messaging are announced and promoted via local print news outlets including the Santa Monica Daily Press, Santa Monica Observer, Santa Monica Mirror, and the Argonaut.
- Outdoor Banner Advertising: Water conservation events, ordinances, and messaging are announced and promoted via Big Blue Bus banners (inside and outside), bus stop displays, and Big Belly recycling receptacles.
- Water Bill Inserts: Water conservation messaging is occasionally included on inserts included with customer bills.
- Events: The Water Conservation staff "tables" at several public events throughout the year. Tabling involves engaging customers in person to discuss water conservation, provide information print materials and to give away free showerheads, faucet aerators, shower buckets, hose nozzles and toilet dye strips. Most notable of the events is the City's annual Coast festival, an outdoor, open-streets event celebrating community sustainability.
- Donut Delivery: The Water Conservation Unit delivers bagged donuts with attached water conservation print materials to gardeners and landscapers about three times per year. The print materials describe watering restrictions and our landscape rebate programs. This direct contact activity with the people that are actually managing landscapes in the City not only delights, but builds trust and educates about water conservation to reduce water waste and increase participation in our landscape rebate programs.
- Sustainable Landscape Trainings: WCU staff coordinates with the City's Public Works, Airport, and Public Landscape on the installation of sustainable landscapes

and rock/rain gardens for yards and parkways. Trainings are conducted at the City's Airport Demonstration Garden where hundreds of residents have participated in these sustainable landscape trainings since 2015.

- Customer Service: Water Conservation Unit staff engages with customers via phone and email every workday regarding water conservation questions and programs. Approximately 300 phone calls and emails from Santa Monica water customers are received and responded to each year.

In addition to continuing the activities described above, the Water Conservation Unit intends to implement the following measures for future public education and outreach:

- Updated Marketing Campaign: Working with the Office of Sustainability's contracted marketing agency, a new water conservation marketing campaign will be created with messaging aligned with the State's "Making Water Conservation a California Way of Life."
- Customer Engagement Portal: The Water Conservation Unit staff will be ramping up its outreach and support of the Badger Eye on Water customer portal used as the City's AMI pilot program expands. In addition, other customer engagement platforms will be explored for potential implementation.
- AMI Support: The Water Conservation Unit will lead outreach and marketing efforts required for successful AMI implementation when/if this occurs.

9.1.5 Programs to Assess and Manage Distribution System Real Loss

The City has approached managing system water loss by developing a capital improvement program for the replacement of water mains. The program is based on three factors which are used to assess the need for pipeline replacement. This includes the age of the water main, the prior history of water main failures on the individual segments of water mains throughout the City and inspections of the internal condition of water mains. The three factors are then used to prioritize annual water main replacements. The selection is reviewed and approved by both engineering and field operations staff.

The first criteria considered, lifespan of the water main, has been selected as 100 years. There are approximately 200 miles of water main therefore City staff have budgeted in 2 miles of water main replacement annually. The second criteria is the historic records of water main leaks. This is documented in the City's computerized maintenance management system, Infor Hansen. The documentation and field staff input provide recommendations for water main replacements. During water main repairs, observations are recorded regarding the condition of the main while exposed during the repair. This has been proven a valid approach when subsequent repairs have been required along segments that had previous failures. Lastly, the City contracted with an inspection service to perform visual inspections of the interior of suspect water mains and provide recommendations on

replacements. This service was conducted while the water mains were pressurized using a camera system that was inserted via fire hydrants.

The State's proposed water loss performance standards will require the City to definitively identify the water losses. This will be accomplished by the installation of meters in the proper location for the City's sourced water entering the distribution system. In addition, the City has implemented regulations that will provide the City the means to meet their urban water use objectives and allowed water use per AB 1668 and SB 606.

9.2 WATER CONSERVATION PROGRAM COORDINATION AND STAFFING SUPPORT

The City's water conservation programs are developed, implemented and coordinated by a two-person Water Conservation Unit (WCU):

Thomas Fleming: Sustainability Analyst (thomas.fleming@smgov.net)

Salvador Gonzalez: Water Resources Specialist (salvador.gonzalez@smgov.net)

To develop and coordinate the City's water conservation programs, the WCU conducts ongoing assessments of the current level of water fixtures, as well as identifying the greatest opportunities for reducing water consumption. Based on this continual analysis, programs are developed and modified to reach the City's long-term objectives via existing and new conservation programs. See sections 9.3.1 and 9.3.2 for details of the measures.

In particular, in response to statewide drought conditions in 2015, the WCU augmented existing, and implemented additional, water conservation measures that has resulted in a permanent water demand reduction of 21 percent, or approximately 3,000 acre-feet per year (AFY). The average annual water consumption has been reduced from 135 GPCD to 102 GPCD. Existing conservation efforts will be enhanced through a new Water Conservation Master Plan to reduce water demand by an additional 785 AFY by 2025.

The WCU continues to implement the City's overall water conservation strategies, policies, incentives and programs to assist in achieving – and sustaining – water self-sufficiency (see Section 9.2.7 below). The WCU is also charged with permanently establishing water conservation as the new normal in the City along with implementing and meeting the AB 1668/SB 606 legislative requirements being developed for the State's mandated water conservation framework ("Making Water Conservation a California Way of Life", Executive Order B-37-16).

9.3 WATER DEMAND MANAGEMENT MEASURES, IMPLEMENTATION TO ACHIEVE WATER USE TARGETS, AND WATER USE OBJECTIVES (FUTURE REQUIREMENTS)

Water Demand Management is achieved through implementation of various water conservation and efficiency programs designed to permanently reduce residential and

commercial potable water use. The City has been actively implementing water conservation programs since 1988 and initiated its Water Efficiency Strategic Plan in 2002. Continuation of existing, and implementation of proposed, conservation measures are essential for the City to eliminate reliance on imported water to achieve water self-sufficiency and to reduce overall use in the face of increased demand pressures from new housing and from the commercial and institutional sectors of the local economy.

9.3.1 Ongoing

- Water Use Allowances (WUAs): The WUA is a component of the WSCP and is the mechanism to implement the mandatory reduction required by a Water Supply Shortage. WUAs represent the amount of water that can be used by a water customer without risk of receiving an exceedance citation (see below). The WUA for the current Stage 2 Water Supply Shortage is 20% below the amount of water used in 2013. Every water customer in the City receives a WUA uniquely calculated for each billing period.
- Water Use Allowance Exceedance Citations: A water customer can receive an administrative citation for exceeding their WUA for any given billing period. Citation fees are $250 for the first exceedance, $500 for the second exceedance (within 12 months of the first) and $1,000 for the third exceedance (within 12 months of the second). Since 2015, over 1,300 WUA Exceedance Citations have been issued.
- Water School: A water customer can have their WUA Exceedance citation fee waived for the first exceedance by completing either an online or in-person Water School. The online Water School, created and maintained by the WCU staff, is an educational course with quizzes on Santa Monica water along with indoor and outdoor water conservation. The in-person Water School is conducted onsite at the customer's property by WCU staff, which includes an audit of indoor water fixtures, the outdoor irrigation system and leak detection using the water meter and toilet dye tabs. Note: The online Water School was eliminated in 2018 due to reduced staff, but the onsite audits continue. Since 2015, over 300 Water School session have been completed.
- Water Use Consultations: WCU staff make onsite visits to customers to comprehensively audit indoor water use (measuring flush and flow fixtures, appliances, checking for leaks, behaviors), outdoor water use (irrigation system, checking for leaks, behaviors), along with a meter check. Recommendations for saving water are documented and sent to the customer. Consultations have resulted in the discovery and repair of major leaks, adjustment of irrigation system timers, installation of low-flow devices (aerators and showerheads (free), toilets and urinals (rebates), and water-use behavior changes. This program is free of charge for any Santa Monica water customer. Since 2015, over 650 consultations have been provided to City water customers.

- Enhanced Landscape Rebate Program: The City's most successful rebate program provides rebates for customers that replace their turf grass and overhead spray irrigation with sustainable, drought tolerant, low-water using landscapes with no or drip irrigation only. Santa Monica's unique landscape rebate requirements establish effective water conservation, provide successful and maintainable projects, and ensure an aesthetically pleasing landscape. Since 2015, over 675 rebate projects have been completed removing over 1.1 million square feet of turf at a program cost of $2.2 million.
- Landscape Consultants: The WCU has partnered with professional landscape professionals who meet with potential landscape rebate customers at their property and provide expert advice on sustainable landscaping and completing a rebate. This service is $50 for a two-hour consultation. Since 2015 over 600 Landscape Consultations have been completed. Since 2015, over 620 Landscape Consultations have been completed. Note: This program was temporarily halted in 2020 due to Covid-19 budget cuts.
- Sustainable Landscape Trainings: WCU staff coordinates with the City's Public Works, Airport, and Public Landscape on the installation of sustainable landscapes and rock/rain gardens for yards and parkways. Trainings are conducted at the City's Airport Demonstration Garden where hundreds of residents have participated in these sustainable landscape trainings since 2015.
- Water Waste Patrols: WCU staff enforces SMMC 7.16.020, the "No Water Waste" ordinance (see Section 9.2.1). Responses to inbound water waste complaints are handled immediately, and proactive patrols in the community provide on-site detection of water waste. Notices of Violations (NOVs) are issued to ensure resolution of water waste issues with Citations issued as needed. Since 2015, over 1,500 NOVs have been issued.
- Enhanced MWD Water Conservation Rebates: As a member-agency of the Metropolitan Water District of Southern California (MWD), the City of Santa Monica participates in their program to provide rebates for high efficiency toilets, urinals, clothes washers, restaurant appliances, irrigation devices and other devices. Since 2015, the WCU has increased the supplemental funding added to MWD's base rebate amounts to further incentivize installation of these water-conserving devices. Since 2015, over 7,200 devices have been rebated at a cost to the City of $137,000.
- Free Water Saving Items: WCU staff has distributed thousands of water saving items to Santa Monica water customers since 2015. These items include low-flow faucet aerators, low-flow showerheads, automatic shut-off hose nozzles, toilet leak-detection dye tabs, shower buckets, flow-rate bags, and reusable canvas bags. The WCU also provides free tent cards and door hangers for hotels/motels to encourage water conservation by guests through reusing towels and sheets. These free items

are available in the OSE office and are also distributed at outreach events. Since 2015, over 17,000 water saving devices have been distributed.

- Customer Support: WCU staff provides excellent customer phone and email support every workday regarding any water conservation issue or program. Approximately 300 phone calls and emails from Santa Monica water customers are received and responded to each year.

2015-2018

Multi-Family Toilet Direct Install Program: This program, a component of the City's Sustainable Water Master Plan, facilitated the retrofitting of inefficient water-wasting toilets with water efficient, high-efficiency toilets in multi-family buildings. Toilets eligible for replacement included those using at least 1.6 gallons per flush (gpf), retrofitted with Premium High-Efficiency Toilets (PHETs) that use 0.8 gpf. 4,330 toilets were retrofitted at a total program cost of $1,367,514 for an average toilet retrofit cost of $316/toilet (includes fixture and accessories, labor, and administrative expenses).

2016 – Ongoing

Water Efficient Landscape and Irrigation Standards (WELIS) (SMMC 8.108): WELIS is a component of the Green Building Ordinance which requires the most water-efficient plumbing fixtures, irrigation, and landscaping for new construction, major remodels, and new or remolded landscapes. In December 2016, the ordinance was significantly updated to ban overhead spray irrigation for all new developments and for new landscape on existing developments. In addition, turf grass is banned on new commercial developments and is limited to 20% of landscaped area for new residential developments.

2017-2020

MOU to Fund Water Conservation: Santa Monica City Council approved an MOU with Santa Monica-Malibu Unified School District (SMMUSD) to fund water conservation projects. The projects funded included professional indoor and outdoor water audits all schools and facilities in Santa Monica (to determine fixture retrofits via the Water Neutrality Ordinance...see Future Projects below) and smart irrigation controller upgrades at nine campus locations. The projects cost $373,191, with projected savings of 3.9 AFY. The program was defunded and closed due to Covid-19 related budget cuts.

2017 – Ongoing

- Water Neutrality Ordinance (SMMC 7.16.050): On July 1, 2017, the City's Water Neutrality Ordinance went into effect and capped water use for new developments to the average five-year historical water use for that individual parcel. If the projected annual water use for the development is greater than existing parcel's annual average over the past five years, the increased amount must be offset by funding water-efficient retrofits of existing buildings elsewhere in the City. Offset

retrofits currently include low-flow indoor fixtures (toilets, urinals, showerheads, aerators). The ordinance applies to pools, ponds, spas and other water features as well. This ordinance was developed and is implemented by WCU staff. Implementation includes performing over 500 development project plan checks each year along with determining fees and managing a full-scale Water Neutrality Direct Install program (see below).

- Water Neutrality Direct Install Program: Implementation of the Water Neutrality Ordinance (above) requires the implementation and managing of a full-scale direct install program to retrofit water wasting fixtures with highly efficient water saving fixtures. Since 2017, the program has retrofitted 1,931 toilets, 44 urinals, 956 showerheads, and 2,083 faucet aerators. The cost of these retrofits through 2020 is $1.44 million, all provided by Water Neutrality Offset fees collected from developers when permits are pulled.

2018 – 2019

- School Education Pilot Program: The City partnered with the Discovery Science Center of Los Angeles to implement a pilot fifth-grade school program during the 2018-19 school year to educate Santa Monica-Malibu Unified School District students on the importance of water conservation and the impacts on our water supply and local watershed. Students participated in a grade-specific, standards-aligned assembly that focused on water use efficiency and conservation in an interactive and dynamic way. At the start and end of the assembly, students completed a quiz on their knowledge on water conservation, Santa Monica water supply, and our watershed. The City, with the Discovery Science Center, developed a Santa Monica specific booklet for students to take home and share with their family. Approximately 724 students went through the program at a City cost of $8,397.

2020 – Present

- Spray to Drip Irrigation Conversion Rebate: A new landscape rebate program provides for customers to replace operational sprinklers in planter beds and hedges with highly efficient drip irrigation that delivers water directly to the plants. This rebate does not apply to existing lawn areas.

9.3.2 Future (2021-2025, pending budget approvals)

- Water Conservation Programs Master Plan: An overall master plan will be developed to provide a more detailed water conservation framework and benefit/cost analysis of existing and proposed programs. An outside consultant will be retained to provide guidance and support for developing this plan.
- Marketing/Messaging Program for “Conservation as a Way of Life” and Potential Drought Resurgence: Working with the Office of Sustainability’s contracted

marketing agency, a new water conservation marketing campaign will be created with messaging aligned with the State's "Making Water Conservation a California Way of Life." Depending on conditions, drought-related information this may also become part of the messaging.

- Targeted Commercial Sector Programs: Restaurants, hotels, and medical facilities are the highest commercial users of water in the City. As such, outreach and support program will be developed for one-on-one audits, evaluations, process recommendations, and rebate incentives for fixtures/devices to provide meaningful water savings in these specific sectors. An outside contractor may be used to develop and implement these programs.
- Expanded School Education Program: Building upon the pilot program described above, the City will again partner with the Discovery Science Center to expand the pilot school program to all fifth-grade Santa Monica students to provide education on water conservation and the impacts on our water supply and local watershed.
- Performance Pays: This effort will leverage Metropolitan Water District's Water Savings Incentive Program (WSIP) for unique, innovative water conservation programs. Potential projects include pump pods for fire department trainings and cooling tower retrofits with new technology.
- School District Retrofits via Water Neutrality Direct Install Program: The scope of properties where the Water Neutrality Direct Install program retrofits fixtures will be expanded from residential and CII to include all City campuses of the Santa Monica-Malibu Unified School District.
- Greywater System Permitting Guidebook: The use of graywater onsite is less energy intensive than treating wastewater and can be a cost-effective alternative water supply for irrigation and other non-potable uses at the property. Santa Monica residents and businesses can currently install Laundry-to-Landscape greywater systems without a permit, but more complex systems require a permit. To assist those that would like to install advanced onsite greywater systems, the City intends to provide a guidebook to help developers navigate the permitting process to help incentive these systems.
- Flow Measuring and Irrigation Controller Devices Incentives: As a bridge to AMI, and to realize the potential water savings from customers having real-time water use data (including leak alerts), an incentive program will be developed for customers to obtain and install a flow measuring device on their water meter. In addition, incentives for installing and properly programming a smart irrigation controller will potentially be developed to address outdoor water efficiency.
- Clothes Washer Incentive for Multi-Family: Clothes washers are among the highest uses of indoor water. Typically, in multi-family shared laundry rooms, the machines

are older, top-loading, water-inefficient models that use 25-40 gallons per load. A program will be developed to incentivize property owners to lease or purchase newer, high efficiency clothes washing machines that use approximately 15 gallons/load.

- Irrigation System Audit and Repair: Much of the outdoor water waste occurs due to incorrect watering schedules programmed in customer's irrigation timers/controllers (i.e. overwatering). In addition, leaks and broken sprinklers heads go unnoticed as irrigation is typically run at night and not observed. This new program will utilize a contractor to provide extensive outdoor audits and make necessary timer adjustments and simple repairs to save water.

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Errata Sheet for Minor Corrections to
City of Santa Monica 2020 Urban Water Management Plan (UWMP)

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

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

X 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:

City of Santa Monica, Chris Aguillon

#	Description of Correction	Location	Rationale	Date Error Corrected
1	Page 6-3 of the UWMP discusses a Groundwater Sustainability Plan (GSP) but does not provide a link to or a copy of the document. A link to the draft GSP for the Santa Monica Groundwater Basin is provided at the following link: https://santamonica.gov/gsp	Page 6-3	The GSP for the Santa Monica Groundwater Basin is due to the California Department of Water Resources in January 2022, after the 2020 UWMP submittal deadline.	November 9, 2021
2	Table 4-4R revised on the WUEdata portal to include supporting information for negative values.	Section 4.1.4	Water Loss Audits table (Table 4-4R) was left blank in the WUEdata portal because the City reported negative values in their water loss audits. The WUEdata portal does not accept negative values for this table, therefore, the City was required to leave the table blank.	November 9, 2021

☐	Water Supplier is reporting the sum of multiple PWSS[1] (AF)
Reporting Period Start Date (mm/yyyy)	Volume of Water Loss*
* Taken from the field "Water Losses" (a combination of apparent losses and real losses) from the AWWA worksheet.	
* Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.	
[1]If water supplier has water loss audit reports for multiple PWSS', supplier will sum the information from all PWSS' water loss audit reports for this table.	
NOTES	Units of measure in AF. The City participates in annual water loss audits, which are validated by an outside auditor according to AWWA standards. In 2015 the total water loss was 3.8% and in 2016 it was 1.6%. Subsequent years to date have yielded water consumption exceeding water supplied. The discrepancy has been attributed to several factors. First, there is a timing issue with the manual meter reading. The City maintains a 60-day billing cycle so there is a lag in consumption data relative to source water entering the system. Second, the metering of the source water entering the City's distribution system are in multiple locations. The City's water system has four sources entering the system; two MWD feeder services, Santa Monica Well 1 and the Arcadia Water Treatment Plant. MWD's two feeder service lines both have meters and are maintained by MWD. Santa Monica Well 1 has a dedicated magmeter. The Arcadia Water Treatment Plant does not have a single flowmeter for the potable water produced. Rather, potable water effluent flow from the Arcadia Water Treatment Plant is a composite of multiple internal plant flowmeters. These internal flows originate from internal bypass flows and reverse osmosis product flows. It is likely that the discrepancies in reporting are due to variations in accuracy from the various flow meters.