City of West Sacramento
2020 Urban Water Management Plan

CITY OF WEST SACRAMENTO

Prepared by:

Tully & Young
Comprehensive Water Planning

Table of Contents

List of Tables

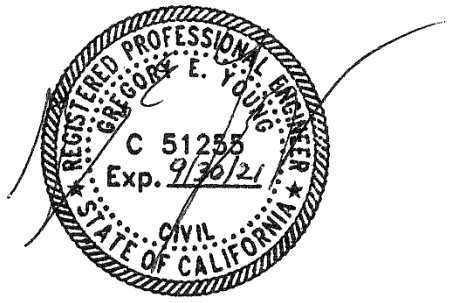
List of Figures

List of Preparers

Tully & Young, Inc.
Gwyn-Mohr Tully, J.D.
Greg Young, P.E.
Kris Olof
Galen Davis
Dave Bolland
Jennie McCarl

City of West Sacramento
Amber Wallace, Senior Civil Engineer
David Tilley, Principal Planner
Raul Huerta, Housing Manager
Ryan Burnett, Administrative Analyst
Seamus Laffey, Associate Planner
Chris Kania, Water Treatment Superintendent

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



Executive Summary
Layperson's Description

After the devastating drought in the late 1970s, the California Legislature declared California's water supplies a limited resource and that the long-term, reliable water supplies are essential to protect California's businesses, communities, agricultural production, and environmental interests. The Legislature also recognized a need to strengthen local and regional drought planning and increase statewide resilience to drought and climate change. Thus, in 1983, the California Legislature created the Urban Water Management Planning Act (UWMPA).[1] The UWMPA requires urban water suppliers serving over 3,000 customers or supplying at least 3,000 acre-feet of water annually to prepare and adopt an urban water management plan every five years,[2] and demonstrate water supply reliability in a normal year, single dry year, and droughts lasting at least five years over a twenty-year planning horizon.[3] The UWMPA also requires each urban water supplier to prepare a drought risk assessment and water shortage contingency plan.[4] And last, beginning in July 2022, each urban water supplier must prepare an annual water supply and demand assessment.[5] The California Legislature asserts that aggregating all of these legal requirements at the urban water supplier level will improve local, regional, and statewide water planning and water resilience.

At a practical level, the Urban Water Management Plan (UWMP) is the legal and technical water management foundation for urban water suppliers throughout California. A well-constructed UWMP will provide the supplier's elected officials, management, staff, and customers with an understanding of past, current, and future water conditions and management. The UWMP integrates local and regional land use planning, regional water supply, infrastructure, and demand management projects as well as providing for statewide challenges that may manifest through climate change and evolving regulations. Thoughtful urban water management planning provides an opportunity for the supplier to integrate supplies and demands in a balanced and methodical planning platform that addresses short-term and long-term planning conditions. In brief, the UWMP gathers, characterizes, and synthesizes water-related information from numerous sources into a plan with local, regional, and statewide practical utility.

[1] California Water Code Section 10610 *et seq*. (Chapter 1 added by Stats. 1983, Ch. 1009, Sec. 1).
[2] California Water Code Section 10610 *et seq*.
[3] California Water Code Sections 10631-10635
[4] California Water Code Sections 10632
[5] California Water Code Sections 10632.1

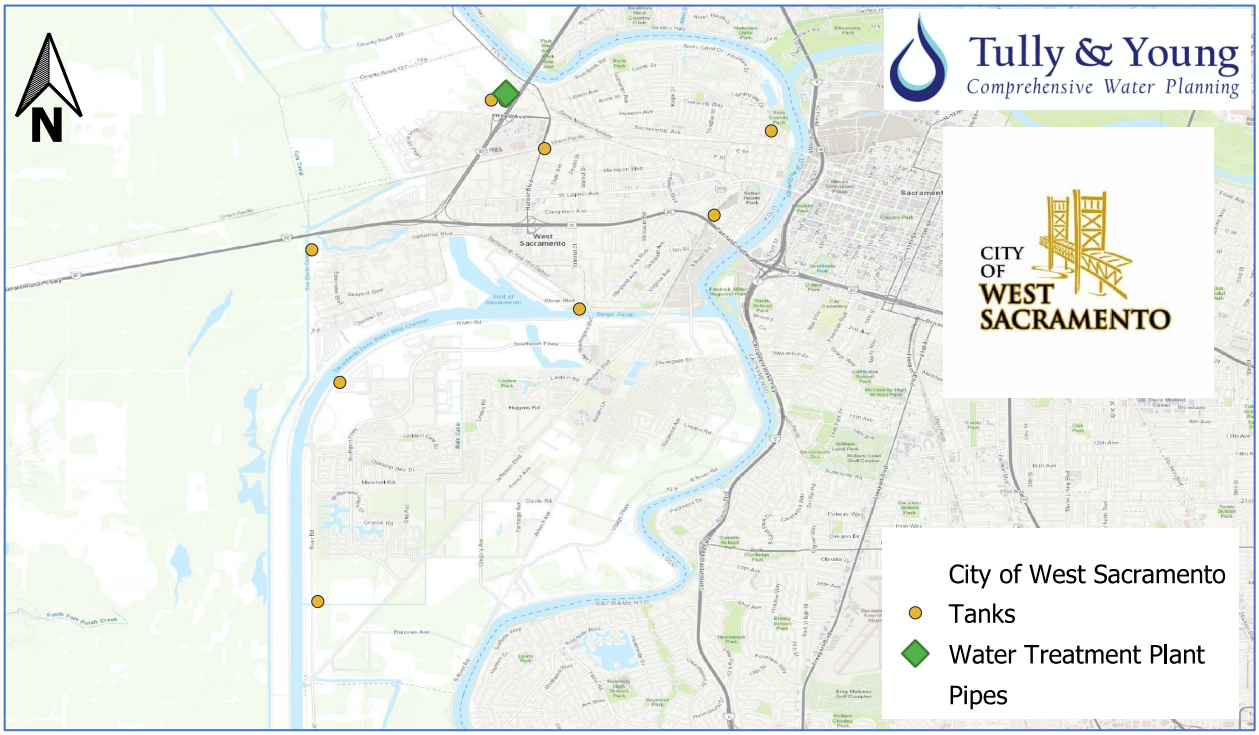
ES-1 City of West Sacramento

The City of West Sacramento (City) is located in California's Sacramento Valley. The City is bounded by the Sacramento River on its north and east sides and by the Yolo Bypass on its western border. The Deep Water Ship Channel borders the City on its southwestern portion with a component of the channel piercing the City to the West Sacramento Port. The City's southern border approximates a line moving west to east at the intersection of Jackson Boulevard and the Deep Water Ship Channel.

The City integrated its land use and water service authorities upon incorporation in 1987. At that time, the City assumed the East Yolo Community Services District's water service duties and finally developed the Bryte Bend Water Treatment Plant to divert and treat surface water from the Sacramento River. The City has since overseen the development and implementation of its water service that parallels the growth and development within the City. The City delivers quality, reliable water to over 15,000 active service connections serving a population of approximately 55,000 people within a service area of 23 square miles

The City is one of the fastest growing areas in California due to the City's centralized location and its proximity to the California State Capitol. The City's population has increased by nearly 70 percent since 2000 and the City continues to rapidly expand its economy and residential services. The City's water system continues to expand to serve this growth. Figure ES-1 shows the City of West Sacramento's water service area that incorporates both the developed and undeveloped areas identified in the City's General Plan.

Figure ES-1: City of West Sacramento Water Service Area



The City holds essentially four water assets – (1) a State Water Resources Control Board-issued Appropriative Water Right Permit (Permit 18150), (2) a Central Valley Project water supply contract (CVP Contract); (3) water supplies derived from the North Delta Water Agency (NDWA) contract; and (4) groundwater from the Yolo Subbasin. All of these water assets are subject to unique monthly and annual management conditions that affect their reliability under various climatological and regulatory conditions.

The City's surface water assets are wholly derived from the Sacramento River. These supplies are subject to the hydrological and regulatory patterns in the operations of the federal and state storage facilities in the watershed. The City has a single point of diversion to capture these surface water supplies, treat the supplies, and deliver them to consumers throughout the City boundary. Together, the City's surface water supply portfolio constitutes the vast majority of water served within the City's boundary.

The City also has access to groundwater supplies. At the time of incorporation, the City was using groundwater as the primary source of water to service the regional customers. The City extracted water from the Yolo Subbasin, treated the water at the source, and delivered it to end users within the proximity of the extraction wells. With the development and perfection of the City's surface water supplies, the City reduced its reliance on its groundwater system and looked to preserve that supply to supplement supply deficits in its surface water system. Today, in the context of the Yolo Subbasin Groundwater Authority's work in the Sustainable Groundwater Management Act (SGMA), the City continues to preserve its groundwater assets and use those assets, as needed, to meet its urban demands.

ES-2 City of West Sacramento's Water Service Reliability

The City of West Sacramento has reliable water supplies to meet demands through the 25 year planning horizon contemplated in this Urban Water Management Plan. The City's water service reliability, however, hinges upon the active management of its water supply sources to meet the hydrological and regulatory variability inherent in each source. More specifically, the City must manage its water supplies to address the monthly supply limitations imbedded in each water asset, particularly in a drought lasting five consecutive years. The City may also seek to improve its system reliability by further diversifying its water asset portfolio, improving water storage options, and integrating with neighboring water systems to create redundancy in its water system. The City is actively pursuing all of these activities in order to create water service reliability that is resilient to a changing climate and other potential short-term and long-term changes to supply availability.

The City's water assets each have attributes and limitations that require active management. The City's Permit 18150 is a valuable water asset that is regularly available in normal and wet hydrological conditions. Permit 18150 may be diverted and used when there are sufficient naturally occurring water supplies in the Sacramento River system to meet the demands of all water users that are senior in priority to the City's Permit supplies and where the state and federal water projects are not required to meet water flow requirements in the Sacramento-San Joaquin Delta (Delta) through releases of water stored in their respective reservoirs. In wet conditions, Permit 18150 is available for diversion in all

months of the year except July and August. In normal conditions, Permit 18150 is subject to Term 91 (generally a curtailment order issued by the SWRCB) which may generally prohibit diversion of the supply from June 1 through September 30. In dry and critically dry conditions, Term 91 may limit diversions under Permit 18150 from April 1 through November 30 – depending upon the severity of the drought and the flow conditions in the Sacramento River watershed. Furthermore, in some years (like 2021), the availability of the supply may tie directly to the timing and significance of Pacific storm systems. In these instances, the SWRCB may declare Term 91 conditions "on and off" throughout a period of time to ensure adequate supplies are available to meet end user needs and the Delta requirements.

The City also holds a Central Valley Project Contract with the United States Bureau of Reclamation (CVP Contract). The CVP Contract incorporates two water supplies – the City's Permit 18150 and a Central Valley Project Supply (CVP Project Supply). These two water assets are imbedded in the CVP Contract so that the City may manage its water supply portfolio to meet the needs of its customers. The CVP Contract limits the total volume available under both supplies to 23,600 acre-feet per year and further caps the total volume of CVP Project Supply at 9,680 acre-feet per year.

The City's CVP Project Supply is generally available in every year but is tied to two important variables: (1) the allocation declared by Reclamation in each year based upon the hydrological conditions (including predicted conditions); and (2) the City's use of the CVP Project Supply in previous years where Reclamation had declared 100% allocation. Under the first variable, Reclamation examines the hydrological conditions in the state and determines whether the City should receive 100% of its CVP Project Supply allocation in that year or some amount less than 100%. In dry years, the allocations generally range between 75% and 50% but in critically dry years, allocations drop to 25%. Reclamation generally does not allocate a supply less than 25% for municipal and industrial water users (like the City) that lie north of the Delta. However, Reclamation may also declare in water crisis conditions that water supplies may only be available to meet health and safety standards. The second variable calculates the available supply based upon the Municipal and Industrial Shortage Policy (M&I Shortage Policy). The M&I Shortage Policy calculates the available supply by averaging the last three years of water use under 100% allocation conditions and then multiplying the percentage allocation in the current year against that average to determine the exact amount of CVP Project Supply that is available for the City. In short, these two variables determine the amount of CVP Project Supply water available to the City in any given year.

The North Delta Water Agency (NDWA) contract is also a valuable water supply that is used to serve the City's residents and businesses. The NDWA supply is derived from historical negotiations between landowners in the NDWA service area boundary and the State of California during the original "Peripheral Canal" deliberations. The essence of the NDWA supply is that the contract supplies water to the landowners that reside in the NDWA service area. The City diverts and delivers this water to meet the demands within the City's service area that also lie within the boundaries of the NDWA service area. These supplies are generally reliable in all year types and help support the City's long-term water reliability objectives for service to its customers.

Last, the City procures groundwater supplies from the Yolo Subbasin. Although groundwater was the primary water supply source for the City until the completion of the Bryte Bend Water Treatment Plant in the late 1980's, the City has generally reduced its dependence on groundwater in order to perfect its surface water resources. Nevertheless, the City views its groundwater supplies as a key component for further improving its short-term and long-term water supply reliability in light of changing climatological and regulatory standards. The City also sees the groundwater system as providing a valuable supplemental supply in the context of emergency conditions (earthquake, flood, or other catastrophic outage) that may occur at some point in the future in the Sacramento River system or to its facilities diverting water from the Sacramento River system.

The City's water supply portfolio should be adequate to meet its potential long-term growth objectives. The City continues to emerge as a residential and business center in the Sacramento region. This projected growth pairs well with the City's ability to capture and use its full water supply portfolio to meet end-user demands. Moreover, the City continues to pursue system redundancy and other inter-agency arrangements to improve its physical reliability in the event there are unforeseen problematic conditions.

The City's water supply is reliable in normal, single dry, and five consecutive dry years. Although each water asset has unique variability under certain hydrological and climatological conditions, the integrated supply portfolio is reliable as shown below. Table ES-1 below shows the City's annual supply as compared to its annual demands through the period 2021-2025 in dry conditions. Table ES-2 shows the City's annual supply as compared to its annual demands through the period 2025-2045 in dry conditions. These tables demonstrate the City's water supply reliability through the 25 year planning horizon contemplated in this Urban Water Management Plan.

Table ES-1: Water Supply Reliability Through 2025

	2021	2022	2023	2024	2025
Supply	29,429	28,866	26,296	29,214	28,838
Demand	12,890	13,520	14,150	14,780	15,410
Difference	16,539	15,346	12,146	14,434	13,428

Table ES-2: Water Supply Reliability Through 2045

	2025	2030	2035	2040	2045
Supply	26,858	27,862	28,865	29,868	30,972
Demand	15,351	17,556	18,260	19,173	21,420
Difference	11,507	10,306	10,606	10,695	9,552

Chapter 1
Introduction

The City of West Sacramento (City) has supplied its customers with reliable, high quality water through the City's Public Works Department since its incorporation in 1987. The City has five City Council members with one of the members, the Mayor, directly elected by all of the City's residents. The City of West Sacramento Public Works Department is responsible for the City's water and sewer system with a major responsibility of maintaining and operating the City's Water diversion, treatment, and conveyance facilities.

Life and the economy in West Sacramento has always been tied to the rivers and water surrounding the City. Located in eastern Yolo County (County), the City is bound on three sides by water; the Sacramento River to the north and east, and the Yolo Bypass and Sacramento River Deep Water Channel in the west serving the City's port industry. The City is in California's Central Valley just east of the San Francisco Bay Area and west of the California State Capital of Sacramento. It sits at an elevation of about 20 feet above sea level. A few of the City's key planning objectives include: responsible and sustainable development of the riverfront and its resources; to create new neighborhoods and redevelop older neighborhoods with their own identity yet interconnected to the city as a whole; to remain a powerful job center for the region; and to maintain a data driven approach for City processes and decisions.[6]

Water supply for the City service area is sourced almost entirely from surface water from the Sacramento River watershed. The City is augmenting its water supply with groundwater to supplement raw surface water in the City's delivery system and is investigating an system intertie with neighboring water purveyors to create redundancy for the City's potable water system. The City's surface water is derived from water rights and contracts and provides significant volumes of water to meet end user needs. Nevertheless, the City's water assets require careful management due to the details embodied in those assets that impact each source's monthly availability. Chapter 3 describes the City's water supply in detail.

Ensuring an adequate supply of water is available to serve the existing and future needs for the City's customers is a critical component of successful operations. This Urban Water Management Plan (UWMP) draws on local, regional and statewide inputs to synthesize information from numerous

[6] The City of West Sacramento General Plan 2035 can be accessed here: https://www.cityofwestsacramento.org/government/departments/community-development/planning-division/general-plan-2035

sources into a reliable water management action plan designed to be referred to as management and Board level decisions arise and conditions change.

1.1 Background and Purpose

The City has prepared this 2020 UWMP to comply with the Urban Water Management Planning Act (UWMPA) requirements for urban water suppliers.[7] This 2020 UWMP addresses West Sacramento's water management planning efforts to assure adequate water supplies to meet forecast demands over the next 25 years. As required by the UWMPA, the City's 2020 UWMP specifically assesses the availability of its supplies to meet forecast water uses during average, single-dry and five consecutive drought years through 2045. Verification that future demands will not exceed supplies and assuring the availability of supplies in dry-year conditions are critical outcomes of this 2020 UWMP.

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

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

The State of California's drought vulnerability and the additional pressures of climate change and population growth increase the importance of planning ahead to meet water demands with potentially at-risk water supplies. Such forward planning is an important outcome of this 2020 UWMP.

1.2 Basis for Plan Preparation

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

Table 1-1: Public Water System Information

Public Water System Number	Public Water System Name	Number of Municipal Connections
CA5710003	CITY OF WEST SACRAMENTO	15,083

[7] California Water Code sections 10610 through 10657.

The State Legislature passed numerous new requirements since the 2015 UMWP cycle which are detailed throughout this 2020 UWMP.[8] Major updates to the requirements are listed below along with a reference to the corresponding section in which they are addressed in this document.

- **Five Consecutive Dry-Year Water Reliability Assessment:** The Legislature modified the dry-year water reliability planning from a "multiyear" time period to a "drought lasting five consecutive water years" designation. This statutory change requires a Supplier to analyze the reliability of its water supplies to meet its water use over an extended drought period. This new requirement is addressed in Chapter 3—Water Supply, Chapter 4–Water Use, and Chapter 5—Water Service Reliability Assessment.

- **Drought Risk Assessment (DRA):** Due to the extensiveness of recent California droughts and the variability associated with climate change predictions, the California Legislature created a DRA requirement for UWMPs. The DRA requires assessment over a five-year period from 2021 to 2025 that examines water supplies, water uses, and the resulting water supply reliability for five consecutive dry years. The DRA is addressed in Chapter 5— Water Service Reliability Assessment and Chapter 6—Water Shortage Contingency Plans.

- **Seismic Risk:** Evaluating seismic risk to water system infrastructure and facilities and having a mitigation plan is now required by the Water Code. Incorporating the water system into regional or county hazard mitigation planning is an important aspect of this new statue. Seismic risk is addressed in Chapter 6.

- **Water Shortage Contingency Plan:** In 2018, the Legislature modified the UWMPA to require a Water Shortage Contingency Plan (WSCP) with specific elements. The WSCP is a document that provides a Supplier with an action plan for a drought or catastrophic water supply shortage. The WSCP is in Chapter 6 of this UWMP.

- **Groundwater Supplies Coordination:** 2020 UWMPs are required to be consistent with Groundwater Sustainability Plans following the 2014 Legislature enactment of the 2014 Sustainable Groundwater Management Act (SGMA). The reliance on groundwater is described in Chapter 3—Water Supply.

- **Lay Description:** A synopsis of the fundamental determinations of the UWMP is a new statutory requirement in 2020. This section is intended for new staff, new governing members, customers, and the media, and it can ensure a consistent representation of the UWMP's detailed analysis.

1.3 Coordination and Outreach

As required by the Urban Water Management Planning Act (UWMPA) the City has coordinated with nearby agencies while developing this UWMP in order to ensure consistency with other related planning efforts such as City General Plans (GP), Water Master Plans (WMP), and Specific Plans for identified

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

development projects (SP). This requirement includes coordination with (a) water suppliers that share a common water source, (b) relevant water management agencies that affect the City's water assets, and (c) relevant public agencies that may have land use or other regulatory relationships with the City. The City has prepared this 2020 UWMP in coordination with regional water purveyors, including the Regional Water Authority (RWA) and North Delta Water Agency (NDWA), and has appropriately notified and coordinated with other appropriate local government agencies as listed in Table 1-2.

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

Table 1-2: Public and Agency Coordination

Coordinating Agencies	Coordinate Regarding Demands	Sent Copy of Draft UWMP	Sent 60-Day Notice	Notice of Public Hearing
Cities, Counties, Customers and Interested Parties				
Yolo County	x	x	x	x
Yolo Subbasin Groundwater Agency	x	x	x	x
United States Bureau of Reclamation	x	x	x	x
Regional Water Authority	x	x	x	x
North Delta Water Agency	x	x	x	x
Department of Water Resources	x	x	x	x
City of Sacramento	x	x	x	x
General Public	x	x	x	x

1.3.1 Water Supplier Information Exchange

Water Code Section 10631 requires wholesale and retail water agencies to provide each other with information regarding water supply and demand. Since the City's surface water rights and general availability are intertwined with neighboring agencies, it has coordinated with those other suppliers within the Sacramento River watershed to provide supply and demand information. This includes, as required by UWMPA, projected water demand in five-year increments for 25 years into the future.

1.4 UWMP Adoption

The City held a public hearing regarding its 2020 UWMP on November 17, 2021. Before the hearing, the City made a draft of the 2020 UWMP available for public inspection at City Hall, 1110 W Capitol Ave, West Sacramento, CA 95691, and on the City's website. Pursuant to CWC Section 10642, general notice of the public hearing was provided through publication of the hearing date and time in the local press as required under the UWMPA. A copy of the adopted 2020 UWMP will be submitted to DWR, provided to the County and the California State Library, and posted onto the City's website.

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

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

1.5 Document Organization

This UWMP is organized as follows:

- Executive Summary provides an overview of the purpose and findings of this 2020 UWMP.
- Chapter 1 establishes the basis for the UWMP, describes outreach activities and introduces the document organization.
- Chapter 2 provides a description of the City's service area, demographic characteristics and climate, and describes the future population the City anticipates needing to serve.
- Chapter 3 describes the City's current and future water supplies and the availability of the supplies through 2045.
- Chapter 4 details the customer uses, including the past and future estimated uses, and describes the City's past and on-going demand management measures.
- Chapter 5 presents the City's water system service reliability into the future, including an assessment of reliability if a drought occurred over the next five consecutive years.
- Chapter 6 is the City's stand-alone water shortage contingency plan, incorporated as a chapter in this UWMP, but also available to be shared and utilized separate from the UWMP.

NOTE TO DWR:

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

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

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

Chapter 2
Water Service and System Description

The City of West Sacramento (City) serves water to its customers directly through its Public Works Department. The City is located in eastern Yolo County (County), sitting between the City of Davis to the west and the City of Sacramento to the east. The City provides water for irrigation, municipal, domestic, industrial and commercial customers through its several water rights and contracts. The City was incorporated in 1987 and assumed ownership and operations of the water system from the East Yolo Community Services District that same year. In 1988, the City's Bryte Bend Water Treatment Plant (WTP) became operational. The WTP allowed the City to convert from a total reliance on groundwater to a usage of surface water from the Sacramento River. Currently, there are areas within the City limits that remain undeveloped and are not connected to the City's water distribution system.

The original water supplies within the City's service area were used to provide irrigation water for farming, but as residential neighborhoods became established, the Sacramento River Deep Water Channel (Channel) was constructed, and the industrial areas surrounding the river and the port developed, the City's water supply responsibilities came to serve a diverse mix of customer classes upon City incorporation. The City serves approximately 15,000 connections as shown in Table 2-1. While the vast majority of the water supply comes from direct diversions from the river, the City also operates a few groundwater wells that may supply raw water into its delivery system as well as operates a few raw water irrigation wells used at parks and for some of the community aesthetic residential lakes. The City's water supply is discussed in detail in Chapter 3.

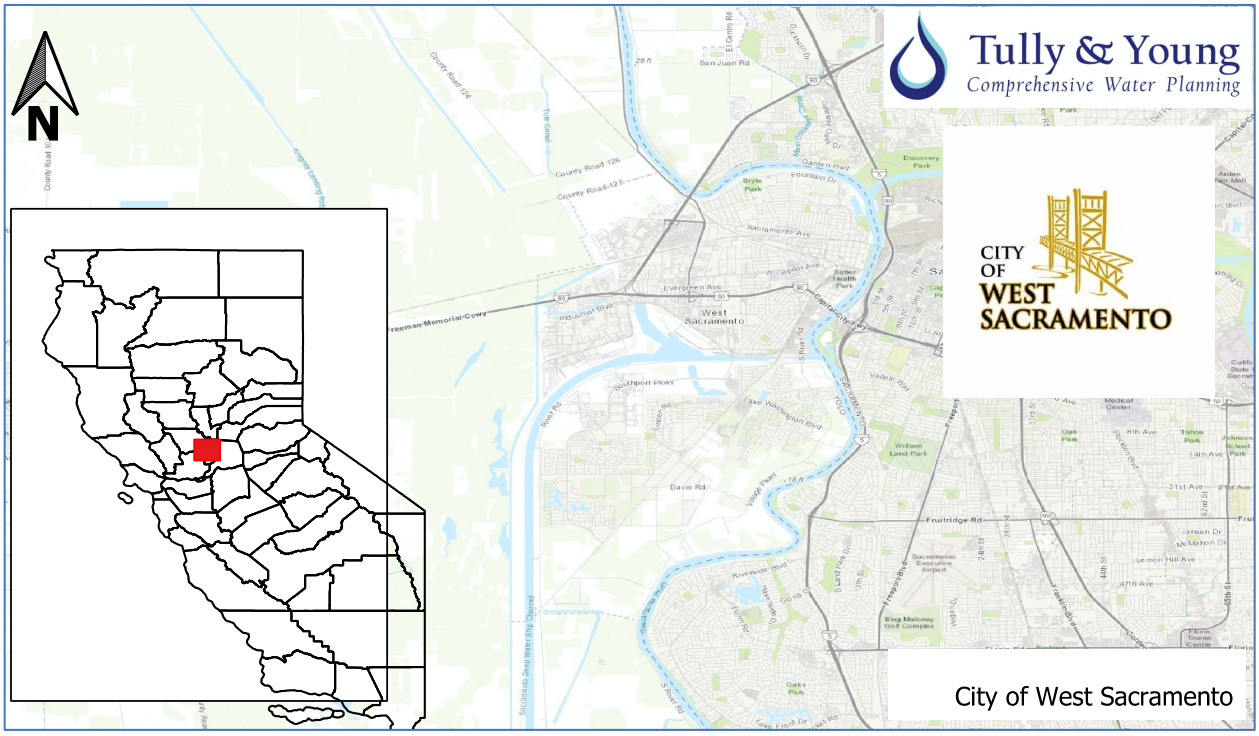
The northern and eastern boundaries of the City and its water service area are mostly contiguous with the course of the Sacramento River. The southwestern boundary follows the Channel which also crosses east to west through the City center. The historic industrial and farming community of West Sacramento occupied the central part of the present-day city north of the Channel, stretching from the Sacramento River in the east to the Yolo Bypass in the west. This area now includes a mix of residential, commercial, and industrial development, including significant industrial land uses along the Channel. Lands south and east of the Channel are considered the Southport area. This is where most of the vacant parcels in the City still exist and will experience the majority of future residential growth.

The water service area covers about 23 square miles as shown in Figure 2-1. Notably, two service areas are shown in the figure: (1) customers located outside of the North Delta Water Agency (NDWA) boundary, generally located north of the railroad tracks near the Broderick neighborhood, and (2) customers located within the NDWA boundary. This distinction is important as it relates to water supplies discussed in further detail in Chapter 3.

Table 2-1: Customer Water Service Connections[9]

Customer Class	2015	2016	2017	2018	2019	2020
Single Family Residential	12,653	12,777	12,887	13,107	13,471	13,571
Multi-Family Residential	905	437	324	-	-	-
Commercial/Institutional	1,252	1,253	1,359	1,258	1,268	1,276
Landscape Irrigation	318	325	329	336	344	355
Total	15,128	14,792	14,899	14,701	15,083	15,202

Figure 2-1: Water Service Area



The City also operates and maintains a sewer collection system consisting of 12 sewer pump stations along with all underlying sewer pipes throughout the City. The collected sewage is then delivered to the Sacramento County Regional Sanitation District for treatment via the 19-mile Lower Northwest Interceptor pipeline.

2.1 Service Area Climate

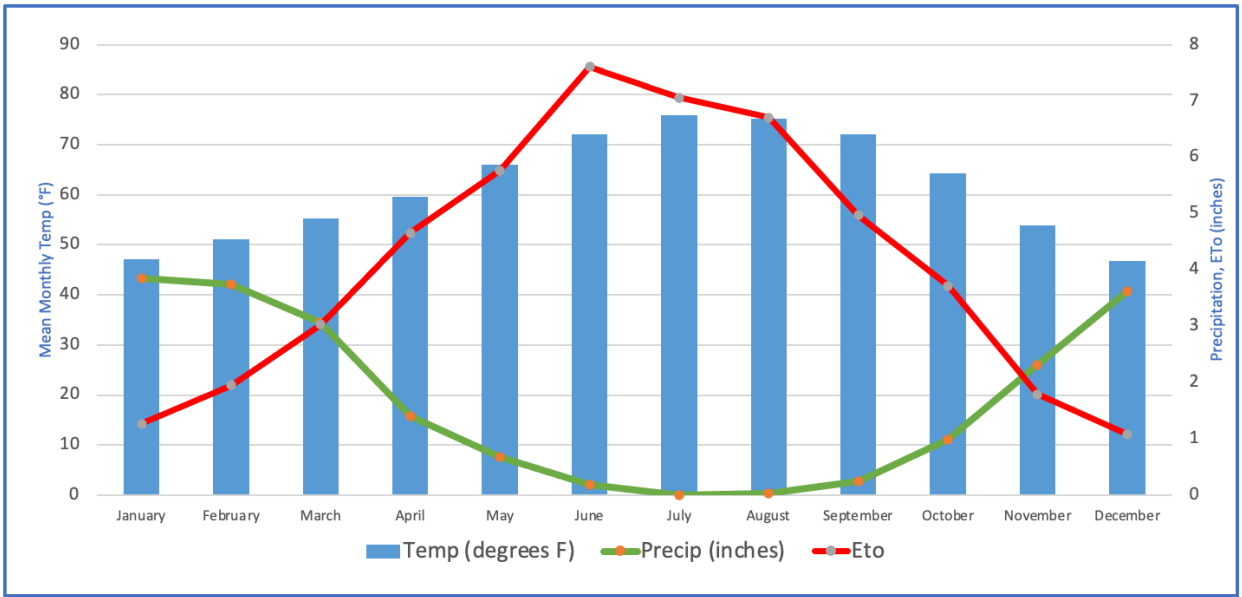
Typical of the California Central Valley, the City service area has a Mediterranean climate with hot, dry summers and cool, wet winters. Historical averages show January as the coolest and wettest month,

[9] The City has been modifying its classifications within its billing system whereby some single-family accounts were previously recorded as commercial, and the multi-family accounts are currently classified as commercial. The City has also been working on its meter installation program causing changes to the accounting and classifications. Annual reporting to the State as part of the electronic Annual Report does not portray the actual trends within each classification.

and July as the hottest and driest. The wet season is from October to April with a 30-year annual average rainfall of 20.11 inches. The annual mean temperature is 61 degrees, but the summer months can regularly see average highs in the mid to high 90s, and average winter lows hover down in the 40s, occasionally reaching the 30s. Other climate characteristics include occasional Tule Fog coinciding with the rainy season, which brings dense fog caused by high relative humidity (after rain) and rapid cooling during the night. The fog can get trapped, due to temperature inversions common in the Sacramento valley, for days or even weeks. Snow is rare but cold fronts can bring freezing temperatures with trace amounts of snow and ice. Autumn starts warm and dry and becomes cooler, wetter and foggier later into the season. The last rains in spring are generally in late April or early May.

Figure 2-2 shows the average monthly temperature, rainfall, and evapotranspiration (ETo) for the service area. Actual annual rainfall totals deviate quite significantly from the 30-year average as illustrated in Figure 2-3; in most years, precipitation totals fall below the mean.

Figure 2-2: Average Climate Conditions[10]



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temp	47.1	51.2	55.2	59.6	66.0	72.2	76.0	75.1	72.1	64.3	53.8	46.9
Precip	3.85	3.75	3.07	1.39	0.67	0.19	0.00	0.04	0.25	0.99	2.30	3.61
ETo	1.26	1.95	3.03	4.66	5.77	7.61	7.06	6.71	4.98	3.71	1.79	1.08

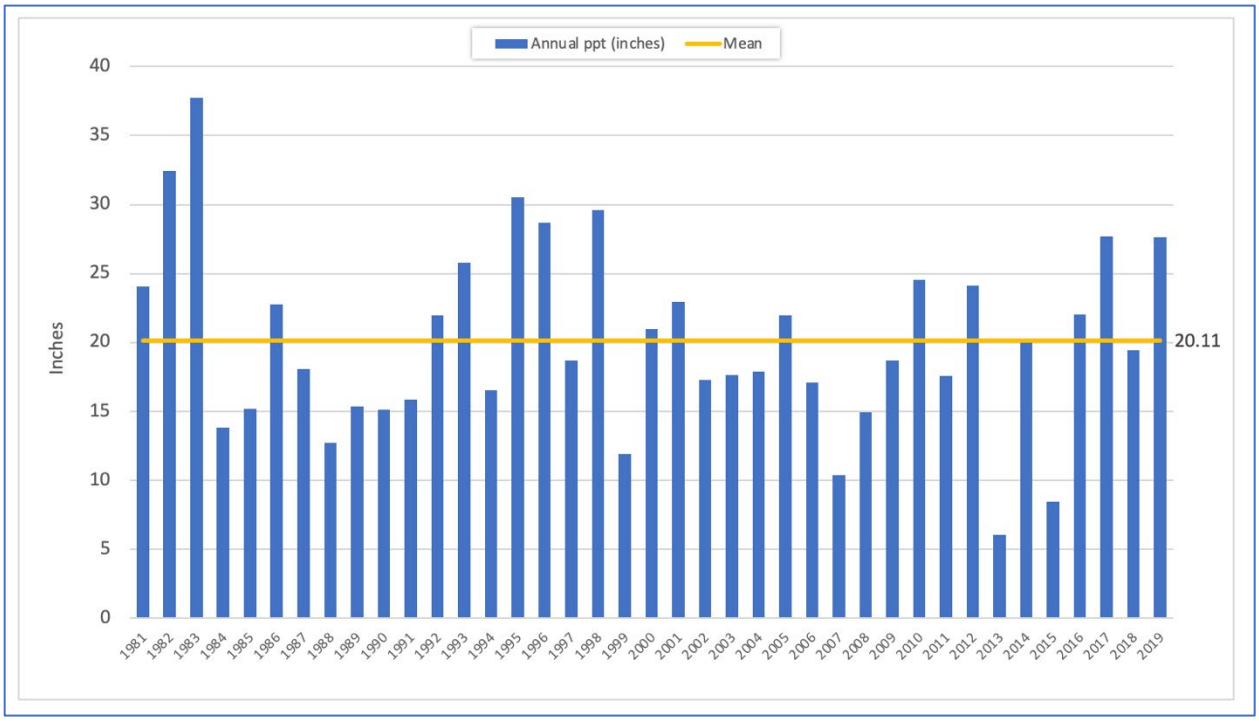
2.1.1 Climate Change

While the California Water Code does not prescribe specific climate change planning and management measures for water suppliers, it does emphasize that climate change is appropriate to consider when

[10] Temperature and rainfall data represents annual averages from 1981-2019 from the PRISM Climate Group https://prism.oregonstate.edu/ Location: Lat: 38.5680 Lon: -121.5352 Elev: 20ft; ETo data is from Verona - Sacramento Valley - Station 235, May 2012 - Oct 2020.

assessing drought risk assessment, water conservation and use efficiency, and demand management and supply—both in a historical and projected context.

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



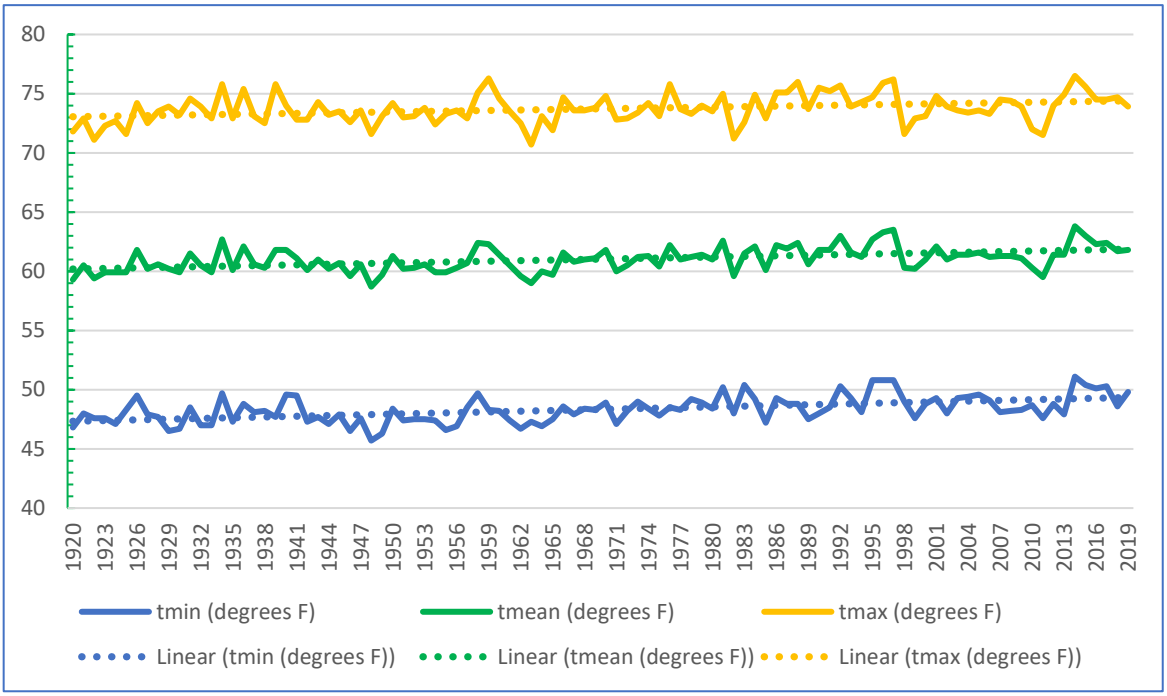
Given the State's reliance on imported water from other watersheds, including from the Sacramento Valley, any effect from climate change on Sierra Nevada snowpack and flows into Northern California reservoirs and the Delta region will have a serious impact on water availability, both locally and statewide. Risks to the City's specific water supplies are further discussed in Chapter 3.

As shown by the trendlines in Figure 2-4, there has been a gradual warming in average temperatures over the past 100 years. Increasing temperatures regionally can result in increased demands, especially from outdoor water uses, and place further stress on supply reliability if current surface water sources are not sufficient to meet increasing need. Additional discussion regarding the potential effects of climate change are included in Chapter 3, Chapter 4, and Chapter 5.

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

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

Figure 2-4: Historical Annual Temperature (1920-2019)[11]



2.2.1 Current Population and Historic Trends

The population served by the City includes a mix of water users and water user classifications. The City's customer base is predominantly residential representing about 90% of the City's water service connections, with non-residential customers the remaining 10% of the connections.

Table 2-2 presents the recent and estimated current population for the City's service area based on information provided by the California Department of Finance. [12] Because the water service area is contiguous with City boundaries represented by the California Department of Finance in their historic and recent population analyses, the estimates in the table are derived directly from these population estimates. The service area currently averages about 2.8 persons per connection.[13]

Table 2-2: Estimated Population – Historical and Current

2015	2016	2017	2018	2019	2020
51,540	53,089	53,384	53,876	53,995	54,328

[11] Temperature data is from the PRISM Climate Group https://prism.oregonstate.edu/ Location: Lat: 38.5680 Lon: -121.5352 Elev: 20ft

[12] California Department of Finance, E-5 City/County Population and Housing Estimates

[13] *2021-2029 Housing Element Update*, adopted July 2021, City of West Sacramento, Table A-6. https://www.cityofwestsacramento.org/residents/housing/housing-element-update

2.2.2 Current and Projected Land Use

The majority of the vacant large and small parcels in the City are in the Southport area, located south and east of the deep water shipping channel. This area includes industrial land use near the channel, a large mix of low to medium density residential and rural residential land designations, and swaths of recreation and parks, and open space along the river.

As remaining development in the Southport communities continues, significant new multi-family development and general redevelopment will also begin in the City's waterfront mixed-use districts, generally referred to as the Bridge District, Washington District and Pioneer Bluff. Infill on smaller vacant parcels and underutilized sites will also transform other parts of the City such as Central Business District and along West Capitol Avenue and Sacramento Avenue.

The north area includes a mix of residential, commercial, and industrial development. There is a concentration of industrial use along the deep water shipping channel and in the northwest part of the service area, including heavy, light and mixed-commercial industrial in the northwest. Residential land use north of the channel is mostly low density with pockets of medium and high-density residential areas. Other land uses include retail and service commercial, office, industrial, public or quasi-public uses, including parks and recreation, schools, and other facilities, agricultural/open space uses, and vacant land.

The recently adopted 2021-2029 Housing Element Update includes a detailed analysis of vacant lands, known and anticipated residential development projects, and estimates of near-term growth rates and housing characteristics as well as growth to 2040.

Using existing customer account information, coupled with an analysis of recent customer water use data, the "current" number and mix of residential and non-residential water users can be characterized. This provides a representation of the current land use and current unit water demands by land-use classification (as further discussed in Chapter 4).

Building on the current representation, data and analysis detailed in the 2021-2029 Housing Element Update provides a basis for estimates of future growth within each of these general land-use classifications to generate an overall characterization of the future land use and customer classifications requiring City water service. Table 2-3 provides the resulting representation of current and forecast residential connections, in 5-year increments, through 2045. Values in this table reflect information detailed in Appendix A and Appendix B of the City's 2021-2029 Housing Element Update with an estimated distribution among residential classifications for the purpose of estimating future water needs. Actual growth within each classification will be dependent on proposed development projects and other considerations the City will evaluate as part of its on-going planning and community development efforts.

Table 2-3: Current and Projected Future Residential Housing Connections[14]

Residential Customers			Cumulative Connections					
			Current	2025	2030	2035	2040	2045
Single Family	Current		13,130	13,130	13,130	13,130	13,130	13,130
	R1	Future	0	1,385	2,770	3,590	4,410	5,960
	R2	Future	0	1,520	3,040	4,010	4,980	6,810
Total Single-Family			13,130	16,035	18,940	20,730	22,520	25,900
Multi-Family	Current		320	320	320	320	320	320
	Studio	Future	0	565	1,130	1,380	1,630	2,100
	1B	Future	0	705	1,410	1,770	2,130	2,810
	2B	Future	0	510	1,020	1,220	1,420	1,800
	3B	Future	0	45	90	110	130	170
Total Multi-Family			320	2,145	3,970	4,800	5,630	7,200
Total Residential Connections			13,450	18,180	22,910	25,530	28,150	33,100

Using the City's recent non-residential customer water use data, the ratio of residential to non-residential connections was estimated to be one non-residential connection for every 10 residential connections – or 10%. Further analysis allowed an estimate of non-residential customers to be subdivided among primary classifications of commercial, public, industry and irrigation. These ratios were used to estimate future non-residential connections expected to occur to as residential growth occurs. Table 2-4 presents the forecast non-residential connections.

Table 2-4: Current and Projected Future Non-Residential Connections

Non-Residential Connections		Cumulative Connections					
		Current	2025	2030	2035	2040	2045
Comm	Existing	850	850	850	850	850	850
	Future	0	370	720	930	1,120	1,500
Public	Existing	75	75	75	75	75	75
	Future	0	40	90	110	130	180
Industry	Existing	95	95	95	95	95	95
	Future	0	10	20	20	30	40
Irrigation	Existing	366	366	366	366	366	366
	Future	0	10	30	30	40	50
Cannabis		0	2	4	6	8	10
Total Non-Residential		1,386	1,818	2,250	2,482	2,714	3,166

A new category was added to the non-residential forecast to reflect the City's anticipated expansion of the Cannabis industry. The City is currently evaluating such potential projects. Since this particular

[14] The "Current" multi-family quantity reflects total connections and does not reflect the quantity of actual multi-family units. The "Future" values reflect forecast units within each sub-classification.

industry can be water intensive (a result of concentrated plant growth in controlled environments), the City recognizes this industry may have a unique water demand factor and wanted to explicitly recognize this water use (see Chapter 4 for further details).

Table 2-5 presents the expected total water service connections by classification, combining the new residential and non-residential connections with the existing connections. This connection forecast will be used to estimate future water use, as detailed in Chapter 4.

Table 2-5: Expected Total Water Service Connections

Customer Class		2025	2030	2035	2040	2045
Existing	Single Family Residential	13,130				
	Multi-Family Residential	320				
	Commercial/Institutional	1,020				
	Landscape Irrigation	366				
New	Single Family Residential	2,905	5,810	7,600	9,390	12,770
	Multi-Family Residential	1,825	3,650	4,480	5,310	6,880
	Commercial/Institutional	420	830	1,060	1,280	1,720
	Landscape Irrigation	10	30	30	40	50
Total	Single Family Residential	16,035	18,940	20,730	22,520	25,900
	Multi-Family Residential	2,145	3,970	4,800	5,630	7,200
	Non-residential	1,816	2,246	2,476	2,706	3,156
	Total Connections	19,996	25,156	28,006	30,856	36,256

2.2.3 Projected Population

To forecast projected service area population, the forecast of new water service connections and the City's projected occupancy rate and projected 2040 population are used, adding the new residents to the existing population. Growth beyond 2040 assumes a continued annual growth rate of 3%.

The resulting projected population through the planning horizon of 2045 is presented in Table 2-6. Values are rounded to represent the estimated nature of this forecast.

Table 2-6: Population Forecast[15]

2020	2025	2030	2035	2040	2045
54,328	64,449	74,570	81,120	87,999	102,015

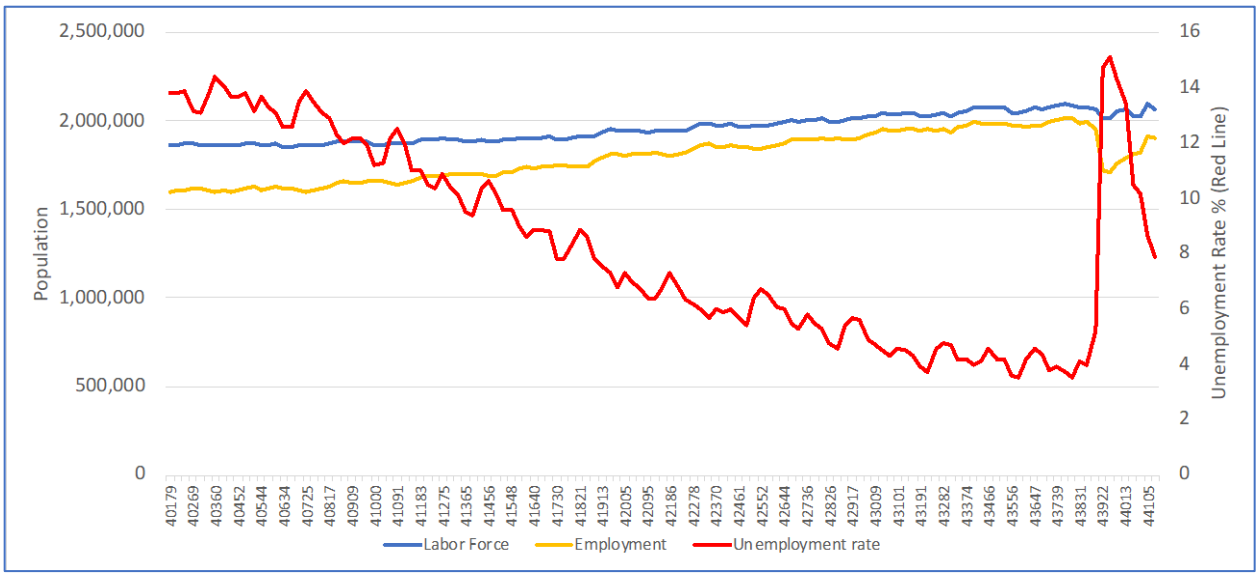
[15] 2020 and 2040 populations are consistent with the City's 2021-2029 Housing Element Update, specifically Table A-1 and Table A-3. u

2.2.4 Economic Trends & Other Social and Demographic Factors

The City of West Sacramento's local economy is diverse and well-rounded. The City's location along a major regional and interstate transportation corridor, along with the deep water shipping port, provides for a strong industrial and logistics industry. The City also supports strong sectors of employment in education and healthcare, public administration, professional services, arts and entertainment, and construction, along with the typical retail and commercial jobs to support a growing residential population.

While the City isn't technically in Sacramento County, it is part of a four-county metropolitan area that includes Yolo County, Sacramento County, and portions of Placer County and El Dorado County. It closely follows the economic trends of the Sacramento – Roseville – Arden-Arcade Metropolitan Statistical Area. Since 2010 the metro area has seen impressive growth adding jobs and decreasing the unemployment rate from as high as 13% in January 2011 to just over 3% as recently as December 2019. However, the coronavirus pandemic crippled the national (and global) economy in 2020 and the area was not spared from the downturn. The unemployment rate in the area spiked to almost 14% in May 2020. Since then, the area has regained some of the jobs, but the labor force has dropped about 5% year over year and there remains a high level of uncertainty with the pace of economic recovery due to the pandemic. These data are shown in Figure 2-5.[16] Still, West Sacramento is projected to experience more job growth than any other city in Yolo County, accounting for more than half (60 percent) of projected growth in Yolo County from 2015 to 2035.[17]

Figure 2-5: Sacramento County Employment Data, January 2010 – November 2020



16 U.S. Bureau of Labor Statistics: Sacramento – Roseville – Arden-Arcade, CA Metropolitan Statistical Area

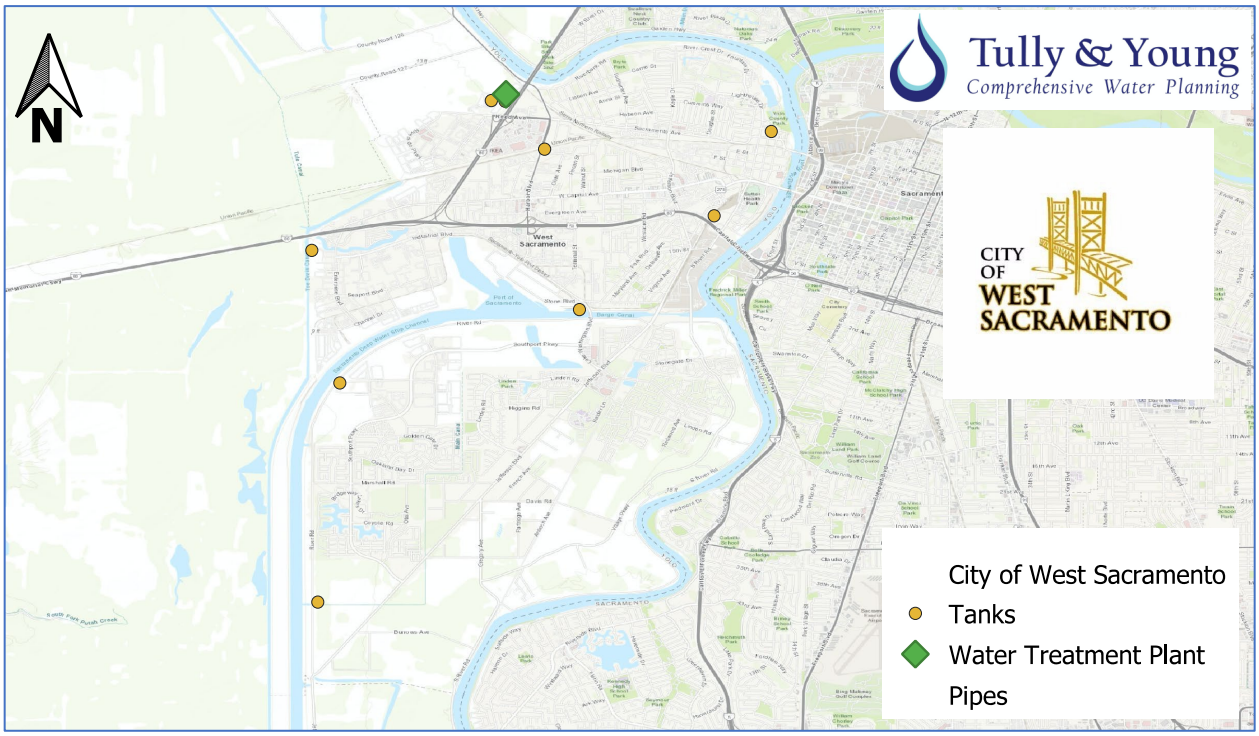
[17] City of West Sacramento General Plan Background Report, Sec. 4-5 Employment Projections

2.3 Delivery System Details

This subsection focuses specifically on the City's potable water delivery systems. The water supplies are described in Chapter 3, with water uses described in Chapter 4.

The City's Bryte Bend Water Treatment Plant (WTP) began treating surface water in 1988, allowing the City to expand water supplies beyond the historical reliance on groundwater.[18] Using a treatment process consisting of chemical coagulation, Actiflo® high rate clarification, dual media granular activated carbon filtration, and chlorine disinfection, the WTP treats surface water diverted from the Sacramento River. From the WTP, treated water is pumped to customers and reservoirs throughout the City via an extensive distribution system (see Figure 2-6). In 2003-2004, the WTP was expanded to a maximum capacity of 58 million gallons per day (mgd), limited by permit to 40 mgd from November to March and full capacity from April to October.

Figure 2-6: Potable Water System



[18] Additional information is available: https://www.cityofwestsacramento.org/government/departments/public-works/operations/water-treatment/plant-operation

2.4 Energy Intensity

Among the statutory changes enacted with new requirements for 2020 UMWPs, an urban supplier shall include information it can readily obtain related to the energy use to produce, treat and deliver water.[19]

Referred to as "Energy Intensity Reporting" for urban water suppliers, this is defined as the total amount of energy expended in kilowatt-hours (kWh) on a per acre-foot basis to take water from the location where the urban water supplier acquires the water to its point of customer delivery.

For purposes of this 2020 UWMP, the City is reporting its energy intensity using the Total Utility Approach. This method sums the annual net energy consumed for all water management processes, divided by total volume of water produced in acre feet. These processes include diversion, conveyance, placement into storage, treatment, and distribution. The total energy intensity is reported in Table 2-7.

Table 2-7: Energy Intensity – Total Utility Approach[20]

Sum of All Water Management Processes	
Volume of Water Entering Process (acre-feet)	11,847
Energy Consumed (kWh)	7,272,844
Energy Intensity (kWh/acre-foot)	613.9

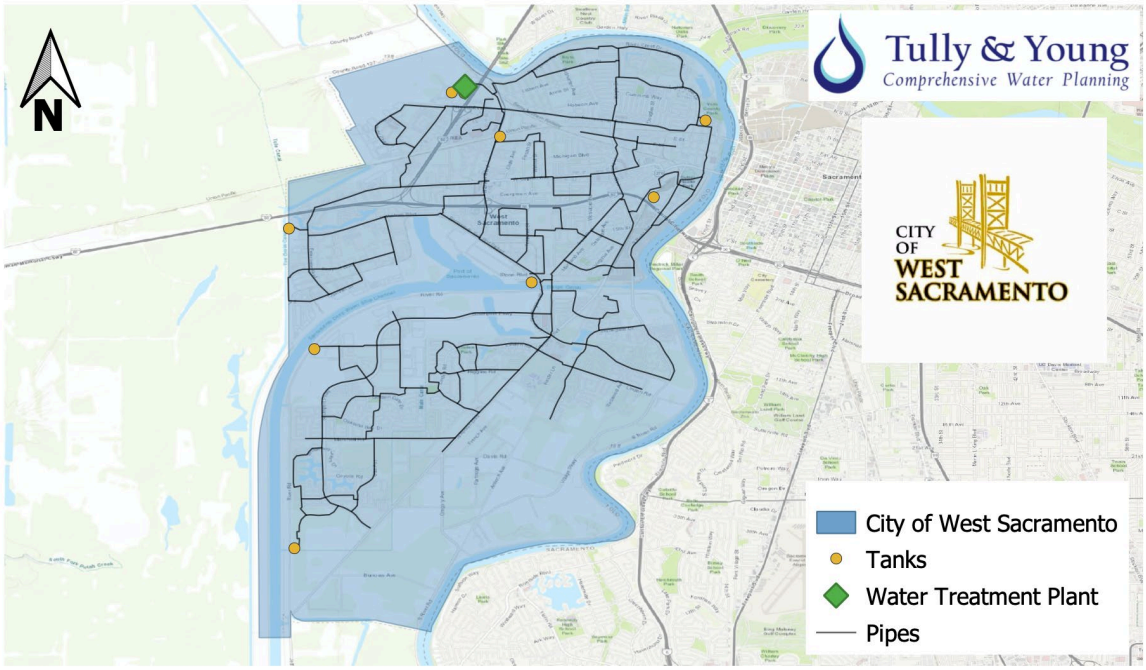
[19] California Water Code Section 10631.2(a).

[20] Energy consumption numbers cover water treatment plant and pump stations for the period August 2020 through July 2021. Monthly water production from the treatment plant differs slightly from the energy use period due to variations in electric billing cycles not lining up perfectly monthly.

Chapter 3
Water Supply

The City of West Sacramento (City) has numerous water supply sources that serve its customers. The City's diverse surface water supplies – derived from water rights and contracts as well as groundwater – provide significant volumes of water that can be used to meet end user demands. However, the details imbedded in each surface water right and contract impact the monthly availability of each supply source. This limited availability requires the City to carefully manage its water supply portfolio to ensure sufficient water supplies in extended drought periods. This section details the City's water supply portfolio and identifies the key components within each water asset that impact the City's long-term water supply reliability. Figure 3-1 shows the City's service area and key water supply features.

Figure 3-1: West Sacramento Service Area and Key Water Supply Features



3.1 Surface Water Supply Sources

The City's water supplies are derived from one primary surface water source: the Sacramento River watershed. The City's three surface water supplies are: (1) State Water Resources Control Board appropriative water right permit; (2) Central Valley Project contract; and (3) North Delta Water Agency contract. All of these water assets are derived from the Sacramento River watershed and are collectively managed in order to optimize delivery in different year types, reduce delivery costs, manage

water quality issues, and handle emergency situations. The City is also developing other water supply sources, including expanding groundwater sources and an emergency intertie with the City of Sacramento, in order to further support its long-term water management objectives.

A fundamental conclusion from the water supply analysis in this 2020 UWMP is that the City requires active water supply management of all of its sources in order to ensure sufficient supplies on a monthly basis during critical drought periods. This management includes close coordination with the United States Bureau of Reclamation to best manage the City's Central Valley Project contract supplies. The sections below provide significant detail about the City's water assets and management actions needed to ensure short-term and long-term water supply reliability.

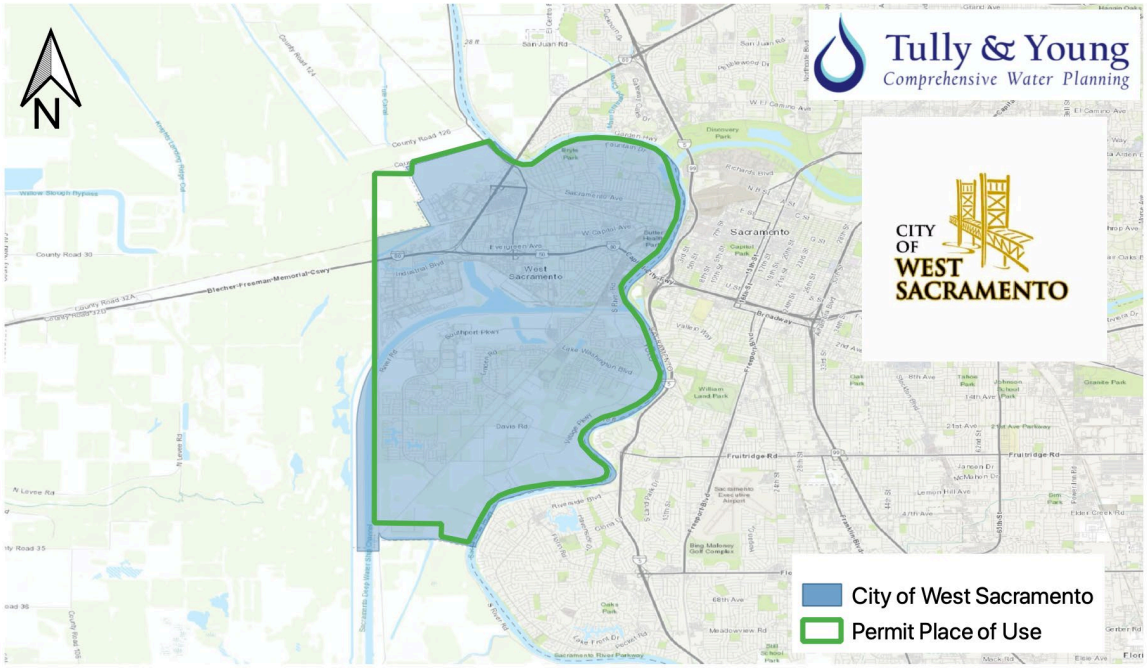
3.2 Sacramento River Watershed Water Supplies

The City's current surface water system is entirely derived from the Sacramento River watershed. This single physical surface supply source is derived from both the natural flow of the Sacramento River as well as stored water in both the federal and state reservoir systems. Importantly, the City's water supply intake accesses only the Sacramento River, creating an inherent vulnerability if there were a catastrophic event in that watershed that prevented diversion of the surface water resources. Nevertheless, the City's three surface water supply sources – State Water Resources Control Board Permit 18150, Central Valley Project Contract No. 0-07020-W0187-P, and North Delta Water Agency Contract – provide reliable water supplies in normal, single dry, and five consecutive dry year conditions through 2045. The details of each supply is described in later sections of this Chapter.

3.2.1 SWRCB Appropriative Water Right Permit 18150

The City holds State Water Resources Control Board (SWRCB) issued appropriative water right Permit 18150 (Permit 18150). Permit 18150 has a 1977 priority date and may be diverted from the Sacramento River from January 1 through June 30th and September 1 through December 31st each year with a maximum diversion rate of 62 cubic feet per second (cfs) and total volume not to exceed 18,350 acre-feet per year. The water supply may be used for municipal purposes anywhere in the service area shown on the map in Figure 3-2 below.

Figure 3-2: West Sacramento Permit 18150 Place of Use



Permit 18150 has two important limitations. First, water may not be diverted in any year under the permit in July and August. In these two months, the City must use water supplies derived from its alternative water assets. Second, Permit 18150 is subject to "Term 91." Term 91 is a special Permit condition that limits the diversion dates of some SWRCB issued appropriative water rights based on river conditions. Specifically, the SWRCB declares Term 91 when it is determined that the State Water Project (SWP) and U.S. Bureau of Reclamation's Central Valley Project (CVP) are required to release stored water in excess of low natural flow to meet Sacramento Valley in-basin uses plus export demands. In short, when Term 91 is activated, the City may not divert water under Permit 18150.

Table 3-1 shows the water use under Permit 18150 since 2016. Term 91 was declared in water years 2016, 2018, and 2020.

Table 3-1: Last Five Years of Water Use Under Permit 18150 on a Monthly Timestep

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2016	588	565	603	800	1,035	0	0	0	0	494	611	591	5,287
2017	559	493	594	641	1,137	1,334	0	0	1,311	1,114	684	637	8,504
2018	576	593	596	719	1,092	0	0	0	0	264	363	570	4,773
2019	550	487	553	699	952	1,173	0	0	1,139	1,024	822	578	7,978
2020	560	612	704	785	1,102	172	0	0	73	290	0	150	4,448

Term 91 curtailments impact the monthly and even daily availability of water derived from Permit 18150. In 2020, for example, Term 91 was declared in May, withdrawn in October, declared again in October, and then withdrawn in January of 2021. This erratic implementation of Term 91 requires the

City to have a flexible water supply portfolio that can be used to backfill supply deficits related to Permit 18150.

In light of the climatological trends that appear to be changing runoff patterns for surface water supplies as well as the tightening regulatory requirements in meeting water quality conditions in the Sacramento-San Joaquin Bay Delta (Delta), the SWRCB is likely to declare Term 91 more often in the future and the curtailment order may have duration that lasts beyond the historical pattern. Thus, for purposes of this UWMP, the City has taken a conservative approach to Term 91 curtailments by showing Term 91 as active in six or seven months in the five consecutive dry year scenario. Table 3-2 shows the projected monthly availability of Permit 18150 in normal, single dry, and five consecutive dry year conditions through 2025. Table 3-3 shows the annual availability through 2045 based on a similar monthly availability pattern.

Table 3-2: Monthly Availability of Permit 18150 Through 2025

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Normal	2,292	2,294	2,294	2,294	2,294	0	0	0	0	2,294	2,294	2,294	18,350
Single Dry	3,812	3,443	3,812	0	0	0	0	0	0	0	0	3,812	14,879
2021	3,058	3,058	3,058	3,058	0	0	0	0	0	0	3,058	3,058	18,348
2022	3,727	3,442	3,727	3,727	0	0	0	0	0	0	0	3,727	18,350
2023	3,812	3,443	3,812	0	0	0	0	0	0	0	0	3,812	14,879
2024	3,727	3,442	3,727	3,727	0	0	0	0	0	0	0	3,727	18,350
2025	3,058	3,058	3,058	3,058	0	0	0	0	0	0	3,058	3,058	18,348

Table 3-3: Annual Availability of Permit 18150 Through 2045

Year Type		2025	2030	2035	2040	2045
Normal		18,350	18,350	18,350	18,350	18,350
Single Dry Year		14,879	14,879	14,879	14,879	14,879
Multi-Year Drought	Year 1	18,348	18,348	18,348	18,348	18,348
	Year 2	18,350	18,350	18,350	18,350	18,350
	Year 3	14,879	14,879	14,879	14,879	14,879
	Year 4	18,350	18,350	18,350	18,350	18,350
	Year 5	18,348	18,348	18,348	18,348	18,348

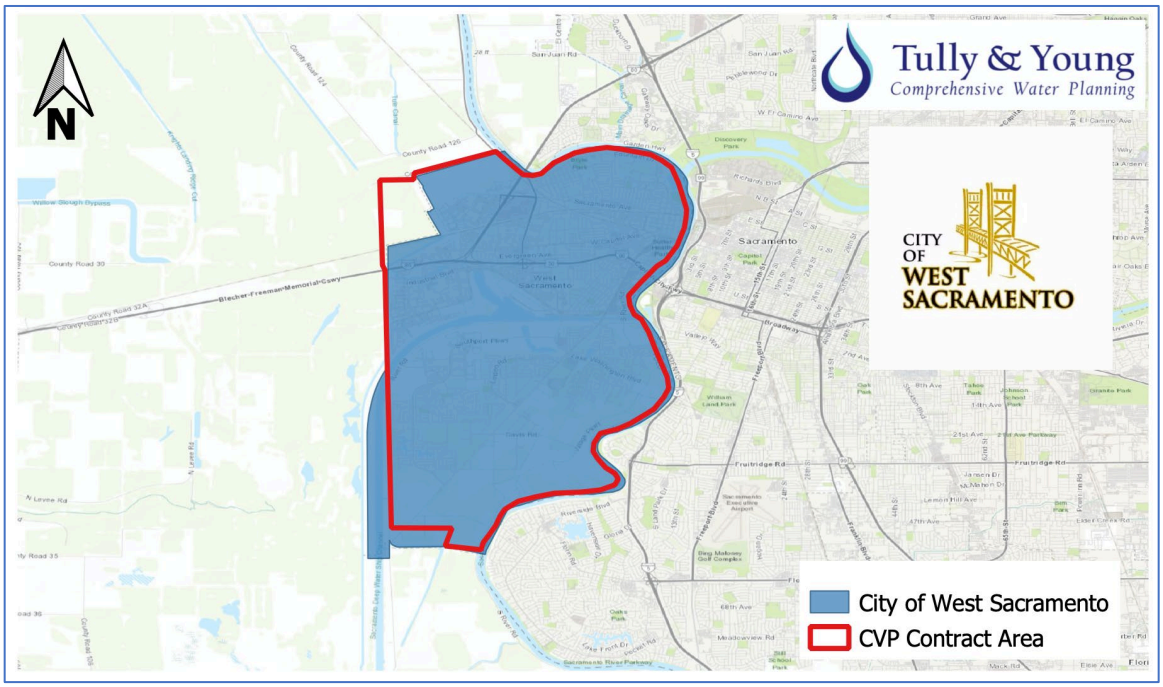
3.2.2 Central Valley Project Contract Supplies

The City's Water Infrastructure Improvements for the Nation Act (WIIN Act) amendment to its Central Valley Project Contract number 0-07020-W0187 (CVP Contract)[21] was signed by Reclamation on May 26, 2020. The City's amended CVP Contract combines two sources of supply: (1) water supplies derived from Permit 18150; and (2) water supplies derived from storage in the Central Valley Project. The CVP Contract incorporates Permit 18150 water as "Base Supply" and supplies derived from the Central Valley

[21] The Amended Contract number is 0-07020-W0187-P

Project as "Project Supply." The CVP Contract place of use includes nearly the entire City boundary and is shown in Figure 3-3.

Figure 3-3: CVP Contract Place of Use



Article 3 of the CVP Contract limits the City's Base Supply to 18,350 acre-feet per year and the Project Supply to 9,680 acre-feet per year. Article 3 further limits the combined supply available under both the Base Supply and Project Supply to 23,600 acre-feet per year. Importantly, under Article 9(c) the City is required to use the Base Supply (Permit 18150) water before using any Project Supply water. As such, the City uses CVP Project Supply in July and August of each year (the two months when Permit 18150 is dormant) as well as in all months where the SWRCB declares a Term 91 condition. Lastly, the amended water year under the CVP Contract starts March 1 and ends on the last day of February – meaning that the 9,680 acre-feet of water available under the contract must be managed on a monthly basis through this time period.

The water supplies available under CVP Contract are subject to Reclamation's Municipal and Industrial Shortage Policy (M&I Shortage Policy).[22] The M&I Shortage Policy allocates water supplies under constrained conditions based upon Reclamation's water year percentage allocation number applied against the last three years of CVP Project Supply use in unconstrained conditions. Adjustments to the historical use numbers can be made based on alternative water supplies used in lieu of CVP Project Supply, population growth, extraordinary conservation measures, and other unique or unusual circumstances. The primary component for obtaining larger dry year supplies, however, is that the City uses CVP Project Supply in unconstrained water years to access more CVP Project Supply in constrained

[22] https://cawaterlibrary.net/wp-content/uploads/2017/10/miwsp-guidelines.pdf

water years. In light of Article 9(c), however, the City may have difficulty boosting its CVP Project Supply water use in unconstrained conditions.

Table 3-4 shows the City's last five years of CVP Project Supply water use. Tables 3-5 and 3-6 show the annual availability of CVP Project Supply for the City in normal, single dry, and five consecutive dry years through 2045. The monthly availability of the CVP Project Supply is detailed later in this chapter.

Table 3-4: West Sacramento CVP Allocations 2016-2020 (AFY)

Year	Use	Allocation %
2016	4,133	100%
2017	4,412	100%
2018	4,053	100%
2019	3,873	100%
2020	871	75%

Dry year supply availability for the Central Valley Project Contract is based upon the Municipal and Industrial Shortage Policy (M&I Shortage Policy). The M&I Shortage Policy essentially takes the last three years of actual use of CVP Project Supply and creates an average use number. Then, an allocation percentage is multiplied against that 3-year average to give the upcoming year's water allocation. For purposes of Table 3-5, we use the current three year use average in 100% allocation years (2017, 2018, and 2019) for a total of 4,113 acre-feet. We then attach percentages to those years to project future supply reliability based on conservative assumptions to ensure coordinated management actions. We assume that a single dry year equates to a critically dry year and use 25% allocation under the M&I Shortage Policy. For the five consecutive dry years we assume a 75%, 50%, 25%, 25%, and 50% allocation in accordance with other regional purveyors assumptions. This pattern has never happened in the historical record but represents a conservative pattern for water supply availability in the event of a significant and prolonged drought scenario and also to represent unforeseen conditions that may be attributed to climate change.

Table 3-5: Annual Availability of CVP Allocations Through 2025

Year Type		Amount
Normal		9,680
Single Dry Year		1,028
Multi-Year Drought	Year 1	3,084
	Year 2	2,056
	Year 3	1,028
	Year 4	1,028
	Year 5	2,056

Table 3-6 represents a similar pattern of supply availability also based upon a conservative Central Valley Project water use projected into the future. Here, future unconstrained water use would occur in

months when the City's Permit 18150 is unavailable. As such, the CVP Project Supply may only be available for use in two months of the year in wet conditions – like 2019 – or may be more widely used if Term 91 is implemented in June and lifted in October as has been normally observed. In this way, the projection for CVP Project Supply availability hinges upon the actual use of the CVP Project Supply in unconstrained conditions when allocations are 100%.

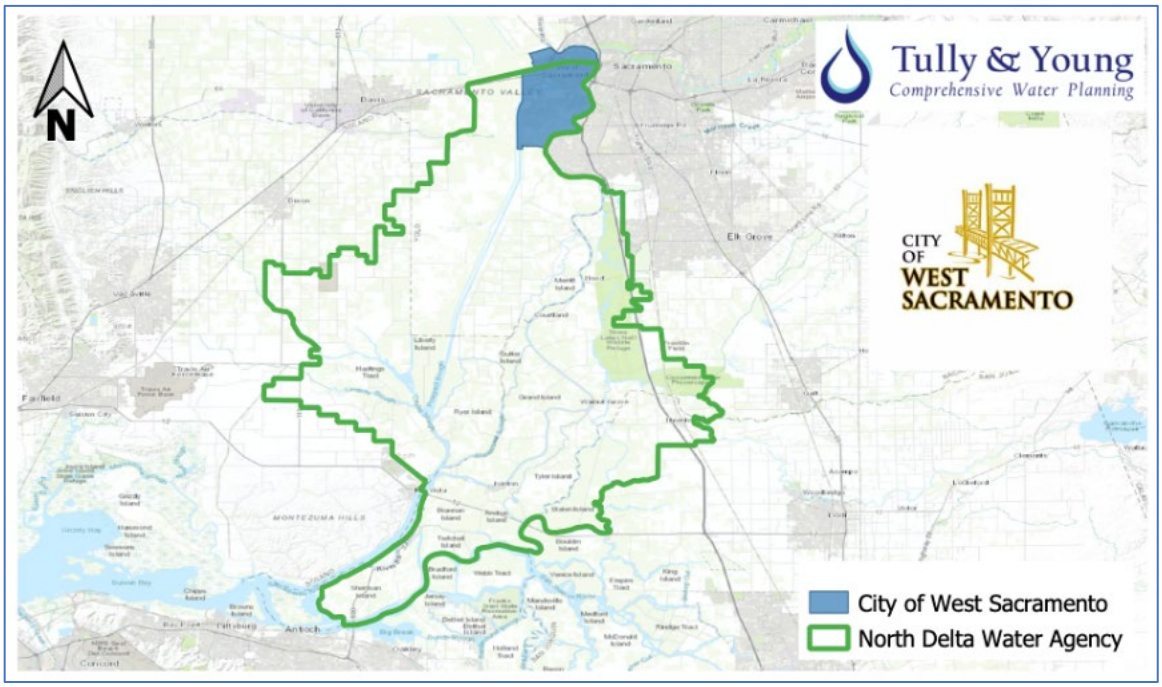
Table 3-6: Annual Availability of CVP Allocations Through 2045

Year Type		2025	2030	2035	2040	2045
Normal		9,680	9,680	9,680	9,680	9,680
Single Dry Year		1,063	1,147	1,230	1,313	1,396
Five Consecutive Drought Years	Year 1	3,190	3,440	3,689	3,938	4,188
	Year 2	2,127	2,293	2,459	2,626	2,792
	Year 3	1,063	1,147	1,230	1,313	1,396
	Year 4	1,063	1,147	1,230	1,313	1,396
	Year 5	2,127	2,293	2,459	2,626	2,792

3.2.3 North Delta Water Agency

The North Delta Water Agency was formed in 1974 to protect the water resources in specific portions of Yolo, Solano, Sacramento, and San Joaquin counties. In 1981, the NDWA executed the "Contract Between the California Department of Water Resources for the Assurance of a Dependable Water Supply of Suitable Quality" (NDWA Contract) as a settlement of claims related to the then-proposed "Peripheral Canal." The NDWA Contract assures that the State, through both the State Water Project (SWP) and the California Department of Water Resources' (DWR) water right permits, will maintain a dependable water supply of adequate quantity and quality for municipal, industrial, and agricultural purposes within the NDWA service area. Specifically, Article 8(a) states in relevant part "…the State shall furnish such water as may be required within the Agency to the extent not otherwise available under the water rights of water users." A large portion of the City's service area boundary lies within the NDWA service area and the property owners within the NDWA boundary are paying property tax assessments to secure NDWA water supplies. Figure 3-4 shows the City's service area in the context of the NDWA service area.

Figure 3-4: City of West Sacramento Service Area and NDWA Service Area



The City delivers the NDWA water supplies for uses within the City's service area boundary that are within the NDWA boundary. NDWA water supplies are 100% reliable in all year types. The City plans to deliver these supplies in future years to meet a portion of its service area demands – including all current and projected future demands in the NDWA service area. Table 3-7 shows the last five years of NDWA deliveries within the City's service area. Tables 3-8 and 3-9 show the annual availability of NDWA supplies in normal, single dry, and five consecutive dry years through 2045. These supplies are available to meet any monthly demand in the NDWA service area within the City and represent increased use over time corresponding to increased demands in the City's service area as the City continues its residential, commercial, and industrial growth.

Table 3-7: West Sacramento NDWA Use 2016-2020 (AFY)

Year	Used
2016	1,774
2017	0
2018	1,210
2019	0
2020	5,932

Table 3-8: Annual Availability of NDWA Through 2025

Year	Amount
Normal	7,995
Single Dry	7,995
Dry Year 1	7,995
Dry Year 2	7,995
Dry Year 3	7,995
Dry Year 4	7,995
Dry Year 5	7,995

Table 3-9: Annual Availability of NDWA Through 2045

Year Type		2025	2030	2035	2040	2045
Normal		8,915	9,835	10,755	11,675	12,696
Single Dry Year		8,915	9,835	10,755	11,675	12,696
Multi-Year Drought	Year 1	8,915	9,835	10,755	11,675	12,696
	Year 2	8,915	9,835	10,755	11,675	12,696
	Year 3	8,915	9,835	10,755	11,675	12,696
	Year 4	8,915	9,835	10,755	11,675	12,696
	Year 5	8,915	9,835	10,755	11,675	12,696

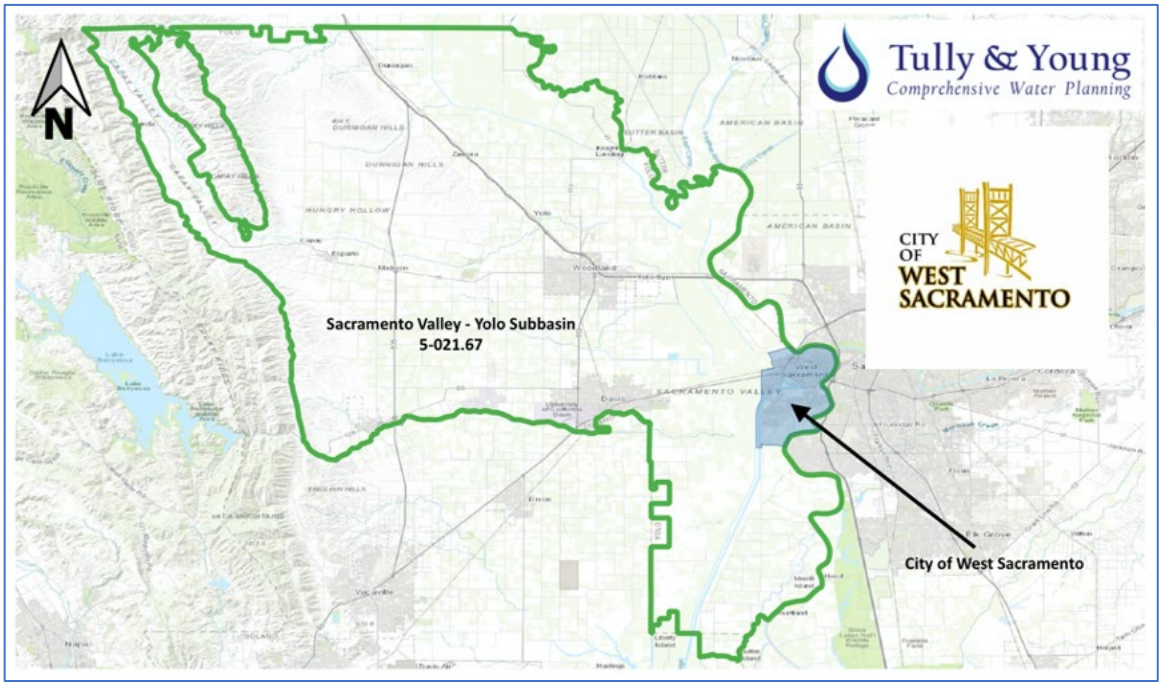
3.3 Groundwater

Groundwater supplies are another component of the City's water supply portfolio. The City transitioned to mostly surface water supplies after construction of the Bryte Bend Water Treatment Plant in 1986. At that time, the City limited its extraction and treatment of groundwater supplies to meet potable water demands but retained its ability to use the groundwater supplies to meet additional future demands. At this time, the City is looking at ways to rehabilitate and expand its groundwater systems in order to supplement water supplies in its water supply portfolio and provide an emergency back-up supply should the surface supplies derived from the Sacramento River watershed become unavailable. This section provides a description of the groundwater basin, characterizes the management structures related to various areas in the groundwater basin, and quantifies supplies available to the City from the groundwater basin.

3.3.1 Groundwater Basin[23]

The City overlies the Yolo Subbasin. The City's service area in the context of the Yolo Subbasin is shown below in Figure 3-5.

Figure 3-5: City of West Sacramento's Service Area in Yolo Subbasin



The Yolo Subbasin is located in the southern portion of the Sacramento Valley and is bounded on the east by the Sacramento River, the west by the Coast Range, the north by Cache Creek, and the south by Putah Creek. The water producing areas include alluvium from flood basins and historical stream channel flows. The water bearing areas include the sand and gravel lenses that are underlain by brackish groundwater. The groundwater basin fluctuates annually based upon hydrological and regulatory conditions. In dry years, groundwater extractions occur at an accelerated rate where surface water supplies are unavailable. In wet years, the basin generally recovers and basin levels rebound for future uses.[24]

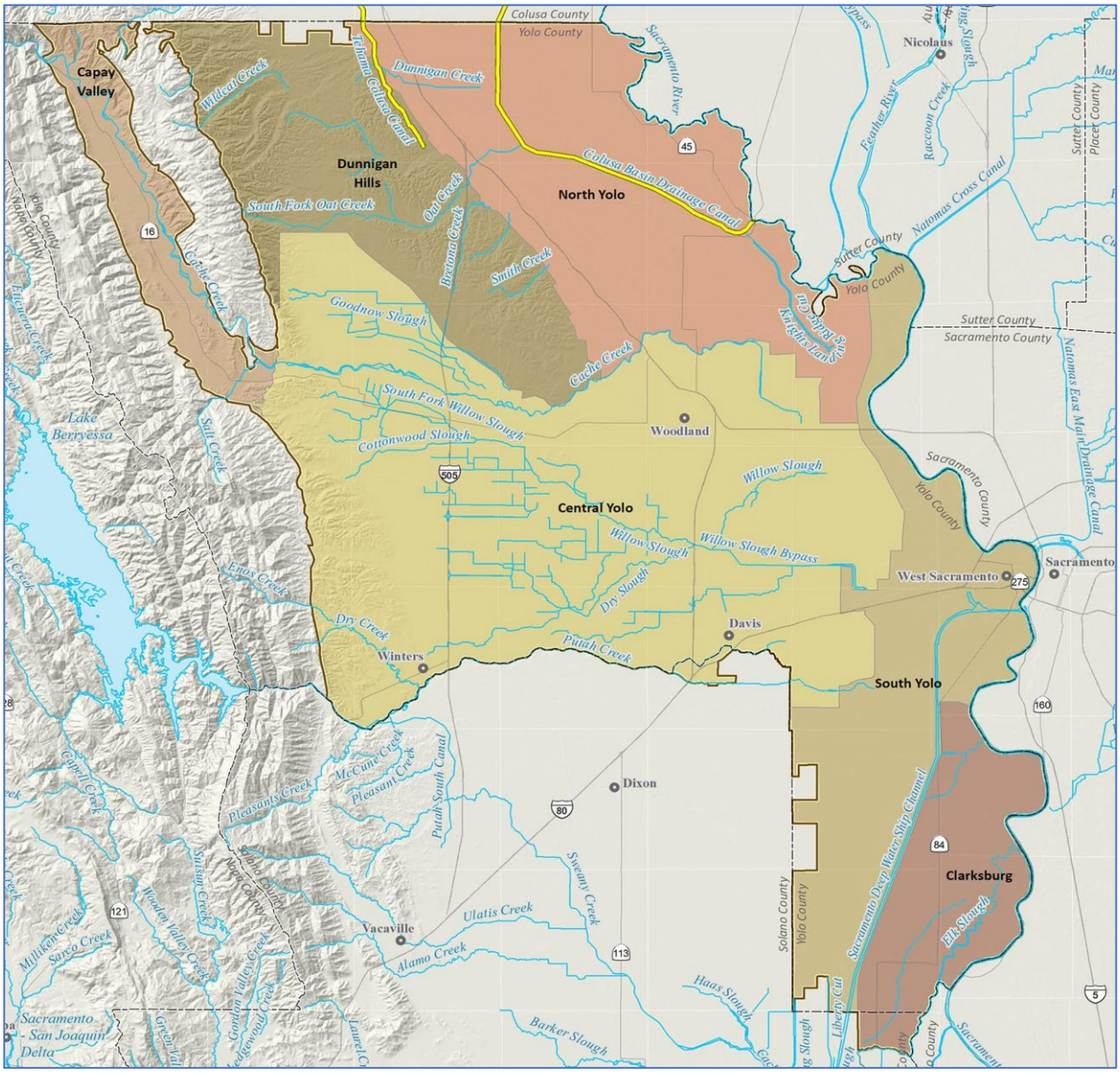
3.5.2 Groundwater Basin Management

The Yolo Subbasin Groundwater Agency (Yolo GA) is the Groundwater Sustainability Agency (GSA) that oversees the Yolo Subbasin. The Yolo GA's boundaries precisely coincide with the Yolo Subbasin boundaries and there are no other GSA's within the Yolo Subbasin. The GSA, however, is subdivided

[23] https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Bulletin-118/Files/2003-Basin-Descriptions/5_021_67_YoloSubbasin.pdf
[24] https://www.yologroundwater.org/yolo-groundwater-sustainability-plan

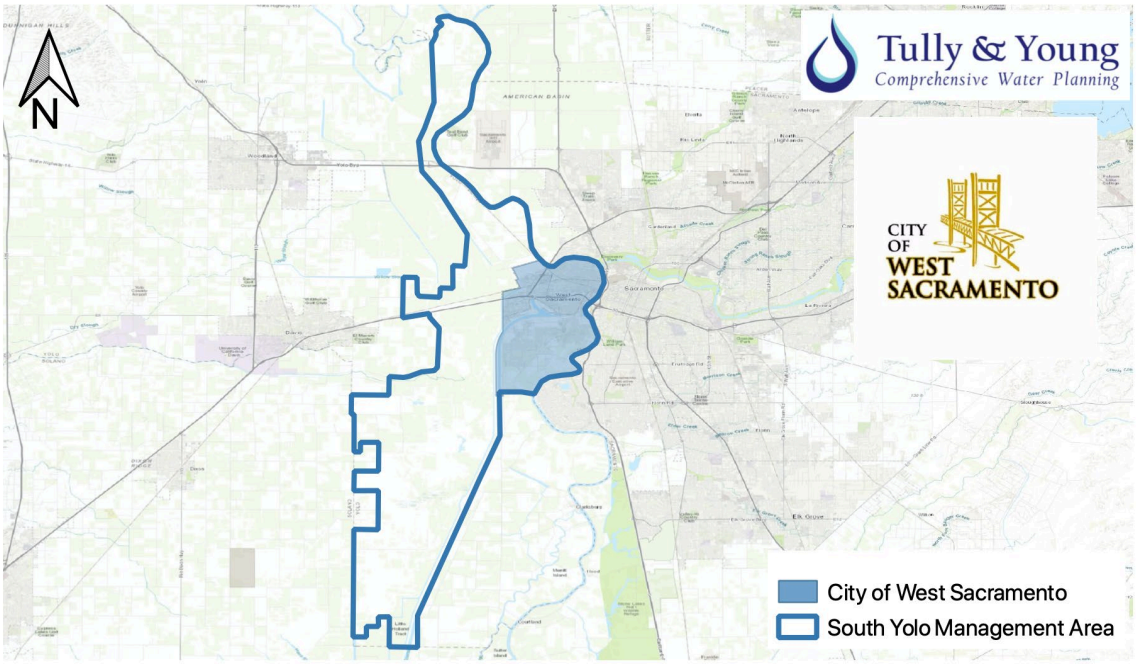
into six "management areas". These areas include: Capay Valley, Central Yolo, Clarksburg, Dunnigan Hills, North Yolo, and South Yolo. The Figure 3-6 shows the six management areas.

Figure 3-6: Yolo Subbasin Groundwater Agency Management Areas



The City is located in the South Management Area. Figure 3-7 shows the City Service Area in the South Yolo Management Area.

Figure 3-7: City of West Sacramento Service Area in the South Yolo Management Area



3.5.3 City's Groundwater Use

The City's has not significantly used groundwater assets for potable water uses derived from the Yolo Subbasin in the last five years. Although the City has numerous wells located within the City's service area, little water has been extracted from these wells in the last five years to serve City customers. Nevertheless, the City anticipates future groundwater use starting in 2025 to meet some demands within the City's service area. Table 3-10 shows the City's planned use of groundwater in normal, single dry, and five consecutive dry years from 2025 through 2045.

Table 3-10: Future Projected Groundwater Supply Availability Through 2045 (AFY)

Year Type		2025	2030	2035	2040	2045
Normal		2,000	2,000	2,000	2,000	2,000
Single Dry Year		2,000	2,000	2,000	2,000	2,000
Multi-Year Drought	Year 1	2,000	2,000	2,000	2,000	2,000
	Year 2	2,000	2,000	2,000	2,000	2,000
	Year 3	2,000	2,000	2,000	2,000	2,000
	Year 4	2,000	2,000	2,000	2,000	2,000
	Year 5	2,000	2,000	2,000	2,000	2,000

3.4 Recycled Water Supplies

The City captures wastewater in its water system and delivers that water to the Sacramento Regional County Sanitation District (SRCSD). SRCSD conveys and treats the City's wastewater beyond the boundaries of the City's service area. Specifically, the City's wastewater is delivered to SRCSD through

the Lower Northwest Interceptor pipeline which flows under the Sacramento River to SRCSD's facilities near Elk Grove, California. The City does not have any infrastructure to capture the treated wastewater provided by SRCSD nor any infrastructure to serve treated wastewater in its service area. As such, although the City may have an opportunity to use raw water to serve parks and other outdoor irrigated uses, at this time serving recycled water within its service area is not a viable option.

3.5 Desalinated Water

The City has no access to desalinated water supplies at this time and therefore does not consider desalinated water as a viable long-term water supply.

3.6 Planned Water Supplies

The City has additional need for an emergency back-up water supply that augments its existing water supply portfolio. This emergency back-up water supply sources should provide protection against catastrophic outages of the City's current surface water system or against denudation of the water in the Sacramento River. The City is in preliminary discussions with the City of Sacramento in an effort to gain access to water supplies on the eastern side of the Sacramento River, including supplies controlled by the City of Sacramento on the American River and North American Subbasin. Although these discussions are in their infancy, the City of West Sacramento has an acute need to develop redundant water supply systems in the event it is faced with a catastrophic outage.

3.7 Water Quality

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

West Sacramento continually monitors the water quality within its Water Service Area system and samples water at the sources as well as within the distribution system to ensure compliance with regulatory standards. West Sacramento treats the water derived from the contracted supplies and groundwater systems with appropriate treatment actions that meet all state and federal guidelines. Table 3-11 below shows the most recent water quality report issued by West Sacramento for the Water Service Area demonstrating compliance with water quality regulatory standards.

Table 3-11: West Sacramento Water Quality

Water Quality Standards	Goal Level	Max Level	Max Level Detected
Primary Standards			
Barium (mg/L)	200	1000	ND
Flouride (mg/L)	1	2	0.81
Arsenic (PBB)	1	6	2.1
Thalium (PBB)	1	2	ND
Secondary Standards			
Aluminum (mg/L)	600	0.2	0.077
Chloride (mg/L)	n/a	500	7
Odor (units)	n/a	3	6
E.C. (µs/cm)	n/a	1600	190
Sulfate (mg/L)	n/a	500	5.7
TDS (mg/L)	n/a	100	120
Silver (PBB)	n/a	0	ND
Calcium (mg/L)	n/a	n/a	12
Magnesium (mg/L)	n/a	n/a	7
Additional Constituents Analyzed			
Turbidity (unit)	n/a	1	0.071
Lead (µg/L)	15	0.2	ND
Copper (µg/L)	1300	300	71

As shown in the table, West Sacramento meets and exceeds all water quality conditions for its 2020 data collection and assessments.

3.8 Water Transfers and Exchanges

The City regularly engages in water transfers and exchanges. The City has provided a portion of its Project Supply to neighboring water agencies in the Sacramento River watershed through the United States Bureau of Reclamation's accelerated transfer program as allowed by the Central Valley Project Improvement Act (CVPIA). The City generally does not purchase any water supplies through transfers and exchanges to augment its water supplies in its water system. The City is contemplating developing option arrangements with Sacramento Vallely water users to supplement its supply portfolio in the event of extreme water supply conditions affecting California.

3.9 Water Supply Portfolio Assessment

The purposes of this section are to present the current and projected water supplies for the City of West Sacramento on a monthly basis and assess those supplies reliability under certain hydrological and regulatory conditions.

The City's three surface water supplies are: (1) State Water Resources Control Board water right Permit 18150; (2) Central Valley Project Contract No. 0-07020-W0187-P; and (3) North Delta Water Agency contract water. The City also shows the development of additional groundwater supplies in the future. All of these supplies are available in normal, single dry, and five consecutive dry years through the 25-year planning horizon in this 2020 UWMP. Table 3-12 summarizes the supplies available from 2021 through 2025.

Table 3-12: Potable Supply Availability in Varying Year Types Through 2025 (AFY)

Total Monthly Supply	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Normal	2,294	2,294	2,294	2,294	2,294	4,419	4,419	4,419	4,419	2,294	2,294	2,294	36,026
Single Dry	3,812	3,443	3,812	1,128	1,128	1,128	1,128	1,128	1,128	1,128	1,128	3,812	23,904
2021	3,058	3,058	3,058	3,058	1,847	1,847	1,847	1,847	1,847	1,847	3,058	3,058	29,432
2022	3,727	3,442	3,727	3,727	1,436	1,436	1,436	1,436	1,436	1,436	1,436	3,727	28,402
2023	3,812	3,443	3,812	1,128	1,128	1,128	1,128	1,128	1,128	1,128	1,128	3,812	23,904
2024	3,727	3,442	3,727	3,727	1,289	1,289	1,289	1,289	1,289	1,289	1,289	3,727	27,373
2025	3,058	3,058	3,058	3,058	1,676	1,676	1,676	1,676	1,676	1,676	3,058	3,058	28,406

Table 3-13 depicts the annual supplies available through 2045. The monthly timestep for management of these supplies would require similar management actions as shown in the 2021 through 2025 management actions.

Table 3-13: Future Projected Total Potable Supply Availability Through 2045 (AFY)

Year Type		2025	2030	2035	2040	2045
Normal		38,945	39,865	40,785	41,705	42,726
Single Dry Year		26,858	27,862	28,865	29,868	30,972
Multi-Year Drought	Year 1	32,455	33,625	34,794	35,963	37,234
	Year 2	31,392	32,478	33,564	34,651	35,838
	Year 3	26,858	27,862	28,865	29,868	30,972
	Year 4	30,328	31,332	32,335	33,338	34,442
	Year 5	31,392	32,478	33,564	34,651	35,838

Chapter 4
Water Use

Understanding water use characteristics is essential to enable the City to reliably and cost-effectively manage its water supplies to continue to meet customer needs. This section characterizes the City's retail customer demands – both the current demands and forecasted demands over the next few decades. Various water demand characteristics – such as how demands vary among different land use classifications, throughout the year, and under differing hydrologic conditions – all help guide the future demand projections.

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

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

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

This section is organized as follows:

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

4.1 Current Customer Water Use

As described in Chapter 2, the City has been serving potable water to over 15,000 customer connections for the past several years. Under normal operations, all of the water supplied by the City to its customers is drawn from the Sacramento River, treated at the City's water treatment plant, and delivered through an array of pipelines and turnouts (see Figure 2-6). The current customers, their recent and expected water use trends, and the City's on-going demand management efforts targeting these customers provide a foundational basis for this UWMP's water use forecast to 2045.

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

4.1.1 Customer Water Use: 2016 to 2019

Recent customer water use can help the City understand water use trends, effects of temporary use restrictions imposed during the most recent prolonged drought and recovery from such temporary restrictions, effects of long-term demand management measures, and other pertinent water use factors

relevant to its forecast of future water use. Water Code Section 10631(d)(1) also requires the City to quantify past customer water use.[25]

Table 4-1 presents the City's past metered customer water use by customer classification for 2016 through 2019. However, the City has been working on residential meter installations during this time period and still has about 10% unmetered. The City also records water use within four primary categories, though has been modifying its reporting among these categories over the past years as it converts to metered customer accounts, updates customer databases, and adapts billing services. As a result, the reporting by customer classification has limited utility for assessing trends within each sector.

The customer classifications include:

- Single-family residential
- Multi-family residential
- Commercial and Institutional
- Landscape Irrigation

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

	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Single-Family Residential	2016	16	18	17	17	26	36	42	52	55	50	39	24	391
	2017	198	174	195	229	390	454	648	549	536	383	260	223	4,241
	2018	214	232	196	257	412	534	581	620	415	379	307	211	4,359
	2019	306	242	279	327	430	587	613	638	543	461	385	289	5,102
Multi-Family Residential	2016	0	0	0	0	0	0	0	0	0	0	0	0	0
	2017	74	65	66	77	82	92	113	102	104	97	79	71	1,023
	2018	79	76	62	72	29	101	108	104	90	83	78	72	952
	2019	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial Institutional	2016	181	212	194	219	268	306	365	416	447	352	325	192	3,477
	2017	127	136	135	165	228	298	354	352	311	346	166	137	2,755
	2018	145	158	136	168	204	308	326	721	275	249	186	127	3,003
	2019	137	126	146	193	390	474	484	482	421	363	278	161	3,653
Landscape Irrigation	2016	9	11	10	18	18	74	109	127	145	116	61	10	709
	2017	7	6	14	20	82	128	171	151	130	90	42	19	859
	2018	12	22	13	40	124	143	152	163	122	85	50	13	939
	2019	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Metered Deliveries	2016	206	241	221	254	313	416	516	594	648	517	424	225	4,577
	2017	407	381	410	492	782	971	1,286	1,153	1,081	915	548	450	8,877
	2018	450	488	407	537	769	1,087	1,167	1,608	902	796	621	422	9,253
	2019	443	368	425	520	820	1,061	1,097	1,119	964	824	663	451	8,755

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

4.1.2 Customer Use in 2020

The majority of customers served by the City are metered at their connection to the City's distribution system as of 2020.[26] These metered values are collected periodically for each customer account and summarized into the City's annual reporting to the SWRCB Division of Drinking Water and to DWR.[27] The 2020 actual customer use presented in Table 4-2 represents the summarized delivery to all the City's customers. It does not, however, include the distribution system losses inherent in a pressurized water delivery system that occur during the City's efforts to treat, store and route the water throughout the extensive distribution system to each customer's connection.

Further, because metering and the recording by customer classification has been evolving over this time period, comparisons to the total values in Table 4-1 cannot be done.

Table 4-2: Customer Water Use: 2020 Actual Use (values in acre-feet)

Use Category	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Single-family Residential	213	252	285	329	470	586	609	590	547	436	322	260	4,900
Multi-family Residential	74	62	80	78	90	128	105	111	111	104	82	76	1,102
Commercial/ Institutional	150	168	193	184	250	310	319	321	307	290	196	169	2,858
Landscape Irrigation	17	24	54	52	110	176	170	176	166	133	64	41	1,185
Subtotal	454	507	611	643	921	1,201	1,204	1,197	1,132	963	665	547	10,044

4.1.3 Existing Distribution System Losses

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

Since 2016, the City has been required to quantify its distribution system losses using the American Water Works Association Method (Title 23 California Code of Regulations Section 638.1 et seq.). An electronic copy of the audit in Excel format is to be submitted to the Department by October 1 of each year for the prior year's estimated system losses, using DWR's online submittal tool pursuant to Code of Regulations Section 638.5. Copies of the relevant loss factor from the City's submittals for the last four years are included in Table 4-3. The 2020 estimate has not been officially submitted to DWR as of the

[26] The City is still completing meter installations for a subset of residential customers, with approximately 1,700 still unmetered. The City intends to have these customers metered by 2025. Water use for these unmetered residential customers is estimated.

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

drafting of this UWMP but is estimated to be approximately 1,200 acre-feet over the year, or about 14% of the water entering the City's distribution system.

Table 4-3: Distribution System Loss: 2016 through 2020

2016	2017	2018	2019	2020
15.0%	15.9%	10.2%	14.0%	13.9%
			Average =	13.8%

As can be anticipated given the dynamic functions of a pressurized potable water distribution system, the estimated annual distribution system loss as a percentage of water entering the system will vary year-to-year and month to month. On average, however, the City's distribution system loss represents about 14% of the water entering the City's distribution system. The average distribution system loss percentage will be used for purposes of water use forecasting later in this Chapter.

4.2 Compliance with 2020 Urban Water Use Target

Pursuant to California Water Code Section 10608.24(b)[28], the City must demonstrate its 2020 water use met the GPCD target adopted in its 2015 UWMP. As set forth in the 2015 UWMP, the City's 2020 GPCD target was established as 234 GPCD, derived as the "gross water use" divided by the population during a defined baseline period, and reduced pursuant to one of four methods defined under California Water Code Section 10608.20(b). The City's 2020 actual GPCD must use the same methodology to derive "gross water use" for 2020, then divide by the estimated 2020 population presented in Chapter 2.

As presented in the City's 2015 UWMP, gross water was determined to be the total water entering the City's water treatment plant. This value corresponds to the total "Potable Water" for 2020 as recorded by the City on it 2020 Water Systems Statistics Report, which was 11,668 acre-feet. This value represents both the customer deliveries shown in Table 4-2 and the distribution system losses represented by the percentage in Table 4-3. As shown in Table 2-2, the City's population in 2020 was estimated to be 54,328. This results in a calculated 2020 compliance value of 192 GPCD, which is less than the City's established target. Thus, the City is in compliance with CWC Section 10608.24(b). The important compliance calculation parameters are summarized in Table 4-4.

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

2020 Volume into Distribution System =	11,668	acre-feet
Allowable Adjustments	0	acre-feet
2020 Gross Water Use =	11,668	acre-feet
2020 Population =	54,328	people
2020 Actual GPCD =	192	
2020 Target GPCD =	234	
Compliance Achieved?	Yes	

[28] 10608.24. (b) Each urban retail water supplier shall meet its urban water use target by December 31, 2020.

4.3 Demand Management Measures

Pursuant to California Water Code Section 10631(e), the City needs to provide a narrative discussion of the water demand management measures it has implemented, is currently implementing, and plans to implement. The historic and on-going measures can help the City understand the effectiveness on managing existing customer uses so as to help guide refinements, emphasis or augmentation that will help position the City to best meet its undefined, to-be-established water use objective.[29]

The City is committed to water conservation and, to date, the City's overall water management efforts have resulted in significant and long-term water conservation savings. The City is also a member of the Regional Water Authority (RWA) Water Efficiency Partnership (WEP). The RWA consists two dozen water providers and affiliates in the greater Sacramento region and represents the interests of its members for the purpose of improving water supply reliability, availability, quality and affordability. The WEP provides region-wide water efficiency activities such as school education, public outreach, widespread marketing, and regional rebate programs to benefit the members. This outreach and additional services have been incorporated with the City's current water conservation efforts to enhance their DMM programs and are discussed in further detail below.

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

4.3.1 Foundational Demand Management Measures

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

Water Waste Prevention Ordinances

Water Conservation is addressed in Article IX – Water Conservation of the City's Municipal Code[30]. Wasteful water use is prohibited in the City's service area as recognized by Section 13.04.770. City code also imposes penalties for violation of any of the water waste provisions inclusive in Sections 13.04.770 through 13.04.790. The City also mandates Water Efficient Landscaping for new construction and rehabilitated landscapes in accordance with city of West Sacramento Water Efficient Landscaping Code (Chapter 13.04, Article 12).

In addition to the City's own water waste monitoring activities, citizens can report water waste online through the West Sacramento Connect tool[31], or by calling the Water Waste Message Line at (916) 617-4545. Once a report is posted, City Staff will contact the responsible party to issue a water waste

[29] Beginning in 2023, all urban water suppliers will be required to begin reporting their use compared to a "Water Use Objective" that is being established pursuant to the recently enacted California Water Code Section 10609.20.
[30] Full text of the Code can be found here: https://www.qcode.us/codes/westsacramento/?view=desktop&topic=13-13_04-ix
[31] https://www.cityofwestsacramento.org/government/departments/community-development/environmental-services-and-sustainability-division/water-conservation/water-waste

warning notice, if appropriate. These notices list the possible violations, as well as resources to learn more about water waste and water conservation.

Additionally, City Ordinance (13.04.830 Declaration of water shortage) recognizes emergency water restrictions and dictates the regulations in the Water Shortage Contingency Plan will apply during upon declaration from the City Manager that water supply conditions justify implementation of emergency restrictions. These fundamental prohibitions align with state-mandated requirements. The ordinance prohibits all users from unreasonable waste and includes graduated penalties for waste and/or unreasonable use during all stage declarations. For all conditions, including Normal Water Supply, restrictions on water waste include:

- Causing or permitting excessive water to discharge, flow, or run to waste into any gutter, sanitary sewer, water course, or storm drain, or to any adjacent property, from any tap, hose faucet, pipe, sprinkler, or nozzle. In the case of irrigation, "discharge," "flow," or "run to waste" means that the earth intended to be irrigated has been saturated with water to the point that excess water flows over the earth to waste.
- Allowing water fixtures or heating or cooling devices to leak or discharge excessively.
- Backwashing so as to discharge to waste from swimming pools, decorative basins or ponds in excess of the frequency necessary to ensure the healthful condition of the water or in excess of that required by standards for professionally administered maintenance or to address structural considerations.
- Operation of an irrigation system that applies water to an impervious surface or that is in disrepair.
- Irrigation of landscaping during rainfall.
- Any other actions as determined by the city manager and designee. (Ord. 14-6 § 3)

The City has implemented this DMM over the planning period (through multiple versions of the WSCP) and will continue to actively manage water waste through 2045.

Metering

Since 2015, when 60% of the City's connections were metered, it enacted its Meter Implementation Plan which created a budget to meter 100% of City water connections. This plan is nearly complete, with about 10% of the residential connections still unmetered. The City also began transitioning to automated metering infrastructure (AMI) to provide more timely information to customers and for the City's management needs. AMI meters have been shown to reduce exterior landscape use and modest reductions in interior water use. The City currently has 10,842 AMI meters install, which is about 70% of customer connections.

Conservation Pricing

The City's water rate structure is set to generate the necessary funds to efficiently operate the City's water system and maintain reliable water supplies, as well as to collect these revenue requirements equitably from each class of user in accordance with their differing demands placed upon the system. Water Service Charges in the City's Book of Fees (updated June 27, 2018) includes flat water rates, metered water rates, and commodity rates[32]. Commodity rates are billed at a usage charge per CCF for both residential and non-residential connections. Commodity rates based on metered use have been shown to effectively reduce customer water use. The general service, flat user class shall be eliminated over time. No new applicants shall be accepted into this class and existing users shall be converted to the general service, metered class as the City converts all accounts to metered rates in accordance with sections 13.04.260 or 13.04.270 of the City's Municipal Code and the Council approved schedule for transitioning to metered rates adopted on December 14, 2016.

Public Education and Outreach

The City regularly engages its customer base with a number of conservation and demand management outreach programs. Promoting water-wise activities, watering schedules, and educational programs are part of the City's regular outreach efforts, which include an efficiency web page providing resources to the community for conserving water.[33]

In addition to local public education and outreach programs, the City also participates in a regional public education and outreach program through the Regional Water Authority. The Regional Water Authority (RWA) is a joint powers authority formed in 2001 to promote collaboration on water management and water supply reliability programs in the greater Sacramento, Placer, El Dorado, Yolo and Sutter counties. In collaboration with 19 water provider members and other wastewater, stormwater and energy partners, RWA formed the Water Efficiency Program (WEP) in 2001 to bring cost effectiveness through economies of scale to public education and outreach activities.

The WEP operates on an average annual budget of $530,000 and is supplemented by grant funding. Grants are an important funding resource for the Program. Since 2003, the Program has been awarded $13.2 million in grant funding for public outreach and education as well as a variety of rebate programs, fixture direct install programs, system water loss, individualized customer usage reports, large landscape budgets and more. Of those funds, $3.8 million was awarded between 2016 and 2020.

The main function of the WEP is to develop and distribute public outreach messages to customers in the region by collaborating with its water provider members. The Program distributes these messages on a regional scale through regional media and advertising buys and was honored with the United States Environmental Protection Agency WaterSense Excellence in Education and Outreach Award in

[32] https://www.cityofwestsacramento.org/government/departments/administrative-services/book-of-fees
[33] https://www.cityofwestsacramento.org/government/departments/community-development/environmental-services-and-sustainability-division/water-conservation

2016. From 2016-2020, the WEP created a series of public outreach campaigns. Below is a summary of each campaign and highlighted achievements.

Following the historic 2015 California drought, the WEP launched the "Rethink Your Yard" Campaign in 2016 with a focus on prioritizing landscape watering, putting trees first and transitioning thirsty lawn and landscaping to beautiful, low water use, River-Friendly landscapes. The Program advertised the campaign through online ads, social media, commercial radio, Sutter Health Park (local AAA baseball stadium) and local billboards. The campaign featured local homeowners with their newly redesigned yards on billboards throughout the region.

The campaign launched in 2017 focused on encouraging customers to understand and deliver the amount of water their landscape really needs and to make permanent equipment changes to improve efficiency such as installing weather-based irrigation controllers, more efficient sprinklers and drip irrigation. The Program partnered on this messaging with local nurseries through a "Get Growing this Fall" initiative to encourage residents to plant in the fall when days are cooler and plants don't need as much water to establish roots.

From 2018 through 2020, the regional campaign focused on tackling the landscape overwatering problem with a "Check and Save" message encouraging residents to check the soil moisture with a moisture meter before turning on sprinklers. To support this message, the Program provided free moisture meters via an online request form and at events. In 2019, WEP distributed 3,000 moisture meters to customers throughout the region.

These campaigns are implemented through both paid advertising buys and earned media from public service announcements (PSAs). Every year the campaigns can be heard on local radio stations such as Capital Public Radio and online through Google, Facebook and YouTube advertisements. From 2016-2020, the WEP public outreach campaigns produced:

- Radio Advertising (2016-2020)
    - 3,443 radio advertisements ran
    - 17.2 million impressions
- Digital Advertising (Facebook, Google Display Network and Spotify) (2016-2020)
    - 24.3 million impressions
    - 262,900 clicks
- Additional advertising (billboards in 2016)
    - 1.8 million digital advertisements ran
    - 51.6 million impressions
- Public Service Announcements (Television and Radio) (2016-2020)

- 20 million impressions
- $570,000 in value had they been purchased as advertising

The Program also continues messaging through its own Facebook page. From 2016-2020, the Program created about 60 Facebook posts a year featuring water saving tips and other relevant information. The WEP hosted several Facebook sweepstake contests including: Tree Hugger in 2016, where participants submitted pictures hugging a tree to raise awareness about the importance of healthy trees and the Under/Over Debate in 2020, where participates were asked to weigh in what is the proper way to hang toilet paper to raise awareness of toilet leaks. The winner of the Under/Over Debate sweepstakes received a case of toilet paper delivered via mail and gift card to a local hardware store.

The Program continues to utilize the public outreach website bewatersmart.info to reach customers throughout the region. The website contains regional and local water provider information on rebates and services, top ways to save, an interactive watering and water waste information map, a water-wise gardening database, recent press releases, the Sacramento Smart Irrigation Scheduler tool, and more.

Educational information and customer services were modified to address the COVID pandemic in 2020 including online water efficiency lessons for kids, a list of nurseries that offered curbside pick-up, virtual water wise house calls, and numerous virtual educational customer workshops. Between 2016 and 2020, the website averaged 96,000 unique visitors per year.

For more targeted outreach, the Program distributed quarterly e-newsletters to participating residents. The e-newsletters are filled with water savings tips, upcoming events and other interesting articles. They are usually timed around changes in the weather to help signal the need for residents to adjust their irrigation systems, such as daylight savings coupled with a message to dial back sprinkler systems. The e-newsletter reaches 6,300 households.

Every year the WEP selects three public events to attend for the public to interact with local water efficiency staff. This provides an opportunity for the region to communicate its messages in person. Events have included the Sacramento Home & Landscape Show at Cal Expo, Creek Week, Harvest Day, Farm-to-Fork Festival and several Earth Day events. Additionally, RWA, in coordination with participating local water providers, hosts an annual Mulch Mayhem event in which customers can pick up a truck load of free mulch from selected locations throughout the region. All in-person regional events were canceled in 2020 due to the COVID pandemic.

The Program is also very active in communicating to local media outlets such as the Sacramento Bee. Between 2016 and 2020, RWA issued 50 press releases on WEP activities and regionally significant news and participated in nearly 30 radio public affairs interviews. The RWA and the WEP were mentioned in dozens of news articles published by local and regional media outlets both within and outside of the Sacramento region during the same time frame.

To support public outreach messaging and water savings tips, the Program also coordinated several regional rebate programs, which were partially funded by state and federal grants. A variety of rebate options were provided including toilets, clothes washers and irrigation. Collectively these rebates and

installations will produce an estimated lifetime (10 years) savings of 6 billion gallons of water and 6.4 million kilowatt hours (kWhs) of energy. The energy savings also shows a reduction in greenhouse gas emissions in the City.

In addition to public outreach, the Program also coordinates school education activities. Since 2012, the Program has hosted the Water Spots Video Contest for high school and middle school students. The WEP provides a new contest theme each year and provides the region's teacher and students with relevant facts and images to help develop 30 second video PSAs. Students submit their videos to RWA who hosts a panel of local celebrities including news anchor Monica Woods from ABC 10 to decide on a first, second and third place winner. The top 10 scoring videos are then posted online for public voting to select a "people's choice" winner as well. Both teachers and student receive cash prizes and the winning videos are played at Sutter Health Park during River Cats games and in select movie theaters throughout the region. The winning PSAs are incorporated into the WEP's media activities as well. Past themes include WATER MYTHS BUSTED!, H2O Hero, and Show Off Your Water Smarts. Between 2016 and 2019, 450 videos were submitted (average of 90 videos a year). The 2020 Water Spots Video Contest was canceled due to the COVID pandemic.

Beginning in 2017, the City began its Community Conservation Education (CCE) Program. Funded by the California Department of Conservation, the CCE Program is designed to increase the public's knowledge of resource conservation issues and improve ecosystem health on agricultural and urban land in the region. The CCE Program entails a Community Conservation Workshop Series concentrating on awareness and efficiency. In 2019, three workshops were held on rain gardens, irrigation, and Watersmart landscaping. Additionally, the CCE Program also involved the implementation of the Student and Landowner Education and Watershed Stewardship (SLEWS) Programs. Prior to its conclusion, the SLEWS Program offered opportunities for high school teachers and students to practice scientific skill, learn from natural resource professionals, and expand on classroom concepts. The hands-on experience included habitat restoration projects at the Stone Lakes Wildlife Refuge.

Implementation of this DMM is active and ongoing.

Programs to Assess and Manage Distribution System Real Loss

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

- Annual water audit and water balance
- Proactive leak identification and repair in the City's distribution system
- Monthly outreach to residents with higher water usage

Water Conservation Program Coordination and Staffing Support

The City funds one full time Water Conservation Coordinator (Coordinator) to run the City's water conservation programs with an annual budget of $50,000. The Water Conservation Coordinator

supervises DMM implementation, evaluates effectiveness, and communicates program goals to the community. Additionally, the Coordinator assists in readying residents and businesses for a commodity-based rate structure as it is implemented, specifically how they can save water and therefore save money. The Coordinator also works with customers, neighboring water suppliers and RWA to promote conservation through public education, water audits, landscape studies to affect water conservation, and monitoring conservation efforts.

4.3.2 Recent DMM Activities

The City has continued to promote and implement water conservation actions with great success. Highlights of the City's recent actions and conservation measures include:

- Drought Monitor Program
- Monthly High Water Bill outreach and assistance program
- Providing flyers and brochures, updated throughout the year
- Be Water Smart Video Library
- Social Media Campaigns
- Respond to numerous service calls per year and fixing numerous leaks in the distribution system.
- Water Wise House Calls
- Offering rebate programs for the following water conservation fixtures and activities:
    - Smart Irrigation Controller Rebate

4.3.3 Planned DMM Activities

In addition to ongoing water conservation commitments, the City will continue to evaluate the need for additional programs and actions necessary to achieve water use objectives in compliance with California Water Code Section 10609.20. Resources will be dedicated in the City's budget for demand management activities which will help comply with these future water use objectives. Special consideration will be taken regarding changing urban water use patterns in the service area as well as the configuration of anticipated new residential customers to assure use remains efficient.

4.4 Forecasting Customer Use

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

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

4.4.1 Representing Current Customer Water Use

Table 4-1 and Table 4-2 provided the actual monthly customer water use for 2016 through 2020. From this information, an estimate of the representative "current" water use by existing customers has been developed. Knowing that actual use by existing customers varies slightly year-to-year based on a variety of factors (e.g. total rainfall and the timing of spring rain events impacting when landscape irrigation may begin), the recent data provides a basis for estimating current water use. Because the 2016 through 2019 data reflects the City's on-going updates to its data management, however, the 2020 customer use data by classification is used as a proxy for "current" water use for each customer classification. This provides a baseline from which to estimate the future use of these existing customers.

The target total "current water demand" was estimated using customer-type demand factors from recent meter and billing data for 2020 customer classification to generate a comparable estimate to the 2020 total production.

Table 4-5 shows the estimated demand factor (acre-feet per year), estimated number of connections by type (based on billing data classifications), and resulting estimate of total annual current use. As previously discussed, the current distribution system loss is estimated to be approximately 14%. This analysis provides a representative current total need that provides the basis for forecasting the future need of existing customers. Values are rounded to the nearest 10 acre-feet to represent these values as estimates.

Table 4-6 provides the representative monthly pattern of this proxy for current use, based upon the estimate in Table 4-5.

Table 4-5: Representative Current Water Use (acre-feet)

Customer Class	Units/ Connection	Demand Factor (af/yr)	Demand (af/yr)
SFR	13,127	0.37	4,900
MFR	320	3.7	1180
Comm	955	2.7	2580
Public	75	2.7	200
Industrial	95	2.8	270
Landscape	365	3.2	1170
		Customer Demand	10,300
		Distribution System Loss	1,660
		Total System Demand	11,960

Table 4-6: Representative Current Water Use by Month (acre-feet)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Current Use	541	604	728	766	1,096	1,430	1,433	1,426	1,347	1,146	792	651	11,960

4.4.2 Factors Affecting Future Customer Use

There are several factors that affect the forecast of future customer use, ranging from State and local landscape regulations, building code requirements, and other water-use mandates, to changes in the types of housing products being offered. These factors are incorporated into determining appropriate per-dwelling unit or per customer connection water demand values for use in forecasting future water needs. Relevant characteristics of the factors are described here.

Water Conservation Objectives

In 2009, then-Governor Arnold Schwarzenegger signed Senate Bill No. 7 (SBX7-7), which established a statewide goal of achieving a 20 percent reduction in urban per capita water use by 2020 for urban retail water suppliers.[34] As presented previously, the City has met this mandated target.

Furthermore, the efforts undertaken by the City and its customers to meet these targets, as well as efforts throughout the State by other urban retail suppliers, have changed the availability and use of appliances, fixtures, landscapes and other water using features, through changes or additions to ordinances and/or through a continuing "conservation ethic."

In response to the recent multi-year drought conditions, Governor Brown issued Executive Order B-37-16 in May 2016 entitled "*Making Water Conservation a California Way of Life*." In May 2018, Governor Brown signed into law SB 606 and AB 1668, which imposed additional statutory requirements above and beyond the 20 percent by 2020 target reflected in the 2009 legislation. This is expected to result in

[34] California Water Code § 10608.20.

continued efforts to increase water use efficiency and ultimately to reduce water demands of existing water users and continue to influence the expected demands of future water users.

Requirements in California Code

Beginning in January 2010, the California Building Standards Commission adopted the statewide mandatory Green Building Standards Code (hereafter the "CAL Green Code") requiring the installation of water-efficient indoor and outdoor infrastructure for all new projects after January 1, 2011. The CAL Green Code was incorporated as Part 11 into Title 24 of the California Code of Regulations, and was revised in 2013 and in 2016 to address changes to the State's Model Water Efficient Landscape Ordinance ("MWELO") adopted during the drought.[35] Revisions to the CAL Green Code in 2019 modified sections to direct users to MWELO regulations contained in other regulatory sections.[36]

The CAL Green Code applies to the planning, design, operation, construction, use and occupancy of every newly constructed or remodeled building or structure. All new residential and non-residential customers must meet the water use requirements of the CAL Green Code as well as the outdoor requirements described by MWELO. The CAL Green Code's requirements generally manifest through: (1) installation of plumbing fixtures and fittings that meet the 20 percent reduced flow rate specified in the CAL Green Code, or (2) by demonstrating a 20 percent reduction in water use from the building "water use baseline."[37] Future customers are expected to satisfy one of these two requirements through the use of appliances and fixtures such as high-efficiency toilets, faucet aerators, on-demand water heaters, or other fixtures as well as Energy Star and California Energy Commission-approved appliances.

California Model Water Efficient Landscape Ordinance and City Ordinance

The Water Conservation in Landscaping Act was enacted in 2006, and has since been revised and expanded multiple times by DWR resulting in today's MWELO.[38] In response to Governor Brown's executive order dated April 1, 2015, (EO B-29-15), DWR updated the MWELO and the California Water Commission approved the adoption and incorporation of the updated State standards for MWELO on July 15, 2015. MWELO requires a retail water supplier or a city or count to adopt the provisions of the

[35] The 2016 Triennial Code Adoption Cycle consisted primarily of the MWELO updates adopted in response to the drought. Indoor infrastructure changes were limited to some minor non-residential fixture changes and changes to the voluntary Tier 1 and Tier 2 requirements. Additionally, the Code was updated to match the new Title 20 Appliance Efficiency Regulations.

[36] The 2019 updated sections to direct CAL Green code users to Title 23 of the California Code of Regulations to allow Title 23 to be the sole location of MWELO requirements.

[37] See CAL Green Code. For Residential construction, Section 4.303.1 provides the residential water conservation standard and Table 4.303.2 identifies the infrastructure requirements to meet this standard. Table 4.303.1 and Worksheets WS-1 and WS-2 are to be used in calculating the baseline and the reduced water use if Option 2 is selected. For non-residential construction, Section 5.303.2.3 provides the water conservation standard as well as the baseline and reduced flow rate infrastructure standards. Note that Worksheets WS-1 and WS-2 incorporate both residential and non-residential fixtures, yet the water use is still to be analyzed by "building or structure" as specified in Chapter 1, Section 101.3.

[38] Gov. Code §§ 65591-65599

MWELO or to enact its own provisions equal to or more restrictive than the MWELO provisions.[39] The changes included a reduction to 55 percent of reference evapotranspiration rates for the maximum amount of water that may be applied to residential landscapes, and non-residential projects to 45 percent, which effectively reduces the landscape area that can be planted with high water use plants, such as turf. For residential projects, the allowable maximum coverage of high-water use plants is reduced to 25% of the landscaped area (down from 33%). The newly updated MWELO also now applies to new construction with a landscape area greater than 500 square feet (the prior MWELO only applied to landscapes greater than 2,500 square feet).[40] The City reviews all new development for conformance with these standards pursuant to its municipal code.

Metering, Volumetric Pricing, and Water Budgets

California Water Code section 525 requires water purveyors to install meters on all new service connections after January 1, 1992. California Water Code Section 527 requires water purveyors to charge for water based upon the actual volume of water delivered if a meter has been installed. This action alone is not expected to substantially reduce water use. However, it is anticipated that the retail billing system will encourage and help maintain reasonable use (e.g. through implementation of a tiered rate structure and/or water budgets), so that individual customer water demands are reasonably not expected to increase over time.

4.4.3 Customer Water Use Forecast

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

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

Existing Customer Future Use

To be conservative and assure the analysis of water service reliability is adequate (see Chapter 5), the City begins with the annual "current" retail customer potable water use as shown in Table 4-5, a total delivered quantity of about 10,300 acre-feet, with a total production need of about 11,700 acre-feet when considering system losses. While this recognizes the existing customers have undertaken water use reductions to date, the City anticipates existing customers will continue to undertake a variety of

[39] The City has incorporated the MWELO requirements into Title 13, Section 13.04, Article XII of the City's Municipal Code.
[40] CCR Title 23, Div. 2, Ch. 27, Sec. 490.1.

additional conservation measures – actively through decisions to modify a behavior or a water use, or passively through the purchase of appliances and fixtures that simply use less water – such that the existing customer use is expected to reduce over the UWMP's planning horizon through 2045.

For purposes of this UWMP's forecast, these conservation efforts are reflected by applying a 5% reduction in 2030 and another 5% reduction in 2040 to the demand factors shown for each customer classification in Table 4-5. This represents a 10% reduction in the respective demand factor for each customer classification. These demand factors can be re-evaluated prior to the 2025 UWMP to evaluate the compliance with forthcoming water use objectives.[41]

Table 4-7 represents the resulting demand factors for each classification over the UWMP's planning horizon. These demand factors are multiplied by the existing connections for each classification (see Table 4-5) to derive water use estimates over the planning horizon. The results are presented in Table 4-10.

Table 4-7: Current and Future Demand Factors by Customer Classification (acre-feet/connection/year)

Customer Class	Demand Factors					
	Current	2025	2030	2035	2040	2045
SFR	0.37	0.37	0.35	0.35	0.34	0.34
MFR	3.7	3.7	3.5	3.5	3.3	3.3
Comm	2.7	2.7	2.6	2.6	2.4	2.4
Public	2.7	2.7	2.6	2.6	2.4	2.4
Industrial	2.8	2.8	2.7	2.7	2.5	2.5
Landscape	3.2	3.2	3.0	3.0	2.9	2.9

New Customer Future Use

As detailed in Chapter 2, the City anticipates continued growth with an associated increased demand placed upon the City's water supplies. Forecasting the needs of these future customers is dependent upon the type and number of customers and the unit water demand factors associated with each customer type.

For this UWMP, two distinct customer classifications are anticipated: (1) residential, and (2) non-residential. Residential customers will include both single-family dwelling units built under a variety of densities, and multi-family residential dwelling units also built with varying anticipated occupancy rates. Non-residential uses are expected to include a blend of commercial, institutional, industrial and active landscapes, such as parks, in ratios similar to the City's current residential-to-non-residential customers. Values developed for each distinct land use are based on several sources of information, details of which are provided in the following subsections.

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

New Residential Customer Water Use

Table 2-3 summarized the City's anticipated new residential growth over the UWMP planning horizon. This growth provides the basis for the estimated future customer water needs, as the non-residential customers will be a ratio of the new residential customers. Table 4-8 presents the relevant residential growth information from Table 2-3. A key aspect of this anticipated growth is the variation in the types of multi-family housing expected – ranging from studio to three bedroom apartments. Each of these subclassifications of multi-family housing will be expected to house different average number of people per household, as discussed later.

Table 4-8: Anticipated New Residential Units (from Table 2-7)

Residential Customers		New Connections				
		2025	2030	2035	2040	2045
Single Family	R1	1,385	2,770	3,590	4,410	5,960
	R2	1,520	3,040	4,010	4,980	6,810
Total Single-Family		2,905	5,810	7,600	9,390	12,770
Multi-Family	Studio	565	1,130	1,380	1,630	2,100
	1B	705	1,410	1,770	2,130	2,810
	2B	510	1,020	1,220	1,420	1,800
	3B	45	90	110	130	170
Total Multi-Family		1,825	3,650	4,480	5,310	6,880
Total Residential Connections		4,730	9,460	12,080	14,700	19,650

The City anticipates these new residential elements will be built in accordance with all applicable building codes including the Cal Green Code discussed previously, and relevant City ordinances.

To estimate the average water need for each connection, distinct demand factors are provided for the following residential uses:

- Indoor Residential Use – this category identifies the generally anticipated water use for single-family and multi-family dwelling units.
- Outdoor Residential Use – this category addresses the landscape water demands commonly anticipated for the two primary dwelling unit types.

For purposes of this UWMP, residential unit water demand factors are described as "the acre-feet of water use annually per dwelling unit" – or acre-feet/dwelling unit ("af/du").

Residential indoor water demands are estimated using an assumed value of 55 gallons-per person per day, multiplied by the assumed occupancy rates for anticipated residential densities for single-family or multi-family classifications in the City. The assumed per-person rate of 55 gallons per day is derived from California Water Code Section 10609.4(a)(3), which states a value of 55 gallons per capita (i.e., per

person) per day ("gpcd") be used for estimating indoor residential use targets.[42] If lower standards are required when the growth occurs, the forecast use would be expected to be lower than estimated in this UWMP.

Based on this per-capita assumption, the following indoor per-dwelling unit value is assumed for each new residential unit: [43]

- Single-family R1 indoor use: 0.17 acre-feet per year based upon an assumed occupancy of 2.8 for people per unit.
- Single-family R2 indoor use: 0.15 acre-feet per year based upon an assumed occupancy of 2.5 for people per unit.
- Multi-family Studio indoor use: 0.06 acre-feet per year based upon an assumed occupancy of 1 person per unit.
- Multi-family 1-bedroom indoor use: 0.07 acre-feet per year based upon an assumed occupancy of 1.2 people per unit.
- Multi-family 2-bedroom indoor use: 0.14 acre-feet per year based upon an assumed occupancy of 2.2 people per unit.
- Multi-family 3-bedroom indoor use: 0.15 acre-feet per year based upon an assumed occupancy of 2.5 people per unit.

Outdoor residential water use is primarily a factor of lot size and the type and extent of landscaped area. The City's anticipated growth will likely include a range of residential densities (e.g. houses per acre), though as noted in Table 4-7, two densities are assumed – R1 and R2. For purposes of estimating outdoor use, each type has an assumed density and therefore an estimated "typical" lot size.

Using information from the City's 2021-2029 Housing Element , the R1 class is assumed to have a total gross area of 7,000 square-feet, with 4,000 square-feet anticipated to be irrigable (after accounting for the home footprint, driveways, walkways, other hardscapes, and non-irrigated areas. The R2 class is assumed to have a total gross area of 4,000 square-feet, with 2,500 square-feet anticipated to be irrigable. These assumptions are conservatively high for irrigable area per lot, assuming over 50% of each lot would be irrigable.

For the various classifications of multi-family units, which typically have shared common landscape areas, two landscape assumptions are made. For Studio and 1-Bedroom, each unit is assumed to have

[42] Water Code Section 10609.4(a) also establishes the indoor residential water use 'standard' to be 52.5 gpcd beginning in 2025 and as low as 50 gpcd by 2030, though the Water Code also provides provisions for the water use target to revert above 50 gpcd. For purposes of this UWMP, the higher value of 55 gpcd is assumed.

[43] The residential occupancy rate are estimated based upon information in the City's 2021-2029 Housing Element Update and expected values for studio and 1-bedroom multi-family units.

the equivalent of 150 square-feet of irrigable area per unit. For 2-Bedroom and 3-Bedroom, each unit is assumed to have the equivalent of 300 square-feet of irrigable area per unit.

Outdoor demands for new residential dwelling units are calculated based on regulations defined under the MWELO. The MWELO provides for determining the Maximum Applied Water Allowance (MAWA) where the maximum residential allowance is calculated as 55 percent of the reference evapotranspiration for the area for every square foot of landscaped area, resulting in the following equation:

> *MAWA = (ETo)(0.62)(0.55 x LA), where ETo is the reference evapotranspiration in inches per year, and LA is the landscape area in square-feet. 0.62 is a conversion factor to gallons. The resulting value is in "gallons per year."*

A primary factor in this calculation is evapotranspiration ("ET"). The methodology directs the use of ET from a reference crop, such as maintained grass – a value referred to as ETo. For this UWMP, the ETo is 50.6 inches per year (4.2 feet per year).[44]

Using the MAWA equation, outdoor demand factors for each residential lot category are calculated:

- Single-Family R1 – Anticipated single-family dwellings are conservatively assumed to be constructed on lots averaging 7,000 sf, with an average landscape area of 4,000 sf. The resulting outdoor demand factor is forecast to be 0.21 acre-feet per dwelling unit per year.[45]
- Single-Family R2 – Anticipated single-family dwellings are conservatively assumed to be constructed on lots averaging 4,000 sf, with an average landscape area of 2,500 sf. The resulting outdoor demand factor is forecast to be 0.13 acre-feet per dwelling unit per year.
- Multi-Family Studio and 1-bedroom – Anticipated multi-family dwellings will have larger common areas, assumed to equate to 150 sf of landscape area per unit. The resulting outdoor demand factor is forecast to be 0.01 acre-feet per dwelling unit per year.
- Multi-Family 2 and 3-bedroom – Anticipated multi-family dwellings will have larger common areas, assumed to equate to 300 sf of landscape area per unit. The resulting outdoor demand factor is forecast to be 0.02 acre-feet per dwelling unit per year.

The resulting forecast water use for existing and new residential customers is provided in Table 4-10.

New Non-Residential Customer Water Use

The City anticipates several acres of non-residential uses to be developed in the future to accompany the residential growth. Non-residential per-connection demand factors were also estimated for purposes of forecasting the water needs of these anticipated commercial, institutional, industrial and irrigated landscape customers. For purposes of this UWMP, the City assumes non-residential

[44] ETo is from the CIMIS Station 235 (Verona) available at: https://cimis.water.ca.gov/Default.aspx

[45] These numbers are conservatively high to ensure water supply reliability for planning purposes.

connections will mimic the existing residential to non-residential ratios, where non-residential connections represent about 10% of the total current connections. Table 4-9 provides the resulting assumed additional connections for commercial, public, industry, landscape irrigation (e.g. parks and recreational areas), and Cannabis (see discussion in Chapter 2 of this expanding industry).

Table 4-9: Future Non-Residential Connections

Non-Residential Customers	New Connections				
	2025	2030	2035	2040	2045
Commercial	370	720	930	1,120	1,500
Public	40	90	110	130	180
Industry	10	20	20	30	40
Landscape Irrigation	10	30	30	40	50
Cannabis	2	4	6	8	10
Total Connections	432	864	1,096	1,328	1,780

For purposes of this 2020 UWMP, demand factors were developed for each categories of non-residential use, with Commercial, Public and Industry combined represented by a single factor:

- Commercial, Public, and Industry – this classification includes a wide array of different uses from neighborhood retail centers, to large retail centers, to office and government buildings, to light and even heavy industrial uses. Using 2020 meter data for these classifications, and average per-connection factor of 2.59 acre-feet per connection per year was determined. While this may reflect a higher use than expected for new non-residential classifications that must adhere to new water use efficiency standards, using the same value as represented for current non-residential customers provides a conservative approach.

- Landscape Irrigation – this classification includes passive and active parks, streetscapes, and other dedicated landscape areas. Each landscape connection is assumed to have an average annual water need of 2.88 acre-feet per connection, based upon the City's existing landscape connections as determined from the 2020 meter data.

- Cannabis – this is a newer classification with limited basis for estimating appropriate demand factors for cultivation. The City was able to obtain water use billing data for an existing Cannabis production facility in the City of Sacramento, which was used to establish a representative demand factor per each future facility. Based upon the available billing information, the City assumes each connection will use 6,000 gallons per day, 365 days per year, for a total of 6.7 acre-feet per connection.[46]

The resulting forecast use of existing and new non-residential customers is provided in Table 4-10.

[46] The utility billing data provided for a facility in the City of Sacramento indicated the facility was approximately 25,000 square-feet. The City's estimated connections assumes this would be the average size for new connections.

4.4.4 Summary of Forecast Water Use

Based upon the estimated water use of the existing and new customers, the City anticipates a significant increase in potable water use over the planning horizon – nearly doubling the current customer demand of 10,300 acre-feet per year to nearly 19,000 acre-feet per year (before accounting for distribution system losses). Table 4-10 presents the resulting customer water use forecast. Although the forecast is presented on an annual basis in 5-year increments through 2045, the monthly pattern is expected to mimic the current monthly pattern detailed in prior tables (e.g. Table 4-6). This characterization is important when evaluating the City's water service reliability as detailed in Chapter 5.

Table 4-10: Forecast Future Water Use (values in acre-feet per year)

Customer Class			2025	2030	2035	2040	2045
Existing	Single Family Residential		4,900	4,700	4,700	4,400	4,400
	Multi-Family Residential		1,180	1,120	1,100	1,070	1,070
	Commercial/Institutional		3,050	2,890	2,900	2,750	2,750
	Landscape Irrigation		1,170	1,110	1,100	1,050	1,050
Existing Customer Total			10,300	9,820	9,800	9,270	9,270
New	SFR	R1 SFL	530	1,070	1,380	1,700	2,290
		R2 SFM	440	870	1,150	1,430	1,950
		Total Single Family	970	1,940	2,530	3,130	4,240
	MFR	Studio	40	80	100	120	150
		1B	60	120	150	180	240
		2B	80	150	180	210	270
		3B	8	20	20	30	30
		Total Multi-Family	188	370	450	540	690
	Commercial		960	1,860	2,410	2,900	3,890
	Public		100	230	280	340	470
	Industry		30	50	50	80	100
	Landscape Irrigation		30	90	90	120	140
	Cannabis		10	30	40	50	70
New Customer Total			2,288	4,570	5,850	7,160	9,600
Total	Single Family Residential		5,870	6,640	7,230	7,530	8,640
	Multi-Family Residential		1,368	1,490	1,550	1,610	1,760
	Commercial/Institutional		4,150	5,060	5,680	6,120	7,280
	Landscape Irrigation		1,200	1,200	1,190	1,170	1,190
	Total Customer Demand		12,588	14,390	15,650	16,430	18,870
Distribution System Loss			2,040	2,330	1,740	1,830	1,530
Total System Demand			14,628	16,720	17,390	18,260	20,400

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

The demand forecasts presented in the prior subsection represent expected water needs under normal hydrologic conditions. To credibly forecast potential maximum future water use, the forecasted normal-year water uses must be modified to reflect anticipated increases in demand during drier conditions.

Conservative modifications to the forecast normal year water use to more likely reflect use conditions during drier and dry years are warranted to help adequately address water service reliability in Chapter 5. For purposes of this UWMP, the following adjustment is made:

- Single dry year: Landscape irrigation needs would increase to reflect the generalized earlier start of the landscape irrigation season due to limited rainfall in the single driest year. Since this increase only applies to the outdoor portion of a customer's forecast use, an adjustment factor of 5% is applied to the total normal-year forecasts to conservatively reflect the expected increase in demand for water for landscaping.

- Multiple dry years: During multiple dry years, demands are also expected to increase similar to the single dry year. For multiple dry year conditions, the single dry year increase of 5% is held in each of the subsequent years. This is representative of an "unconstrained demand" as should be represented when evaluating whether Water Shortage Contingency Plan actions may be warranted.[47]

These values are reflected in tables provided for the Drought Risk Assessment and Annual Reliability Assessment presented in later subsections.

4.4.6 Climate Change Considerations

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

This potential is reflected in the consideration of the single dry year increase of 5% that is used for the water service reliability analysis, as discussed previously. Whether the elevated single dry year water forecast becomes more akin to the "normal" demand will become more apparent as the City continues to assess monthly water use trends throughout its service area.[48]

[47] California Water Code Section 10632(a)(2) states water suppliers should use "unconstrained demand" when performing their annual water supply and demand assessment.

[48] A closer assessment of the correlation of monthly water use by customer type to rainfall and temperature will help the City improve water use forecasts to assure the effects of climate change are adequately being reflected in water service reliability analyses.

4.5 Forecasting Water Use for the DRA and Annual Assessment

The California Legislature created two new UWMP requirements to help suppliers assess and prepare for drought conditions: The Drought Risk Assessment,[49] and the Annual Water Supply and Demand Assessment.[50] These new planning requirements were established in part because of the significant duration of recent California droughts and the predictions about hydrological variability attributable to climate change.

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

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

4.5.1 Projecting Water Use for 5-year Drought Risk Assessment

A critical component of new statutory language for the 2020 UWMP cycle is the requirement to prepare a five-year DRA using a supplier-defined hypothetical drought conditions expected to occur from 2021 through 2025. This drought condition is meant to allow suppliers to test the resiliency of their water supply portfolio and their Water Shortage Contingency Plan actions to meet severe conditions.

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

Total water use for 2021, for example, is developed by modifying the water use representation for "current" conditions (see Table 4-5 and Table 4-6) taking into consideration the anticipated factors affecting water use, with each subsequent year further adjusted, as appropriate. Adjustments year-to-year reflect several factors the City anticipates may occur, including increases from growth. To make these adjustments, the difference in annual water use between the "current" condition and the forecast potable use in 2025 is prorated equally across each of the years 2021 through 2025, so that the same 2025 forecast water use is matched.

With an initial annual estimate, each year is further adjusted to reflect anticipated increases in the "unconstrained demand" during a single dry year. As noted previously, this is reflected by applying a 5%

[49] California Water Code Section 10635(b)
[50] California Water Code Section 10632.1

increase to the total potable water use forecast. The resulting unconstrained demand during a dry year for 2021 through 2025 are shown in Table 4-11.

Table 4-11: Forecast DRA Water Use for 2021 through 2025 (acre-feet per year)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2021	620	680	780	870	1,220	1,420	1,560	1,560	1,330	1,240	880	730	12,890
2022	650	710	820	910	1,280	1,490	1,640	1,640	1,390	1,300	920	770	13,520
2023	680	740	860	940	1,330	1,620	1,720	1,720	1,520	1,370	960	800	14,260
2024	710	770	900	990	1,400	1,630	1,800	1,800	1,510	1,420	1,000	850	14,780
2025	740	800	940	1,030	1,460	1,700	1,880	1,880	1,570	1,480	1,040	890	15,410

4.5.2 Projecting Water Use for Annual Assessments

The City will need to perform an Annual Assessment and submit the findings to DWR beginning in 2022. To evaluate the plausible water service reliability conditions for 2021 or 2022, described in Chapter 5, requires two separate representative "current" water use conditions to be developed. The first condition uses the "current" water use characterization included in Table 4-5. These demands represent the water use under a normal condition. Alternatively, a "single-dry year current" forecast is also calculated to provide the City with representative current unconstrained demands. This second characterization of current water use applies the same single-dry year adjustment described previously, represented by a 5% increase in the current water use values. Table 4-12 provides the Normal Year and Single Dry Year current water use for the City's water service area. These are used in Chapter 5.

Table 4-12: Normal and Single Dry Year "Current" Water Use (acre-feet)

Year Type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Normal	541	604	728	766	1,096	1,430	1,433	1,426	1,347	1,146	792	651	11,960
Single Dry	570	630	760	800	1,150	1,500	1,500	1,500	1,410	1,200	830	680	12,530

4.6 Projecting Disadvantaged Community Water Use

Pursuant to CWC Section 10631.1, retail suppliers are required to include the projected water use for lower income households in 2020 UWMPs. Per California Health and Safety Code Section 50079.5, a lower income household has an income below 80 percent of area median income, adjusted for family size. For purposes of this UWMP, annual median income was derived from 2019 U.S. Census Bureau and determined to be about $70,700 for the City.[51] Therefore, 80% of this is estimated to be about $56,600 per year. According to the detailed data, approximately 40% of the households earn at or below this 80-percentile income.

For purposes of estimating the future water needs, 40% of the total single-family and multi-family connections are presumed to represent disadvantaged households, resulting in 20% of the future total

[51] This data is from the Household Income in the Past 12 Months (In 2019 Inflation-adjusted Dollars) American Community Survey 1-year estimates https://censusreporter.org/profiles/16000US0684816-west-sacramento-ca/

potable water use. Applying this condition to the forecast water use for the entire City results in the estimate provided in Table 4-13.

Table 4-13: Estimated Low-Income Water Use Forecast (acre-feet)

	2025	2030	2035	2040	2045
Total Potable Use	14,628	16,720	17,390	18,260	20,400
Lower Income Use	2,895	3,356	3,624	3,900	4,404
% of Total Potable	20%	20%	21%	21%	22%

In addition to the information provided in Table 4-13, the City is developing a detailed assessment of water supply reliability in low income areas in accordance with Housing Element Policy 5.2. The City's diverse water supply portfolio coupled with the City's integrated treatment and conveyance systems allow water supplies to be easily distributed throughout all areas of the City, ensuring supply reliability for low income communities. Nevertheless, the City continues to develop system assessments in order to fulfill the City's policies for low income housing water supply reliability.

Chapter 5
Water System Reliability

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

Assessing water service reliability is the fundamental purpose for the City in preparing its 2020 UWMP. Water service reliability reflects the City's ability to meet the water needs of its customers with water supplies under varying conditions. The City's UWMP considers the reliability of meeting customer water use by analyzing plausible hydrological variability, regulatory variability, climate conditions, and other factors that impact the City's water supply and its customers' water uses. The reliability assessment looks beyond the City's past experience and considers what could be reasonably foreseen in the future.

Moreover, the analysis posits that active supply management will be integral to the City's long-term water reliability. This chapter synthesizes the details imbedded in Chapters 3 and 4 and provides a rational basis for future decision-making related to supply management, demand management, and project development. This chapter presents three system reliability findings:

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

In short, through active management, the City has reliable annual water supplies available for its service area through 2045 during normal conditions, and it will need to actively manage its supply portfolio to reliably meet month-by-month customer demands during multi-dry periods. Under single-dry and multiple dry year conditions, supplies are projected to align with unconstrained demands when assessed on an annual basis. As described in Chapter 3, the City is developing alternative supplies to create system redundancy and additional supply surplus. The City's Water Shortage Contingency Plan (WSCP) would be triggered to address any shortcomings identified in a particular year, based upon the Annual Assessment detailed in Chapter 6.

5.1 Five Year Drought Risk Assessment

The Drought Risk Assessment is a new requirement for the 2020 UWMP cycle. The DRA requires a methodical assessment of water supplies and water uses under an assumed drought period that lasts five consecutive years.

The City has a unique water supply portfolio. As noted in Chapter 3, the City currently has access to multiple sources of supply and each source has unique attributes that affect reliability under various hydrological and regulatory conditions. These supply sources are further complicated by the interactions among each water asset and the availability triggered upon certain hydrological and regulatory conditions. As such, this diverse water supply portfolio creates a water management structure that requires careful consideration of hydrological, regulatory, and institutional variability. Specifically, some water assets are particularly susceptible to drought while other water assets have varying degrees of reliability based upon regulatory constraints and historical water use. Nevertheless, the City has organized and continues to coordinate its water portfolio management to optimize water supply reliability in the event of a severe drought.

Table 5-1 below shows the City's DRA that integrates all of its supplies for 2021 through 2025 as described in Chapter 3 and reflects the dry year unconstrained water uses described in Chapter 4. As the table shows, the City has surplus water assets available on an annual basis under its prescribed water management protocol, although some months may be further constrained, depending on the month-to-month and year-to-year management of available water supplies. The City is separately evaluating these monthly supply management opportunities to assure water service reliability throughout all months under multiple constrained conditions for all of its water customers.

Table 5-1: Five Year Drought Risk Assessment (AFY)

	2021	2022	2023	2024	2025
Supply	29,429	28,866	26,296	29,214	28,838
Demand	12,890	13,520	14,150	14,780	15,410
Difference	16,539	15,346	12,146	14,434	13,428

5.2 Long Term Service Reliability

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

5.2.1 Long Term Service Reliability

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

Normal and Single Dry Conditions 2025-2045

The City's future water supplies in normal and single dry conditions reflect the same hydrological, regulatory, and institutional criteria described in previous sections. In normal years, supplies are generally constrained only by their express limiting features. In dry years, additional hydrological, regulatory, and institutional issues will constrain the availability of water. However, future water supplies continue to grow as average demands grow over time. All of this information is described in detail in Chapter 3 and is reflected in the tables below.

The City's future water demands in normal and single dry conditions through 2045 reflect the same considerations described Chapter 4. In normal conditions, demands tend to reflect anticipated uses based upon normal hydrological conditions. But in dry situations, demands increase to reflect arid conditions and additional application of water for outdoor irrigation. Future water demands are generally predicted to increase as land uses and populations within the City's service area grow. All of this information is detailed in Chapter 4 and reflected in the numbers shown in the tables below.

Table 5-2 shows the normal year and single dry year supplies and demands in five-year timesteps from 2025 through 2045. Notably, based upon the ability to manage the unique water supplies, the City anticipates having adequate supplies to meet unconstrained demands through this UWMP's planning horizon. However, meeting these demands will require the City to closely monitor and manage supplies during wet conditions to maximize supply flexibility and optimally manage supplies during conditions when various supplies are constrained. Any actual shortage condition would trigger the City's WSCP (see Chapter 6) to appropriately modify supply and demand conditions.

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

Normal Year	2025	2030	2035	2040	2045
Supply	38,945	39,865	40,785	41,705	42,726
Demand	14,620	16,720	17,390	18,260	20,400
Difference	24,325	23,145	23,395	23,445	22,326

Single Dry Year	2025	2030	2035	2040	2045
Supply	26,858	27,862	28,865	29,868	30,972
Demand	15,351	17,556	18,260	19,173	21,420
Difference	11,507	10,306	10,606	10,695	9,552

Five Consecutive Dry Years 2025 – 2045

The City defines a drought condition lasting five consecutive years as one that constrains the City from obtaining some of its water supplies in its water supply portfolio due to hydrological, regulatory, and institutional constraints. These conditions include more restrictive regulatory constraints on its water rights and constrained conditions defined by the City's water supply contracts. The restrictive conditions manifest in changes to the availability of the City's water assets during different periods in a given year but keep the annual volumes above the annual need. Moreover, these restrictive conditions may also impact the increased uses of available supplies in the future that are associated with land use and population growth. These conditions are described in significant detail in Chapter 3 and reflected in the tables below.

Five consecutive dry year demands include the anticipated demands based upon historical trends in water usage in drought conditions by the City's customers. Demands in extended dry conditions may increase as hydrological conditions generate additional customer uses for outdoor irrigation. As droughts persist, however, demands may decline as the realistic constraints on supply availability are realized at the customer level. Out of an abundance of caution to evaluate whether supplies are available to meet projected demands, the potential decreasing demand pattern is not reflected in this future reliability assessment. The gradual increase in demands also account for reasonable water conservation measures derived from improved efficiencies in indoor fixtures, improved management of outdoor landscape irrigation, and a general awareness of the value of long-term water conservation at the consumer level. In addition, the future dry conditions reflect increased land use and populations that would rely upon available supplies. These variable conditions are described in detail in Chapter 4.

Table 5-3 below shows the annual water supply and demand conditions for the City's service area in five consecutive dry years from 2025 through 2045.

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

		2025	2030	2035	2040	2045
Year 1	Supply	32,455	33,625	34,794	35,963	37,234
	Demand	15,351	17,556	18,260	19,173	21,420
	Difference	17,104	16,069	16,535	16,790	15,814
Year 2	Supply	31,392	32,478	33,564	34,651	35,838
	Demand	15,792	17,697	18,442	19,622	21,420
	Difference	15,600	14,781	15,122	15,029	14,418
Year 3	Supply	26,858	27,862	28,865	29,868	30,972
	Demand	16,233	17,837	18,625	20,072	21,420
	Difference	10,625	10,025	10,240	9,796	9,552
Year 4	Supply	30,328	31,332	32,335	33,338	34,442
	Demand	16,674	17,978	18,808	20,521	21,420
	Difference	13,654	13,354	13,527	12,817	13,022
Year 5	Supply	31,392	32,478	33,564	34,651	35,838
	Demand	17,115	18,119	18,990	20,971	21,420
	Difference	14,277	14,359	14,574	13,680	14,418

Notably, annual supplies appear to exceed demands so long as the monthly variability is adequately managed. Varied management of the City's supply assets during dry conditions will be extremely important. This multi-year drought scenario also helps the City evaluate actions it may need to undertake in the event of unforeseen circumstances to assure customer water service reliability and to prepare customers for potential demand reduction circumstances.

5.3 Annual Reliability Assessment

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

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

5.3.1 Normal Year Supply and Current Water Use

The City defines a normal year condition as one that allows the agency to obtain water supplies from all sources in its water supply portfolio under normalized conditions. These conditions include normally anticipated regulatory constraints on its water rights and limited constrained conditions for its water supply contracts. These conditions are described in significant detail in Chapter 3 and reflected in the supply determinations shown below.

Normal year demands include the anticipated demands based upon historical trends in water usage in non-drought conditions by the City's customers. Demands in normal conditions generally are lower in the wetter months and higher in the drier months. These demands may fluctuate over time as land uses and populations change within the City's service area. The monthly demands also account for reasonable water conservation measures derived from improved efficiencies in indoor fixtures, improved management of outdoor landscape irrigation, and a general awareness of the value of long-term water conservation at the consumer level. These demand conditions are described in Chapter 4 and reflected in the reliability assessment shown below. Table 5-4 below shows the normal year water supply and demand conditions for the City's service area. Under normal conditions, the City has surplus water in all months.

Table 5-4: Normal Year Water Supply and Demand (AFY)

Normal Year	Current
Supply	36,025
Demand	11,668
Difference	24,357

5.3.2 Single Dry Year Supply and Dry-Year Current Demand

The City defines a single dry year condition as one that constrains the City from obtaining some of its water supplies in its water supply portfolio due to hydrological, regulatory, and institutional constraints. These conditions include more restrictive regulatory constraints on its water rights and significantly constrained conditions for its CVP water supply contract. The restrictive conditions manifest in changed availability of some City water assets in various months. These changed monthly water supply conditions are described in detail in Chapter 3.

Single dry year demands include the anticipated demands based upon historical trends in water usage in drought conditions by the City's customers. Demands in dry conditions may increase in the normally wetter months as reduced rainfall generally results in additional customer uses for outdoor irrigation. These conditions are described in detail in Chapter 4 and reflected in the demand tables below. The analysis uses the "current" water use, adjusted as described in Chapter 4.

Table 5-5 shows the single dry year water supply and demand conditions for the City's service area.

Table 5-5: Single Dry Year Water Supply and Demand (AFY)

Single Dry Year	Current
Supply	23,903
Demand	12,252
Difference	11,651

5.4 Water Supply Reliability Summary

The City has a diverse and robust water supply portfolio. When evaluated on an annual basis, these supplies are generally capable of meeting the forecast water demands throughout the City of West Sacramento's service area in normal years from 2020 through 2045 with active management of its supply portfolio. Importantly, as noted in Chapter 3, the supply reliability has assumptions related to future hydrological, regulatory, and infrastructure conditions that will require further assessment in light of proposed land use plans and the City's water management. Moreover, the City has plans to connect with neighboring water systems to address unforeseen water crises.

During single-dry and multiple-dry years, depending on how the City manages its supply assets, demands may come close to exhausting supplies, which would trigger the City's WSCP. The projected conditions and prediction of any shortfall will be evaluated at the beginning of each year under the

City's newly adopted Annual Assessment procedures (see Chapter 6). And these annual supply reliability determinations will also need to consider future management and infrastructure changes.

The City's diverse water supply portfolio requires coordinated water management between the City and applicable regulatory agencies in order to render the supply reliable through 2045. The City recognizes month-to-month demand requirements may challenge water supply availability under some hydrologic conditions. These circumstances are currently subject to a more detailed evaluation of supply management scenarios and opportunities. The City will continue to evaluate monthly supply and demand conditions to assure long-term customer reliability throughout the year.

Chapter 6
Water Shortage Contingency Plan

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

This WSCP consists of the following required elements:

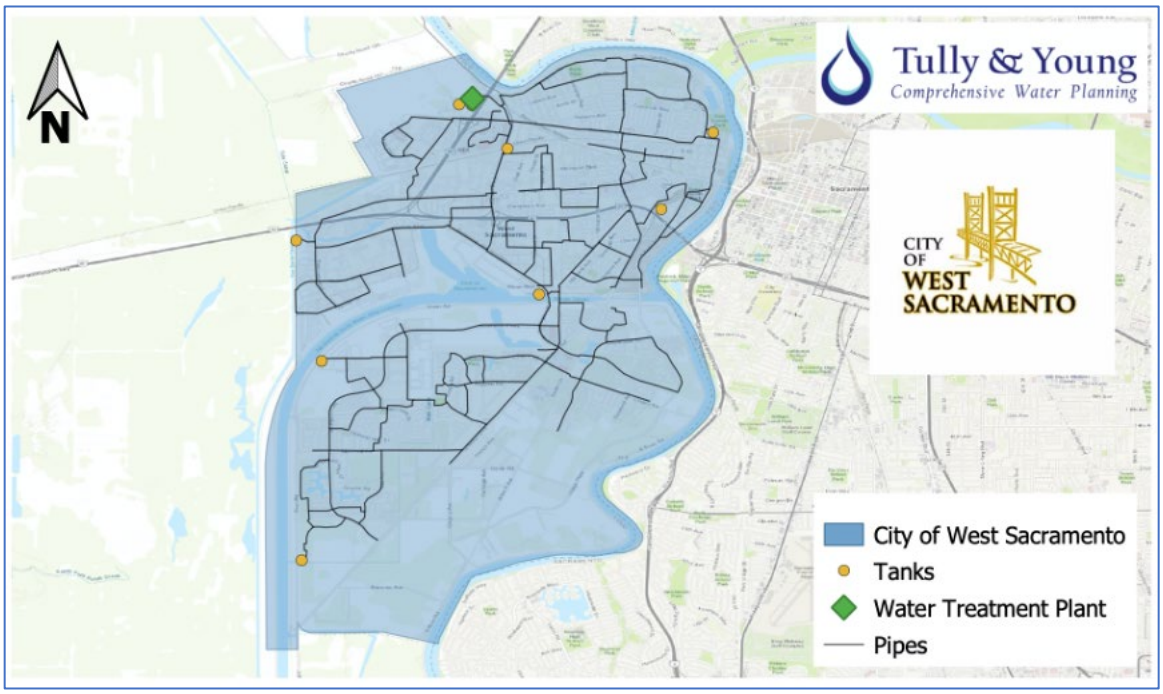
1. An analysis of water supply reliability.
2. Procedures for conducting an annual water supply and demand assessment.
3. Six standard water shortage levels corresponding to progressive ranges of up to 10, 20, 30, 40, and 50 percent shortages and greater than 50 percent shortage.
4. Shortage response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

The Act contains specific requirements for each of these elements.[52] As required by Water Code Section 10632 this WSCP is incorporated into the UWMP, yet it is also a stand-alone plan that is adopted independently from the UWMP and may be amended or refined and readopted over coming months and years as needed (see subsection 6.12 Plan Adoption, Submittal, and Availability, below). The City has enacted Article IX of Chapter 13.04 of the City's Municipal Code to address water conservation and water shortages that links this WSCP to those rules.[53] These local rules were developed to help manage water shortage conditions in the event of drought, catastrophic outage, or regulatory mandate requiring statewide reduction in water use. As such, this WSCP is fully integrated with the City's most recent iteration of Article IX of Chapter 13.04 of the Municipal Code.

6.1 Water Supply Reliability Analysis

The City was formed in 1987 and integrated numerous smaller areas into a single public entity. The City provides water service to residential, commercial, industrial, and institutional water users within the boundaries of the City. The City is located on the eastern edge of Yolo County and is bordered by the Sacramento River on its northern and eastern edges, the Yolo bypass and Deep Water Ship Channel on its western edge and the town of Clarksburg to the south. The City delivers quality, reliable water to over 15,000 active service connections serving a population of approximately 55,000 people within a service area of 23 square miles as shown in Figure 6-1.

Figure 6-1: City's Service Area



[52] California Water Code Section 10632, available at: (https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=WAT&sectionNum=10632)
[53] http://qcode.us/codes/westsacramento/?view=desktop

As described in Chapter 5 of the UWMP, the City has a reliable water supply in normal, single dry and five consecutive dry years through 2045. The City generally relies on surface water supplies that are diverted from the Sacramento River. Water is conveyed from the City's diversion through its treatment plant to consumers throughout its service area.

Groundwater is subject to management in compliance with the Sustainable Groundwater Management Act (SGMA). Yolo Subbasin Groundwater Agency (Agency) is the primary managing authority for development of the Yolo Subbasin Groundwater Sustainability Plan (GSP) and the City resides in the South Yolo Management Area as depicted in the GSP. All of the City's water supply sources may be impacted by climate factors, catastrophic events, and regulatory measures – all of which are considered in the reliability assessment in Chapter 5. The City regularly evaluates its overall water supply reliability through its Urban Water Management Plan and through regional planning efforts in coordination with the Regional Water Authority (RWA), the Agency, and other neighboring water purveyors.

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

6.2 Annual Water Supply and Demand Assessment Procedures

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

6.2.1 Analytical and Decision-making Processes

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

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

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

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

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

6.2.2 Submittal Procedure

The City will submit its Annual Assessment to the DWR via email by June 15 each year, but in no case later than July 1 each year. At the time of DWR submittal, City will also notify RWA, Yolo County, Yolo Subbasin Groundwater Agency, the Public, and other stakeholders concerning the results of the Annual Assessment and where it is available for review.

6.3 Six Standard Water Shortage Stages and Triggers

New state requirements for the WSCP require water suppliers to adopt six water shortage stages, which correspond to progressively severe water shortage conditions (up to 10%, 20%, 30%, 40%, 50%, and greater than 50% percent shortage), as compared to the normal service reliability condition. Each stage corresponds to a range of reduction in anticipated water supply availability and is aligned with shortage response actions which can reduce water demand as needed to address the water shortage. Reduction

of available water supply by the indicated percentages will trigger an appropriate water shortage stage and the City will implement the response actions identified in Tables 6-1 through 6-6.

6.4 Shortage Response Actions

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

6.4.1 Stages of Shortage Response Actions

The City has identified shortage response actions to be implemented during each of the six sequential stages and corresponding water shortage conditions. These actions are based on specific hydrological and regulatory conditions and the fundamental need to meet water service requirements within the City's service area. Moreover, the shortage response actions provide the City with some flexibility to address water dynamic water shortage conditions while protecting the City against extreme conditions where supplies are drastically reduced beyond 50%. The following is an overview of the staged response actions the City could follow during a given water shortage condition based on shortage severity, relative supply conditions for each stage, and percent shortage reduction levels. A water shortage declaration would be made by resolution of the City Council, with administrative discretion delegated to the City Manager or that person's designee. Importantly, the City reserves its ability to use various tools to meet water conservation objectives in each identified stage, such as warnings and fines for unauthorized water uses, as described in the City's Municipal Code.

The shortage response actions that may be implemented in each stage are listed in detail in Tables 6-1 through 6-6 but are summarized as noted in the information below:

Stage 1 (up to 10 percent shortage) "Water Alert" – If water supplies are threatened with constraint, the Plan calls for an introductory Stage 1 drought response, during which customers are informed of possible shortages and asked to voluntarily conserve 10 percent. In addition, customers are prohibited from wasting water or unreasonably using water for beneficial purposes. For example, prohibited water uses under this stage that align with the Municipal Code include: allowing water to run off unused into a gutter, ditch, or drain; failing to repair a controllable leak; washing sidewalks, driveways, parking areas, tennis courts, patios, or other paved or areas; utilizing a hand-held hose without an automatic shut-off nozzle; and irrigating during a precipitation event.

This stage includes performing public outreach and education about the shortage and methods individuals can implement to reduce their water use. The City will inform the public and neighboring governmental bodies of the potential shortage condition and will coordinate with customers to implement the actions consistent with this Stage. The City will use its enforcement authorities as needed to ensure consistency with the objectives within this stage.

Stage 2 (10 - 20 percent shortage) "Water Warning" – In the event Stage 2 is implemented the City will continue to encourage community-oriented voluntary conservation measures, enforce conservation measures, and implement mandatory water use reduction measures to decrease demand by up to 20 percent. Stage 2 activities include a continuation of activities described under Stage 1, as well as greater conservation and water use restrictions. These additional restrictions go beyond those identified in Stage 1, limiting outdoor irrigation to the hours of 9:00 PM and 9:00 AM and vehicle washing must be done using a bucket or hand-held hose with an automatic shut-off nozzle, or take place at a commercial car wash. Customer baseline water use may be monitored and addressed with excess use above the shortage percentage subject to financial penalties under Chapter 13.04 of the City's Municipal Code and other enforcement authorities as applicable. The City will also continue to engage in public outreach and education as it applies to the water shortage conditions and the actions necessary to achieve up to 20% reduction in use.

Stage 3 (20 - 30 percent shortage) "Severe Shortage" – Stage 3 includes all response actions taken in Stages 1 and 2 and is focused on continuing to encourage customers to voluntarily reduce water use regarding turf watering, fillings pools, etc., mandatory-watering restrictions will be implemented following additional shortage actions described in Stage 2. Increased monitoring related to prescribed water conservation actions will occur under this stage. Customer baseline water use may be monitored and addressed with excess use above the shortage percentage subject to financial penalties under Chapter 13.04 of the City's Municipal Code and other enforcement authorities as applicable. The City will also continue to engage in public outreach and education as it applies to the water shortage conditions and the actions necessary to achieve up to 30% reduction in use.

Stage 4 (30 - 40 percent shortage) "Critical Shortage" – Stage 4 includes all response actions taken in prior stages regarding mandatory conservation and intensifies their implementation and enforcement. Stage 4 restrictions will be implemented if the Stage 3 demand reduction and other response actions are deemed insufficient to achieve reductions due to water supply shortages. All Stage 3 response actions will be intensified, and water production will be monitored daily by City for compliance with necessary reductions. Customer baseline water use may be monitored and addressed with excess use above the shortage percentage subject to financial penalties under Chapter 13.04 of the City's Municipal Code and other enforcement authorities as applicable. The City will also continue to engage in public outreach and education as it applies to the water shortage conditions and the actions necessary to achieve up to 40% reduction in use.

Stage 5 (40 - 50 percent shortage) "Water Crisis" – Stage 5 includes all response actions taken in prior stages regarding mandatory conservation. The primary focus of Stage 5 is to ensure the protection of the water supply for all public health and safety purposes. This Stage will require reductions in water demand by up to 50 percent and will follow all voluntary and mandatory actions described in Stages 1-4. Customer baseline water use may be monitored and addressed with excess use above the shortage percentage subject to financial penalties under Chapter 13.04 of the City's Municipal Code and other enforcement authorities as applicable. The City will also continue to engage in public outreach and education as it applies to the water shortage conditions and the actions necessary to achieve up to 50% reduction in use.

Stage 6 (greater than 50 percent shortage) "Water Emergency" – Stage 6 includes all response actions taken in prior stages focused on reducing water demands by more than a fifty percent in response to greater than 50 percent water shortages. This water emergency stage actions become effective when the Board of Directors declares that the City is unable to provide sufficient water supply to meet ordinary demands, to the extent that insufficient supplies are available for human consumption, sanitation, and fire protection. The declaration is to be based on their judgment concerning the degree of the immediate or future supply deficiency. This stage requires only use of water for human health and safety purposes. No additional water uses are permitted, including any outdoor irrigation for anything other than maintenance of legacy vegetation.[54] Customer baseline water use may be monitored and addressed with excess use above the shortage percentage subject to financial penalties under Chapter 13.04 of the City's Municipal Code and other enforcement authorities as applicable. The City will also continue to engage in public outreach and education as it applies to the water shortage conditions and the actions necessary to achieve greater than 50% reduction in use.

[54] Legacy vegetation includes fully matured trees and other vegetation that require irrigation in order to survive. Minimal irrigation should be used and alternative sources of water should be considered for use.

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

Table 6-1: WSCP Actions to Reduce Customer Use - Stage 1

Stage 1 Water Alert: Savings up to 10%
1. Waste and unreasonable use of water prohibited and voluntary conservation encouraged (up to 10%). 2. Water shortage situation and possible subsequent water shortage stages explained to the public and governmental bodies (up to 10%) 3. Establish customer use baselines. 4. Identify customers with high per capita water usage to achieve proportionally greater reduction than those with low use. 5. Water use penalties under Chapter 13.04 available. 6. Actions may include, but are not limited to: Public information campaign consisting of distribution of literature, speaking engagements, website updates, bill inserts, and conversation messages printed in local newspapers and educational programs in area schools. 7. Consumption Reduction Methods, including: • Encourage customers to fix leaks or faulty sprinklers promptly (*0-1%*). • Decorative water features (water fountains, etc.) to recirculate water and be leak proof (*0-1%*). • Direct customers to irrigate landscapes during cooler morning and evening hours to reduce evaporation and minimize landscape runoff (*0-5%*). • Landscape watering shall be confined to a user's property and shall not runoff onto adjacent properties, roadsides or gutters (*0-5%*). • No landscape watering shall occur while it is raining (*0-5%*). • Use a shutoff nozzle on hoses (*0-1%*). • Washing down impervious surfaces such as driveways and sidewalks is prohibited unless for public health and safety purposes (*0-1%*). • Commercial, industrial, institutional equipment must be properly maintained and in full working order (*0-1%*). • Encourage customers to wash only full loads when washing dishes or clothes (*0-1%*). • Encourage customers to use pool covers to minimize evaporation (*0-1%*). • Encourage restaurants to only serve water to customers on request (*0-1%*). • Assess current water use against a water use baseline to determine conservation

Table 6-2: WSCP Actions to Reduce Customer Use – Stage 2

Stage 2 Moderate Shortage: Savings up to 20%
1. All measures implemented in Stage 1 2. Encourage additional voluntary conservation usage reductions (up to 20%) 3. Mandatory conservation rules and restrictions and some prohibitions on end uses (10-20%). 4. Water Use Penalties under Chapter 13.04 available. 5. All consumption reduction methods from Stage 1 and intensified as needed; additionally: • Mandatory outdoor irrigation restrictions including limiting number of watering to 3 days per week, and time when irrigation can occur (e.g., between 9:00 pm and 9:00 am). Plant containers, trees, shrubs and vegetable gardens may be watered additional days using only drip irrigation or hand watering (5-10%). • Fix leaks or faulty sprinklers within 7 days (0-1%). • Restaurants serve water only upon customer request (up to 1%). • Pool covers required (up to 5%) • Non-essential potable water uses strongly discouraged (up to 20%) • No restrictions on landscape watering with non-potable water. • Assess customer usage against baseline (up to 20%).

Table 6-3: WSCP Actions to Reduce Customer Use - Stage 3

Stage 3 Severe Shortage: Savings up to 30%
1. All measures implemented in Stages 1 and 2 2. Some or all of the following: • Adherence to customer baselines and actual water use reductions water allocations and mandatory conservation rules (20-30%). • Customer water usage in excess of baseline to be monitored and recorded (up to 30%). • Water use prohibitions include further restrictions of days and daytime hours for watering, excessive watering resulting in gutter flooding, using a hose without a positive shutoff device, prohibition on use of decorative fountains with non-recirculating pumps, prohibition on washing down sidewalks or patios, not repairing leaks in a timely manner, etc. (up to 30%) 3. All activities are intensified and production is monitored daily for compliance with necessary reductions from customer baseline (up to 30%) 4. Water Use Penalties under Chapter 13.04 available 5. All Consumption Reduction Methods from Stage 2 and intensified as needed; additionally: • Fix leaks or faulty sprinklers within 3 days (*0-1%*). • Decorative water features that use potable water must be drained and kept dry (*0-1%*). • Car washing is only permitted using a commercial carwash that recirculates water or by high pressure/low volume wash systems (*0-1%*). • Require a construction water use plan be submitted to the water supplier that addresses how impacts to existing water users will be mitigated (such as dust control) (*0-1%*). • With the exception of landscapes watered with non-potable water, limit the installation of new landscaping to drought tolerant trees, shrubs and groundcover. Prohibit installation of new turf or hydroseed. Customers may apply for a waiver to irrigate during an establishment period for the installation of new turf or hydroseed. (*0-1%*) • During Warm/Dry Season: Up to two days per week turf watering when using potable water (*5-20%*) and irrigation between 10 pm and 7 am. Cool/Wet Season: Turf shall not be watered unless utilizing non-potable water during extended dry spells (*1-5%*). • Assess customer usage as measured against customer baseline (up to 30%)

Table 6-4: WSCP Actions to Reduce Customer Use - Stage 4

Stage 4 Critical Shortage: Savings up to 40%
1. All measures implemented in Stages 1-3 2. All activities are intensified and production is monitored daily for compliance with necessary reductions from customer baseline (up to 40%). 3. All Consumption Reduction Methods from Stage 3 and intensified as needed; additionally: • Fix leaks or faulty sprinklers within 1 day (*0-1%*). • Existing pools shall not be emptied and refilled using potable water unless required for public health and safety purposes (*0-1%*). • Water use for new landscape installations or renovations is not authorized (*0-1%*). • Previous waivers for watering during an establishment period will be revoked (*0-1%*). • Warm/Dry Season outdoor irrigation: Up to one day per week turf watering when using potable water (*10-30%*) from 11 pm to 6 am. Cool/Wet Season: Turf shall not be watered unless utilizing non-potable water during extended dry spells (*1-5%*). 4. Water use penalties under Chapter 13.04 available.

Table 6-5: WSCP Actions to Reduce Customer Use - Stage 5

Stage 5 Shortage Crisis: Savings up to 50%
1. All measures implemented in Stages 1-4 2. Source of supply for the System is severely curtailed to the level that requires each customer to restrict their water use for only human health and safety purposes (up to 50%) 3. All activities are intensified and production is monitored daily for compliance with necessary reductions from customer baseline (up to 50%). 4. All Consumption Reduction Methods from previous stages and intensified as needed 5. Update current water shortage condition response measures based on Board approvals and direction, state policy directives, emergency conditions, or to improve customer response 6. Water use penalties under Chapter 13.04 available. 7. Catastrophic Event (Supply reduction up to 50%): Implement Applicable Actions for Catastrophic Events (such as boil water order)

Table 6-6: WSCP Actions to Reduce Customer Use - Stage 6

Stage 6 Emergency Shortage: Savings greater than 50%
1. All measures implemented in Stages 1-5 2. Source of supply for the System is severely curtailed to the level that requires each customer to restrict their water use for only human health and safety purposes. Customer rationing may be implemented. (>50%) 3. All activities are intensified and production is monitored continually for compliance with necessary reductions from customer baseline (more than 50%). 4. All Consumption Reduction Methods from previous stages and intensified as needed 5. Update current water shortage condition response measures based on Board approvals and direction, state policy directives, emergency conditions, or to improve customer response 6. Catastrophic Event (Supply reduction greater than 50%): Implement Applicable Actions for Catastrophic Events. 7. Water use penalties under Chapter 13.04 available.

6.4.2 Demand Reduction Actions

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

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

6.4.3 Mandatory Prohibitions

This section is required to identify any mandatory prohibitions against specific water use practices that are in addition to state-mandated prohibitions and appropriate to the local conditions. City adopted Article IX of Chapter 13.04 of the City's Municipal Code to address water waste. The ordinance prohibits intentional or unintentional water waste and unreasonable uses of water and encourages beneficial water use.

6.4.4 Emergency Operations Plan for Catastrophic Water Shortages

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

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

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

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

Table 6-7: Summary of Actions for Catastrophic Events

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

6.4.5 Seismic Risk Assessment and Mitigation Plan

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

City intends to submit a copy of the Yolo County Emergency Operations Plan[55] that was revised in 2013. The EOP addresses the vulnerabilities associated with various hazards and emergencies and the financial issues that impact implementation of the EOP, as well as a comprehensive mitigation strategy. Accordingly, the EOP is incorporated by reference into City's WSCP.

6.5. Communication Protocols

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

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

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

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

- Publishing information on City's website.
- Staffing a telephone hotline.

[55] https://www.yolocounty.org/home/showpublisheddocument/24660/635289380535200000

- Providing bill inserts and direct mailings above and beyond those legally required.
- Directly calling and/or emailing customers.
- Developing materials for non-English speaking customers.
- Preparing social media posts to communicate City actions.
- Advertising actions on other local audio and video media.
- Coordinating voluntary and mandatory water conservation activities with other local and regional governing bodies.

6.6. Compliance and Enforcement

The City's Water Ordinance embodied in Chapter 13.04 of the Municipal Code has significant compliance and enforcement options for implementing its water shortage planning. Financial penalties, flow restrictors, and disconnected water service are among the options available to the City to ensure compliance with the required water shortage actions. Appeals processes are also available for those that are subject to the enforcement provisions of the Municipal Code.

In addition, the General Provisions of the California Municipal Code states that the City may begin an administrative proceeding against the customer to impose and collect the administrative fine and recover the City's enforcement costs, if a notice of public nuisance has been issued to the customer and corrective work specified in the notice has not been completed within specified time.

6.7. Legal Authorities

The City is empowered to implement and enforce its WSCP under its organizing statutes and Chapter 13.04 of the Municipal Code.

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

6.8. Financial Consequences of WSCP

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

6.8.1 Revenue and Expenditure Impacts

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

When a drought or water shortage occurs, the City's costs increase due to the additional activities and duties of instituting a stage of action. Not only will there be costs for materials, and time from permanent staff, but additional staff may need to be hired to assist in implementing the Water Shortage Contingency Plan. Staff will regularly report the identified and anticipated revenue and expenditure impacts and recommend appropriate responses to the City Board. The City maintains a reserve fund to supplement revenue shortfalls.

6.8.2 Drought Rate Structures and Surcharges

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

6.9. Monitoring and Reporting

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

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

- Gathering monthly or bi-monthly customer water use data.
- Preparing technical assessments of customer water use and identifying deficiencies.

- Analyzing trends in water supply availability, including meteorological events, regional water supply coordination actions, and statewide regulatory trends.
- Assessing water conservation activities and the effectiveness of enforcement actions as applicable to achieving conservation objectives.

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

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

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

6.10. Re-evaluation and Improvement Procedures

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

6.11. Special Water Feature Distinction

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

Water shortage response actions will focus on health and safety issues and balancing continuation of these uses with the severity of the water shortage condition. The relative total water use from these

sources is a consideration for how special water features and swimming pool uses could be curtailed during specific water shortage conditions. For instance, when swimming pool filling and refilling would exceed a customer's use allocation under the various drought stages in the Municipal Code, then these actions are prohibited and can be subject to drought penalties and other City enforcement actions. City determined that special water features are a relatively small discretionary use but may be restricted under all identified water shortage condition.

6.12. Plan Adoption, Submittal, and Availability

The WSCP has been adopted, submitted, and is available as required by the Urban Water Management Planning Act. As a stand-alone document, the WSCP is also subject to the following separate adoption, submittal, and availability processes, and whenever it is separately amended or revised in the future. City may refine or amend this WSCP as necessary and in compliance with the normal public notice and adoption. City has followed all applicable law in adopting the WSCPs. The current adopted WSCP shall be available to City customers and to Yolo County, Yolo County Groundwater Agency, and the public within 30 days of its adoption. A copy of the current WSCP is available for public inspection during business hours at the City office (subject to current COVID 19 restrictions). The current WSCP is posted and available for download here www.cityofwestsacramento.org.