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2020 Urban Water Management Plan

Florin Resource Conservation District

Elk Grove Water District

Prepared by:

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ZANJERO

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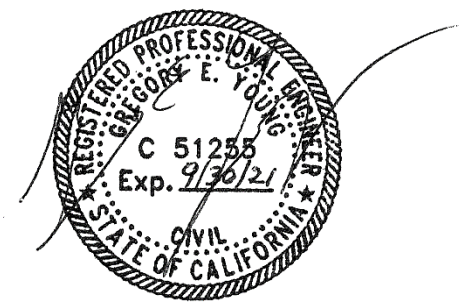
This 2020 Urban Water Management Plan was prepared under the direction of a California licensed civil engineer.



Executive Summary
Layperson's Description

After the devastating drought in the late 1970s, the California Legislature declared California's water supplies a limited resource, subject to ever-increasing demands and that the long-term, reliable supply of water is essential to protect California's businesses, communities, agricultural production, and 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

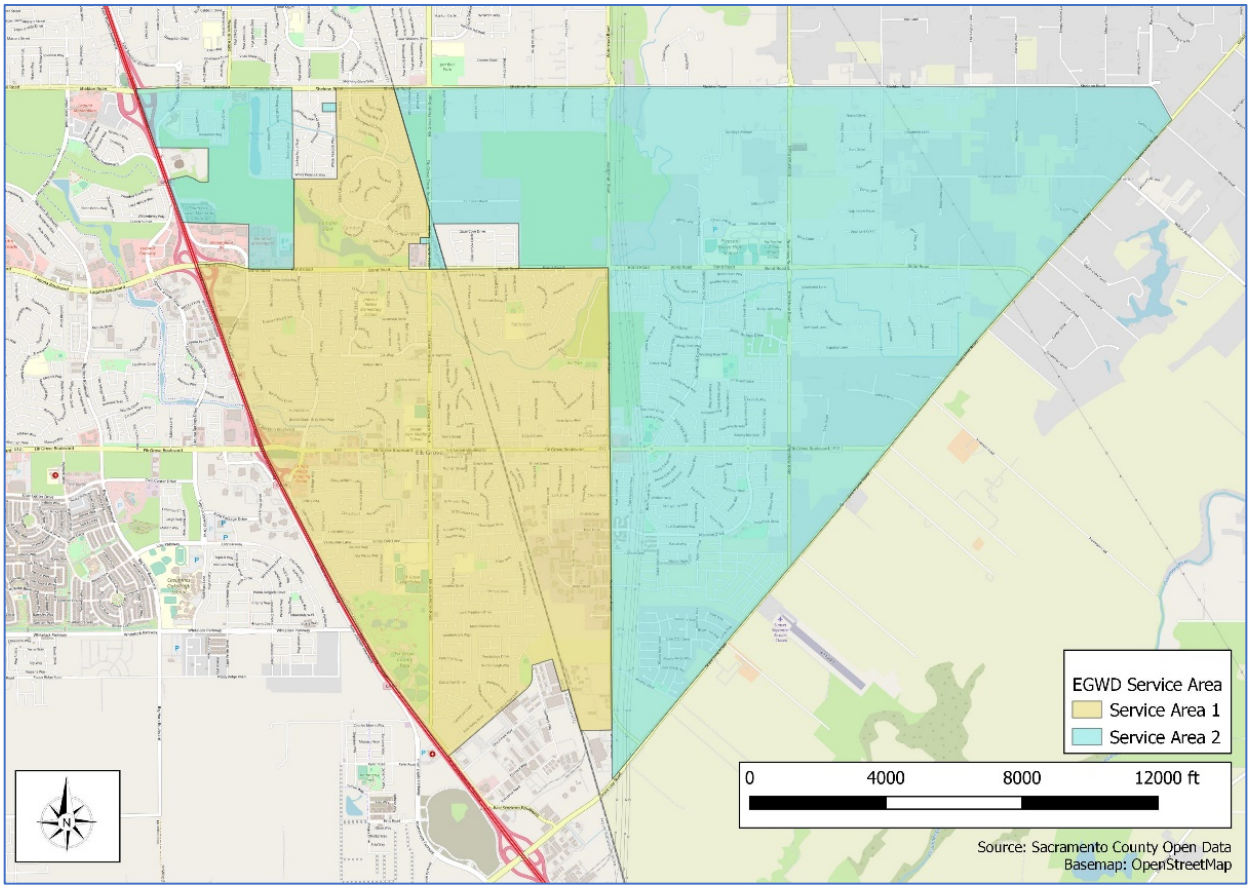
ES-1 Elk Grove Water District

The Elk Grove Water District (District) is a public water agency that provides potable water directly to retail customers throughout the approximately 13 square mile service area boundary. The District, originally created in 1893 to provide local water services and fire protection water resources, has continued to be a predominant water purveyor within the City of Elk Grove. Formerly called Elk Grove Water Works, it was family owned until 1999 when it was purchased by the Florin Resources Conservation District (FRCD). The District's services are coordinated and managed within the FRCD, and it is governed by a five member, publicly elected Board of Directors.

Serving a population of over 45,000, the District has a broad range of responsibilities, including long-term water reliability planning, management of current groundwater assets, and distribution of potable water.

The District is separated into two service areas: Service Area 1 and Service Area 2. Service Area 1 is supplied by groundwater wells and treated by the District's water treatment plant. Service Area 2 is supplied by surface water and groundwater purchased from SCWA. Figure ES-1 represents EGWD's service areas.

Figure ES-1: Elk Grove Water District Water Service Area



ES-2 EGWD's Water Service Reliability

Elk Grove Water District has developed a robust water supply portfolio to serve its current and future demands. The District derives its water supplies from two sources – groundwater from the South American Subbasin and contract supplies through an agreement with Sacramento County Water Agency. The District's groundwater supplies are linked to a number of historical groundwater management actions, including formation of the Sacramento Central Groundwater Authority (SCGA) and more recently the development of the SCGA Groundwater Sustainability Agency (GSA) under the Sustainable Groundwater Management Act (SGMA). SCGA prepared the original groundwater management framework that has been included in the District's 2020 Urban Water Management Plan. SCGA's ongoing water management activities have stabilized the South American Subbasin's groundwater levels and helped preserve the District's access to those supplies for future generations.

SCGA GSA is updating the existing groundwater management plans, in cooperation with four other GSA's, to ensure that the South American Subbasin meets the SGMA sustainability objectives. The South American Subbasin Groundwater Sustainability Plan (GSP) will be completed in 2022 and will characterize and develop specific actions that meet the SGMA sustainability objectives. And although the new GSP may alter how and under what conditions the District may access groundwater supplies from the South American Subbasin, the District does not anticipate any actions that would reduce long-term reliability of the groundwater to meet its current and future demands.

The District also has a Master Water Agreement with Sacramento County Water Agency (SCWA) that it signed in 1995 and renewed in 2002 (Agreement). This Agreement obligates SCWA to provide water supplies to the District's service area. The Agreement has a fifty-year term and a right of renewal that stabilizes the long-term reliability of this supply to meet the District's current and future demands. Moreover, SCWA may deliver any of its water supplies – both surface water and groundwater – based on the terms of the Agreement, giving the District added reliability through SCWA's diverse water supply portfolio and conjunctive use actions. Taken together, the District's groundwater supplies and Agreement provide reliable supplies to meet the District's normal, single dry, and five-consecutive dry year water supply needs through 2045.

Chapter 1
Introduction

The Elk Grove Water District (EGWD or District) has been a water supplier in southern Sacramento County for over 120 years. The District, originally created in 1893 to provide local water services and fire protection water resources, has continued to be a predominant water purveyor within the City of Elk Grove. Formerly called Elk Grove Water Works, it was family owned until 1999 when it was purchased by the Florin Resources Conservation District (FRCD). The District's services are coordinated and managed within the FRCD, and it is governed by a five member, publicly elected Board of Directors.

Serving a population of over 45,000, the District has a broad range of responsibilities, including long-term water reliability planning, management of current groundwater assets, and distribution of potable water.

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

Elk Grove Water District has prepared this 2020 UWMP to comply with the Urban Water Management Planning Act (UWMPA) requirements for urban water suppliers. This 2020 UWMP addresses the District'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 District's 2020 UWMP specifically assesses the availability of its supplies to meet forecast water uses during average, single-dry and five consecutive drought years through 2045. Verification that future demands will not exceed supplies and assuring the availability of supplies in dry-year conditions are critical outcomes of this 2020 UWMP.

The 2020 UWMP is an update to the EGWD'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. These updates are detailed in Chapter 2 and throughout the rest of the UWMP. 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 EGWD's Board of Directors, staff, customers and the State of California about its water management practices. It reflects the District's planning assumptions and goals and should be used in combination with other planning resources and documents over the UWMP planning horizon.

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

1.2 Basis for Plan Preparation

In addition to operating a Public Water System as described in California Health and Safety Code 116275, Elk Grove Water District qualifies as a Retail Urban Water Supplier as described in Water Code Section 10617, providing water for municipal purposes to more than 3,000 customers or 3,000 acre/feet of water per year. This qualification requires the preparation of an Urban Water Management plan every five years. The District'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 2020
CA341008	Elk Grove Water District	~ 12,890

The State Legislature passed numerous new requirements since the 2015 UMWP which are detailed throughout this 2020 UWMP[6]. 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 Characterization, 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.

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

- **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 District's Groundwater Supplies are described in Chapter 3—Water Supply Characterization.
- **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 Supplier's detailed analysis.

1.3 Coordination and Outreach

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

Elk Grove Water District is a member of the Regional Water Authority (RWA), a joint powers authority, created by water purveyors in the Sacramento region to have a unified approach to regional water issues. The RWA provides members and associates significant regional coordination to enhance water management practices.

As stipulated in Water Code Section 10621(b), every urban water supplier shall seek active involvement from diverse elements of the community. EGWD sought public participation with hearings and notices to members of the community. 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				
Sacramento County			X	X
Sacramento County Water Agency	X	X	X	X
City of Elk Grove (Planning Dept.)	X	X	X	X
City of Elk Grove (Public Works Dept.)	X	X	X	X
Cosumnes CSD			X	X
Sacramento County Regional Sanitation District			X	X
General Public				X
Shared Groundwater Resource Interests				
Cal-Am Water Company			X	X
Sloughhouse RCD			X	X
Golden State Water Company			X	X
Rancho Murrieta CSD			X	X
Omochumne Hartnell ID			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. SCWA provides wholesale water to the District, and as required by UWMPA, EGWD and SCWA exchange projected water demand in five-year increments for 20 years into the future. The District's service area is completely encompassed by SCWA. Due to its contractual and geographical relationship, SCWA plays a role in the District's water management of Service Area 2.

1.3.2 Statutory Requirements for Notice

EGWD provided formal written notification to Sacramento County (County) and the City of Elk Grove that the District's UWMP was being updated. In accordance with the UWMPA, this notification was provided at least 60 days prior to the public hearing of the plan as required by Section 10642 of the Water Code. Electronic copies of the final UWMP will be provided to the County and City no later than 30 days after its submission to DWR.

1.4 UWMP Adoption

The District held a public hearing regarding its 2020 UWMP on June 15, 2021. Before the hearing, a draft was made available for public inspection at the District's office, and on its website. Pursuant to CWC Section 10642, general notice of the public hearing was provided through publication of the hearing date and time and posting of the hearing at the District's office.

Following the public hearing, the District Board of Directors considered the comments from the public, and then voted on whether to adopt the 2020 UWMP. By a majority vote, the Board adopted the 2020

UWMP on June 15, 2021. 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 District's website.

The District plans to submit all required documentation related to the UWMPA through the DWR submittal website soon after adoption. These include the following required DWR Excel workbooks:

- "FINAL Submittal 2020 UWMP Tables 04.02.2021.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:

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

NOTE TO DWR:

The Elk Grove Water District has written this Urban Water Management Plan (UWMP) primarily as a water resources planning tool to effectively manage water supply, reliability and demand. This UWMP also 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 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 are 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 Elk Grove Water District (District) is a department within the Florin Resource Conservation District, that provides potable water directly to retail customers throughout its approximately 13 square mile service area boundary. The District and surrounding area overlie the Sacramento Area Groundwater Basin, and specifically rests atop the Central Basin. The District is bounded by Sheldon Road to the north, Highway 99 to the west, Grant Line Road to the east, and the Union Industrial Park to the south. The District is surrounded by the Sacramento County Water Agency (SCWA) on all sides.

2.1 Water Service Area

The District is separated into two service areas: Service Area 1 and Service Area 2. Service Area 1 is supplied by groundwater wells and treated by the District's water treatment plant. Service Area 2 is supplied by surface water and groundwater purchased from SCWA. Figure 2-1 represents EGWD's service areas.

The District provides water service to approximately 12,890 residential, commercial/institutional, irrigation, and industrial service connections. Much of the development is low and medium density single-family housing, with accompanying retail commercial use. Table 2-1 provides the historical and current number of service connections by customer class for the entire District.

2.2 Service Area Climate

The District's climate is typical of California's Central Valley with hot, dry summers, and cool, wet winters. Climate data was obtained from local reporting stations with the same microclimate characteristics as the District's service area.

Temperature data was obtained from the Western Regional Climate Center (WRCC) station at Sacramento Executive Airport, located about 17 miles northwest of the service area. The average annual temperature is about 61 degrees Fahrenheit (°F). Typically, July and August are the hottest months of the year with an average daily temperature of about 75 °F, though daytime high temperatures average between 92-93 °F. There are approximately 73 days a year when the high temperature exceeds 90 °F. December and January are generally the coolest months of the year, with a mean annual temperature of about 46 °F, and the average minimum dipping down to 38 °F. Historically, there are about 18 days per year in which temperatures go below 32 °F.

Figure 2-1: Service Areas

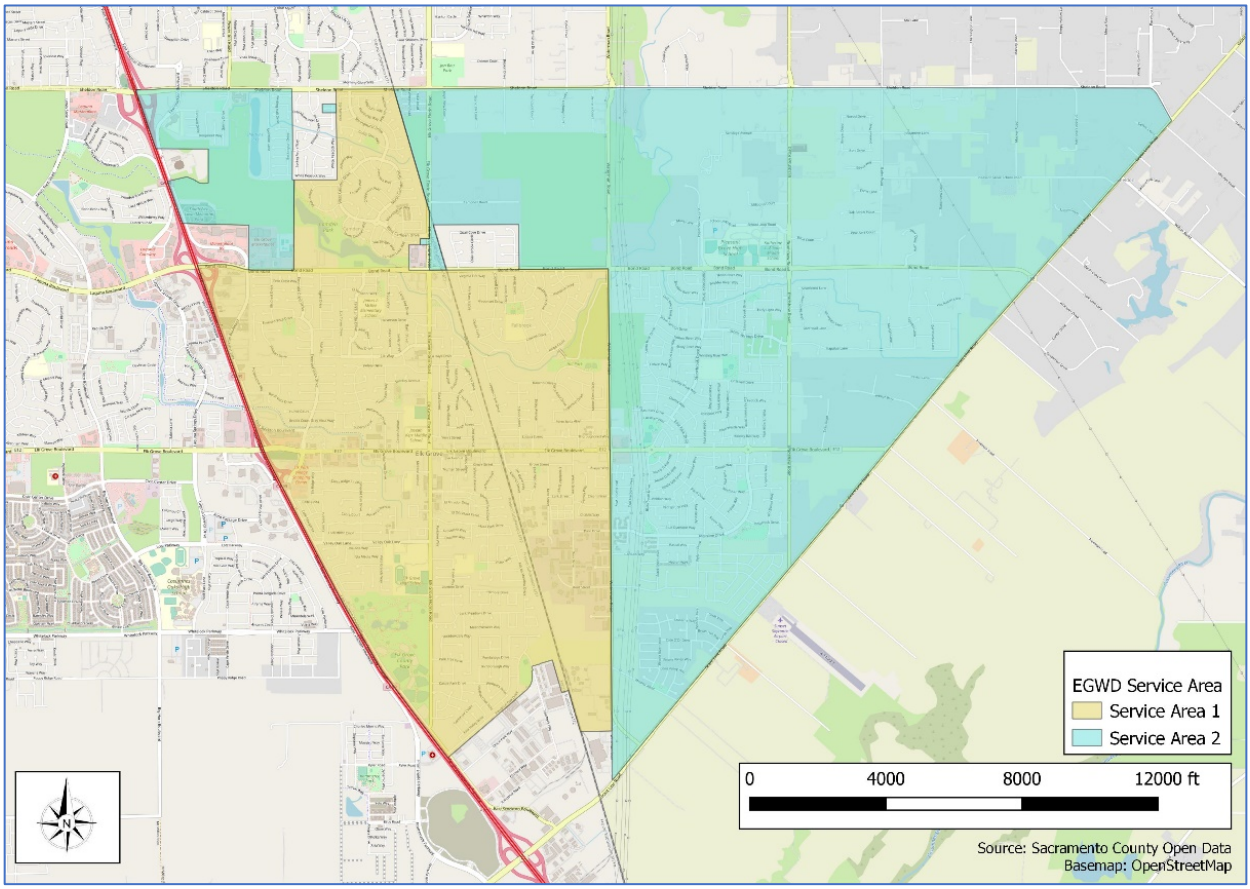


Table 2-1: Customer Water Service Connections

Customer Class	2015	2016	2017	2018	2019	2020
Single Family Residential	11,576	11,671	11,802	11,812	12,055	12,295
Multi-Family Residential	60	62	62	62	62	62
Commercial/Institutional	346	520	357	360	360	361
Industrial	43	0	43	43	43	43
Landscape Irrigation	105	105	115	119	119	121
Other	n/a	10	10	10	17	10
Total	12,130	12,263	12,389	12,406	12,656	12,882

Precipitation data is also documented from the WRCC Sacramento Executive Airport station. For the period 1941-2016[7], average rainfall was measured at 17.24 inches. The wettest months are December, January and February, and the driest months are typically July and August.

Evapotranspiration (ETo) varies seasonally, and during dry years the significance of evapotranspiration is magnified because it continues to deplete surface and soil water supplies that are not being replenished

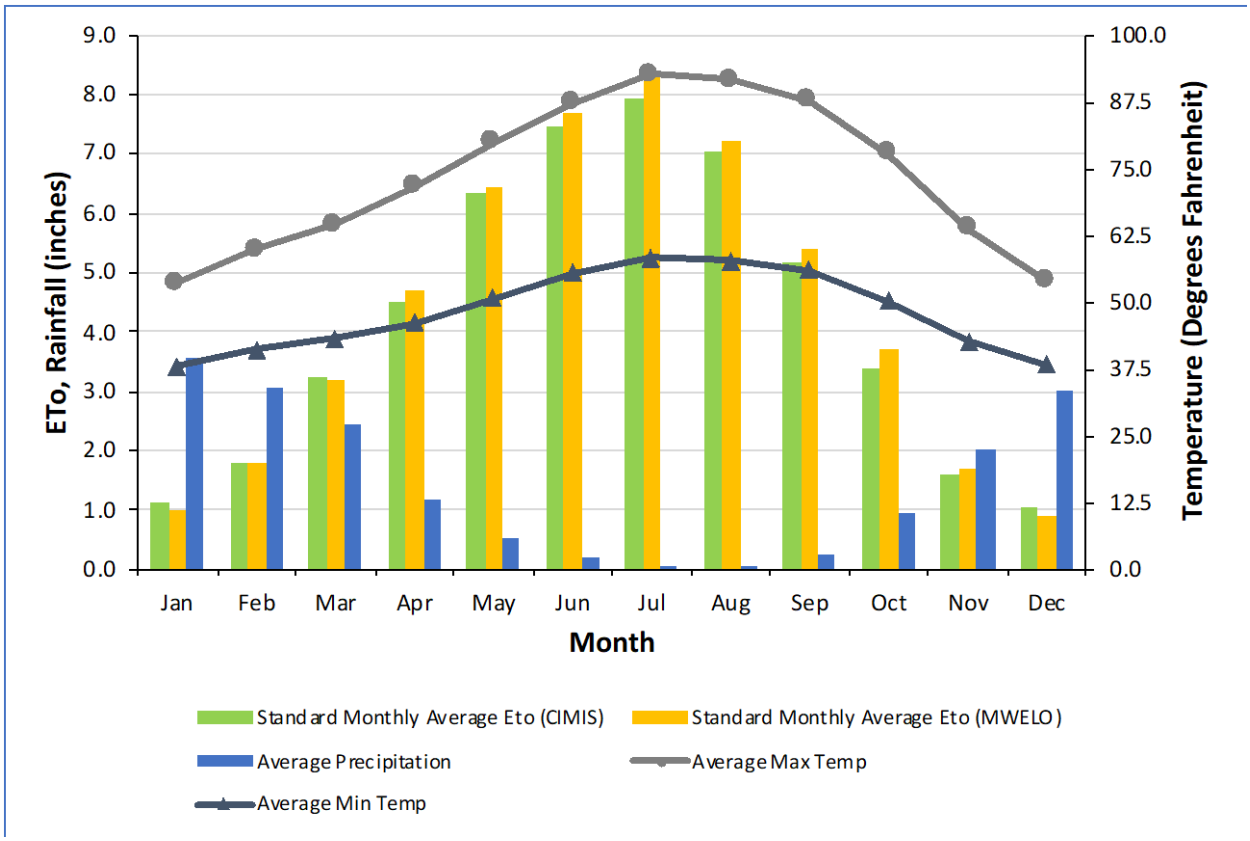
[7] Period of Record: 11/10/1941 to 06/09/2016

by sufficient precipitation. EGWD monitors ETo closely. Standard monthly average ETo data was obtained from the California Irrigation Management Information System (CIMIS) Station 131 located in Fair Oaks, California, which is about 20 miles northeast of the service area. Average annual ETo for the period 1998-2020 measured 50.54 inches.

Additional ETo data from California Model Water Efficient Landscape Ordinance (MWELO) is also reported in Table 2-2. Local agencies are to use the MWELO ETo values as the standard for approval of landscape plans associated with specific development projects. Since the City of Elk Grove (City) was not listed in the MWELO ETo Table, data from the nearby City of Sacramento was used[8].

All ETo, rainfall, and temperature data is provided in Table 2-2 and Figure 2-2.

Figure 2-2: Monthly Average Climate for the Elk Grove Water District



[8] As outlined in the 2015 update to the MWELO § 492.4 (a) (1): For geographic areas not covered in MWELO Appendix A, use data from other cities located nearby in the same reference evapotranspiration zone, as found in the CIMIS Reference Evapotranspiration Zones Map, DWR, 1999.

Table 2-2: Elk Grove Water District Climate Information

Month	MWELO Appendix A ETo (in)	CIMIS Standard Monthly Average ETo (in)	Average Precipitation (in)	Average Temperature (°F)	Average Maximum Temperature (°F)	Average Minimum Temperature (°F)
January	1.0	1.12	3.56	45.7	53.5	37.8
February	1.8	1.78	3.07	50.4	59.9	41.0
March	3.2	3.24	2.44	53.9	64.6	43.1
April	4.7	4.52	1.17	58.6	71.4	45.9
May	6.4	6.35	0.50	65.3	79.9	50.7
June	7.7	7.44	0.18	71.3	87.2	55.4
July	8.4	7.91	0.03	75.5	92.7	58.2
August	7.2	7.03	0.06	74.6	91.5	57.8
September	5.4	5.14	0.25	71.8	87.7	55.8
October	3.7	3.36	0.93	63.9	77.7	50.2
November	1.7	1.61	2.04	53.1	63.7	42.6
December	0.9	1.04	3.02	46.0	53.8	38.2
Annual:	**51.9**	**50.54**	**17.24**	**60.8**	**73.6**	**48.1**

Totals may not add due to rounding.
MWELO Appendix A data from Sacramento, CA.
ETo data from DWR CIMIS Data, Fair Oaks Station 131, 1997-2020.
Precipitation and Temperature data from WRCC, Sacramento Executive Airport (041630) 1941-2016.

2.2.1 Climate Change

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

The service area climate is highly variable with respect to precipitation and temperature. The dry summer months make the state extremely susceptible to drought when a deficiency in precipitation materializes, especially in mountain snowpack. Much of the water supply comes from the mountains falling as winter rain or snow and is then stored as snowpack and subsequently captured in reservoirs and appropriated throughout the year.

As a member of the Regional Water Authority (RWA), the District participated in the American River Basin Study. Per DWR requirements regarding the inclusion of climate change analysis, pertinent excerpts from the referenced study are presented below.

American River Basin Study

In 2020, the American River Basin (Basin) region conducted a climate change study in partnership with local water purveyors and the United States Bureau of Reclamation (USBR). The purpose of the American River Basin Study (ARBS or Study) was to develop data tools and analyses, identify supply-demand imbalances, and climate change adaptation strategies specific to the Basin. Under the "new

normal" of a changing climate, the ARBS aims to improve the resolution of regional climate change data and to develop regionally-specific mitigation and adaptation strategies. More detail, along with the approved study can be found at www.pcwa.net/planning/arbs[9].

The Study Area is bounded by the Sierra Nevada mountain range to the east, the Feather and Sacramento Rivers to the west, the Bear River to the north, and the Cosumnes River to the south. In addition to the American River Watershed, the Study Area encompasses the North and South American Groundwater Sub-basins, and Non-Federal Partners' service areas outside of the American River Watershed.

Projected Future Conditions

Analysis of projected future climate conditions in the American River Basin and development of climate scenarios for the ARBS were based on an ensemble of bias-corrected and spatially downscaled climate projections.[10] This ensemble has been used by the California Water Commission and DWR as the primary source of climate projection information in several recent studies, including the Water Storage Investment Program (WSIP) and California's Fourth Climate Change Assessment.[11] Projected future climate conditions were evaluated and characterized based on the ensemble of downscaled climate projections.

Hydrology scenarios were used to develop streamflow inputs to CalSim 3.0, which was then used to evaluate changes in water supplies, demands, and management throughout the Central Valley Project (CVP) and State Water Project (SWP), including the Study Area. Demands for each water purveyor largely relied upon water purveyors' information provided in Regional Drought Contingency Plan/Regional Water Reliability Plan[12] and 2015 UWMPs.

Temperature

Surface air temperatures are projected to increase steadily, with average summer temperatures increasing by approximately 7.2 degrees Fahrenheit (°F) by the end of the 21st century, and winter temperatures increasing by 4.9°F. Projections of daily maximum and minimum temperatures suggest similar warming trends during all seasons, with maximum temperatures projected to increase as much as 7.3°F during the summer months.

[9]Study not yet complete.

[10]Climate projections were developed using Global Climate Models from the Coupled Model Intercomparison Project Phase 5 (CMIP5) and downscaled using Localized Constructed Analogs (LOCA) method projected and coupled with two future emission scenarios (RCP 4.5 and RCP 8.5) available from Dr. David Pierce at the Scripps Institution of Oceanography.

[11] Pierce, D. W., J. F. Kalansky, D. R. Cayan. Climate, Drought and Sea Level Rise Scenarios for California's Fourth Climate Change Assessment. August 2018.

[12] Regional Water Authority (RWA). North American Basin Regional Drought Contingency Plan, October 2017 and Regional Water Reliability Plan, May 2019

Precipitation

Annual precipitation projections show no significant trend in the median of change over the 21st century. Many of the available general circulation model (GCM) projections show change in precipitation, but there is no consistency in the magnitude and direction of projected change between models. Approximately half of the projections indicate a minor increase in annual precipitation and half indicate a minor decrease, highlighting the large uncertainty in future precipitation over this region. Although lacking a clear trend in projected annual precipitation, by the end of the 21st century the average fall and spring precipitation is expected to decrease, with winter and summer precipitation increasing. Increasing variability is also projected in winter and fall precipitation. Table 2-3 displays the projected (2070-2099) change in precipitation and temperature compared to 1980-2009 averages.

Table 2-3: Projected Change in Precipitation and Temperature Over the American River Basin Study Area Between 1980-2009 and 2070-2099

Season	Percent Change in Basin-Averaged Annual Mean Precipitation (%)	Change in Basin-Averaged Annual Mean Daily Air Temperature (°F)	Change in Annual Mean of Daily Maximum Air Temperature (°F)	Change in Annual Mean of Daily Minimum Air Temperature (°F)
Fall	-6.0	5.8	6.1	5.5
Winter	4.7	4.9	5.0	4.8
Spring	-11.9	5.8	6.3	5.1
Summer	10.4	7.2	7.3	7.0

Snowpack

Snow water equivalent (SWE) is a key indicator of water supplies in this region, where runoff is largely influenced by snowmelt. The increasing variability in precipitation combined with increases in surface air temperatures are key drivers in projections of a reduction in annual average SWE. Average SWE is forecasted to decrease by 50-85% across all climate scenarios and future time periods. In addition, areas that accumulate snow above Folsom Reservoir are also projected to have up to a 12-inch decrease in maximum snowpack by end of the century.

Evapotranspiration

Potential evapotranspiration (PET) serves as a key indicator of landscape and agricultural water demands, including consumptive use by evaporation and transpiration from bare soil, water surfaces, native vegetation, and crops. Average annual PET is expected to increase 1.2 to 6.2 inches across all climate scenarios and future time periods. PET is strongly correlated with air temperature and thus expected to increase more under the hot scenarios (hot-dry, hot-wet) than under the warm scenarios (warm-dry, warm-wet).

Runoff

Watershed runoff is a direct indicator of local water supply available, and is used to determine the availability of water for the State Water Project and Central Valley Project. Climate change projections indicate a pronounced shift in the distribution of runoff from May and June to earlier in the season (December to March), implying a transition in precipitation from snow to rainfall and/or earlier snowmelt and increasing the amount of runoff during the winter months. Peak runoff is expected to shift by more than a month earlier by mid to late century (Figure 2-3). Spring runoff will decrease due to reduced winter snowpack. Similar to the precipitation scenarios, there is large uncertainty in projected runoff where the 'wet' scenarios suggest an increase in annual runoff and the 'dry' scenarios suggest a decrease in annual runoff. The projected changes in basin wide runoff range from an increase of 486 thousand acre-feet (TAF) under the warm-wet scenario to a decrease of 203 TAF under the hot-dry scenario by the end of the century.

This 2020 UWMP includes additional climate change discussion in Chapters 3 and 4.

Figure 2-3: Distribution of Average Monthly Runoff for Historical Record (1922-2015) and Future Projections under Central Tendency Climate Scenario

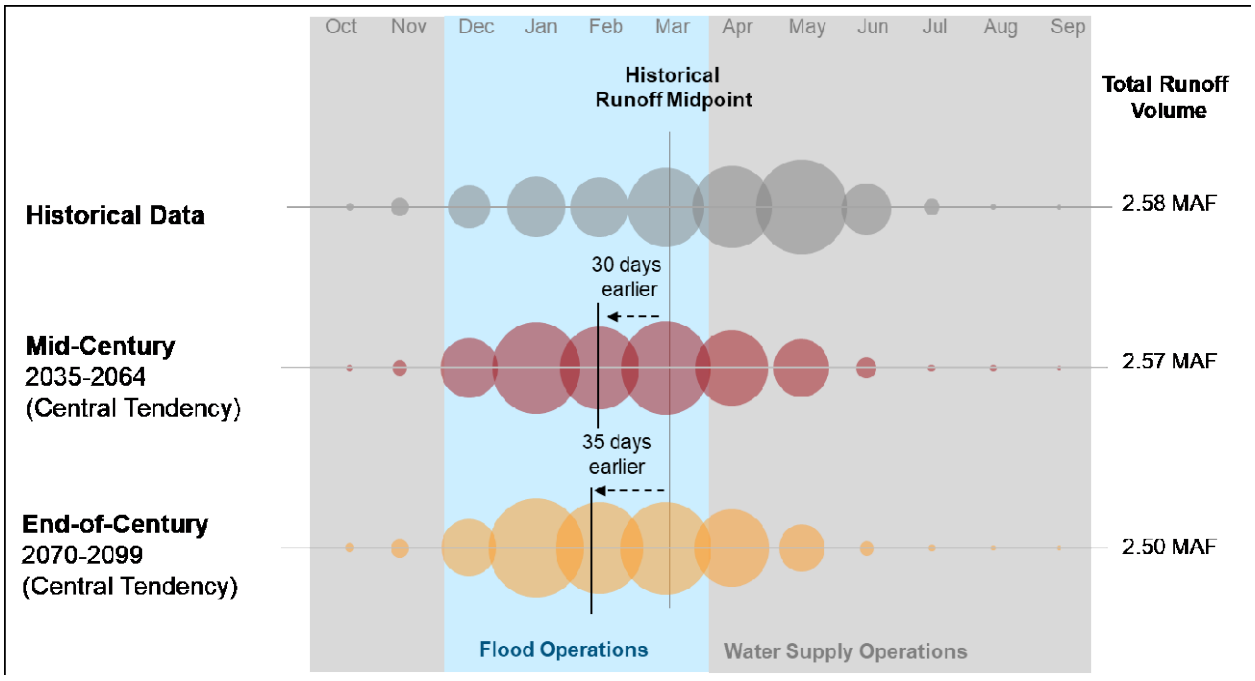


Table 2-4 lists the change in annual climatic and hydrologic indicators between historical baseline observations (1915 to 2015) and projected future conditions for the ARBS area.

Table 2-4: Change in Hydrologic Indicators between Historical Observations and Projected Future Hydrology

Time Period	Climate Scenario	Precip. (in)	T_{avg} (°F)	T_{max} (°F)	T_{min} (°F)	PET (in)	SWE avg. (in)	SWE max (in)	Runoff (TAF)
Historical Baseline									
1915-2015	Historical Observations	38.2	54.8	67.8	35.6	42.8	1.5	5.7	1,458
Variance from Historical Baseline									
2040-2069	Warm-Wet	1.9	4	6.2	1.6	1.6	-0.7	-2.3	701
	Central Tendency	0.1	5	8.1	2.1	2.7	-0.9	-2.8	-2
	Hot-Dry	-2.8	6.2	10.4	2.7	3.7	-1.1	-3.4	-206
2055-2084	Warm-Wet	3.8	4.7	7.4	2	2	-0.8	-2.5	199
	Central Tendency	-1.1	6.3	11.1	2.6	4.1	-1.08	-3.5	-93
	Hot-Dry	-3.4	7.9	13.3	3.7	5	-1.2	-3.8	-185
2070-2099	Warm-Wet	7	5.4	8.3	2.5	1.8	-0.9	-2.9	486
	Central Tendency	-0.6	6.5	11	2.8	3.9	-1	-3.3	-54
	Hot-Dry	-4.6	8.9	15.7	4.1	6.2	-1.3	-4.3	-203

2.3 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 District'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 in Chapter 4.

2.3.1 Current Population and Historic Trends

The population served by the Elk Grove Water District includes a mix of users and user classes, and follows similar demographic and population trends as the City. EGWD's customer base is comprised of single-family residential (95.4 percent), commercial and institutional (2.8 percent), landscape irrigation (0.9 percent), multi-family residential (0.5 percent), with 0.3 percent of customer connections designated as industrial. The build out of the service area will consist of mainly residential, multi-family, and commercial land uses.

Table 2-5 presents the recent and estimated current population for the District's service area. Because the service area does not easily correlate to existing boundaries represented by the California Department of Finance in their historic and recent population analyses, the estimates in the table are derived using an occupancy rate and the residential connection data provided in Table 2-1.

The service area's currently averages about 3.27 persons per connection.[13] Also, because the existing multi-family connection information in Table 2-1 represents multiple residences for each connection, population projection needs the connection to adjust to residences prior to the average persons per connection to be applied. For the purposes of this UWMP, each multi-family connection reflects an average of 25 units.

Table 2-5: Estimated Population – Historical and Current

2015	2016	2017	2018	2019	2020
42,800	43,200	43,700	43,700	44,500	45,300

2.3.2 Current and Projected Land Use

As described previously, the District serves water into two areas: Service Area 1 and Service Area 2 (see Figure 2-1). Service Area 1 is nearly built-out, with mostly infill projects remaining. Service Area 2 expects to receive the majority of additional growth.

Recently, the City of Elk Grove released the public review draft of its 2021 through 2029 Housing Element, a proposed update to its General Plan.[14] Using information published in the draft, an assessment was made to determine the likely number of new housing units – both single-family and multi-family – that may be constructed within the District's service area. Since the City also projects growth for areas west of Highway 99, which receive water service from Sacramento County Water Agency, the total estimated new housing needed to be evaluated for whether it was occurring within the District's service area. The analysis resulted in an estimated 2,400 new residential units added by 2029. This reflects about a 0.3% growth rate.

[13] California Department of Finance, E-5 Population and Housing Estimates for Cities, Counties, 2020

[14] https://www.elkgrovecity.org/UserFiles/Servers/Server_109585/File/Departments/SPI/Housing_2021/EG-Housing-Element_Public%20Review%20Draft_2021-04-13_TrackChanges.pdf

During the analysis of the City's housing projections and comparing to additional projects currently permitted or under plan review, as available through the City's planning department,[15] the District anticipates minor additional growth will continue beyond the 2029 horizon in the City's Housing Element. This growth will most likely be smaller infill residential projects as well as non-residential commercial and industrial growth that often lags the housing.

To accommodate future growth beyond the Housing Element, the District assumes additional housing units equal to about 25% of the Housing Element's projected 2,400 new households would be constructed by 2045 – equal to an additional 500 units. Given the likely location for this growth in Service Area 2, which is characterized by mostly single-family homes, these 500 units will be assumed to all be single-family homes.[16]

To estimate non-residential growth, the existing mix of residential to non-residential connections can be a proxy for estimating the future mix for the incremental new connections. As noted previously, residential connections represent about 95% of the District's customers, with non-residential uses representing 5%. With the addition of 2,400 residential units between 2020 and 2029 plus the additional 500 residential units by 2045, the existing ratio would result in 145 new non-residential connections by 2045. Using the existing ratio of sub-classifications of non-residential customers, the 145 additional connections are assumed to be spread among commercial, industrial and landscape irrigation connections.

Table 2-6 presents the expected new connections by customer classification over the UWMP's planning horizon. Multi-family connections assume 25 households per connection.

Table 2-6: Cumulative New Connections

Customer Class	2025	2030	2035	2040	2045
Residential	1,200	2,400	2,600	2,800	2,900
Non-residential	60	120	130	140	145

[15] https://elkmap.maps.arcgis.com/apps/MapTour/index.html?appid=3c40052d00c34da6a10af32f609decb5

[16] For water use forecasting, this is a more conservative approach since multi-family units have lower per-unit water demand factors. Thus, if some of the future households are multi-family, the use will likely be less than forecast.

Table 2-7 presents the expected total 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 2-7: Expected Total Connections

Customer Class		2020	2025	2030	2035	2040	2045
Existing	Single Family Residential	12,295	12,295	12,295	12,295	12,295	12,295
	Multi-Family Residential	62	62	62	62	62	62
	Commercial/Institutional	361	361	361	361	361	361
	Industrial	43	43	43	43	43	43
	Landscape Irrigation	121	121	121	121	121	121
	Other	10	10	10	10	10	10
New	Residential	0	1,200	2,400	2,600	2,800	2,900
	Non-residential	0	60	120	130	140	145
Total	Residential	12357	13,557	14,757	14,957	15,157	15,257
	Non-residential	535	595	655	665	675	680

2.3.3 Economic Trends & Other Social and Demographic Factors

EGWD's service areas are contained within the City of Elk Grove city limits. While the City's boundaries include areas that are outside of EGWD's service area, there is overall compatibility with respect to employment and growth characteristics.

Since the 1950's, the region has experienced a strong urban growth, typical of post-World War II suburban and metropolitan areas. During the 1990's, the City of Elk Grove's population grew by more than 70%, while job growth mainly occurring in other parts of the greater Sacramento region.[17] Major job sectors for the City's population include government, healthcare, educations, and tech industries, with overall job growth averaging 11.5% annually during the period 2000 to 2013. It is estimated that the City is expected to see an increase in jobs of approximately 35.5% in 2040 when compared to the 2016 number of jobs.[18]

In the years prior to the COVID pandemic, some areas within the greater Sacramento Region experienced a substantially low unemployment rate. Figure 2-4 displays the Sacramento metropolitan area Labor Force and Employed populations as well as the resulting Unemployment Rate for the period 1990 through 2020. As seen on the figure, in September 2019, the region experienced the lowest unemployment rate for the period (3.1%). Commensurate with the impacts on the labor market due to the pandemic, 2020 saw the largest increase in the unemployment rate for the period, resulting in a high of 14% (April 2020).

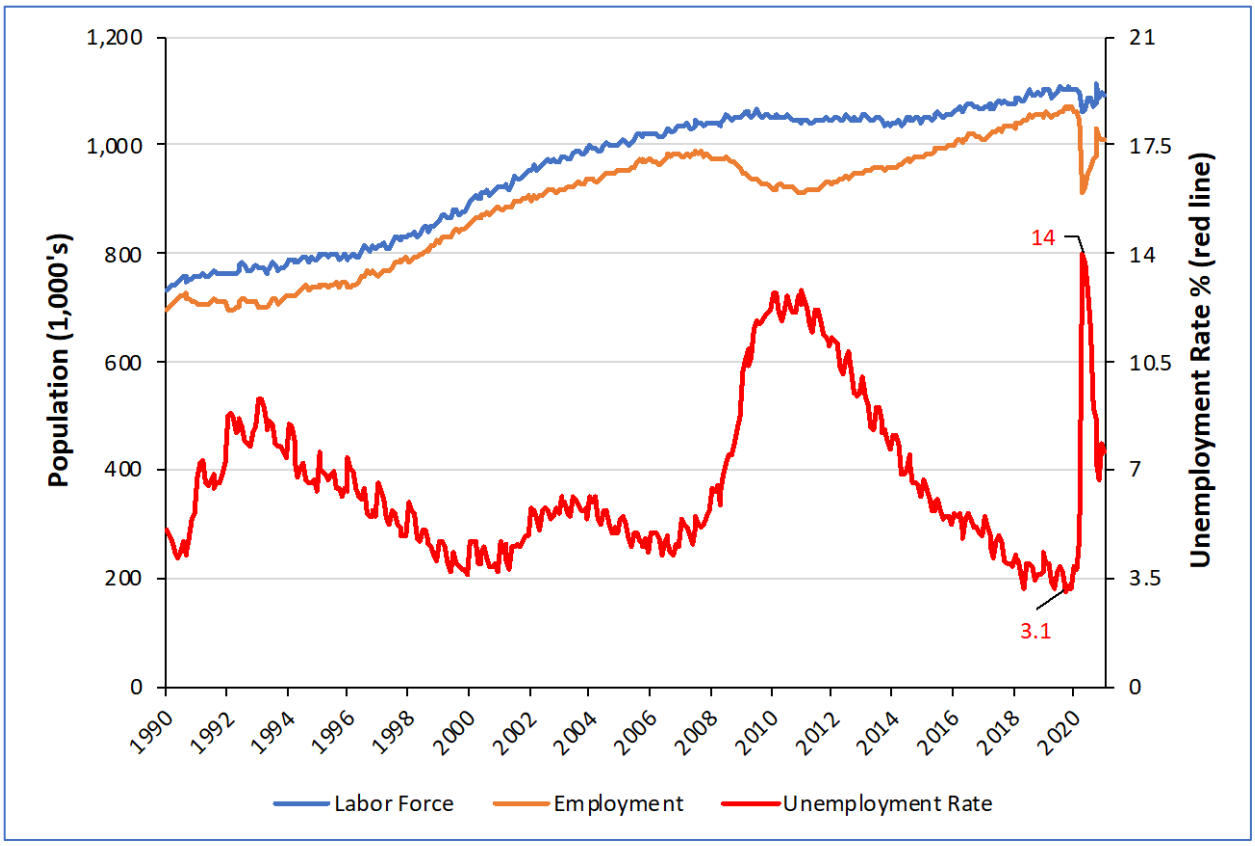
[17] City of Elk Grove. General Plan. December 2019 (amended).

[18] https://www.elkgrovecity.org/UserFiles/Servers/Server_109585/File/Departments/SPI/Housing_2021/EG-Housing-Element_Public%20Review%20Draft_2021-04-13_TrackChanges.pdf

The increased unemployment rate experienced during 2020 appears to be rebounding from the historic high. The rate of economic recovery for the region remains to be seen, indicating a high level of uncertainty with respect to pace and type of future economic job growth for the greater Sacramento region. Despite the recent increase in unemployment, the City's policy toward development entails increasing jobs and economic opportunities while acknowledging the importance of housing and a resident workforce[19].

The DWR DAC Mapping Tool does not identify any portions within the District service area as a "Disadvantaged Community."[20] The City has an estimated median income of $84,827[21] while the threshold for Disadvantaged Community designation is less than $56,982.

Figure 2-4. Sacrament Region Labor Statistics[22]



Expected Population Based Upon Land-Use Planning

To forecast projected service area population as accurately as possible requires consideration of the past growth rate, local economic predictions, and current and projected land uses. Importantly, one of

[19] City of Elk Grove Policy LU-1-2.
[20] https://gis.water.ca.gov/app/dacs/
[21] https://www.elkgrovecity.org/visitors/about_elk_grove
[22] Source: United States Bureau of Labor Statistics (Sacramento, Roseville, Arden-Arcade, CA)

the recent statutory updates to the UWMP Act states urban water suppliers "*shall coordinate with local or regional land use authorities*"[23] regarding land uses that may affect water management planning.

The District's growth prospects are predominantly defined by the City's Housing Element, with some minor continued growth, primarily for non-residential customers. Since boundaries used for various population projections made by the Department of Finance do not correlate to the District's service areas, the projected population for this UWMP is estimated by adding the existing population presented in Table 2-5 to population based upon the total new residential connections shown in Table 2-7 multiplied by the persons-per-household occupancy rates.

The resulting future population is provided in Table 2-8.

Table 2-8: Projected Future Population

2020	2025	2030	2035	2040	2045
45,300	49,200	53,100	53,800	54,500	54,800

2.4 Delivery System Details

The District serves customers through an array of groundwater wells, water treatment plants and distribution pipelines.

Further discussion of these systems and the water supply used within each is included in Chapter 3, with current and future customer water use described in detail in Chapter 4.

2.4.1 Potable System

The District's primary function is delivering potable water to its customers within each previously described service area (see Figure 2-1).

Service Area 1 is supplied by several groundwater wells that deliver water to a potable groundwater treatment plant owned and operated by the District. The system includes the treatment plant, two storage tanks, production wells serving the plant, and various distribution system pipes and appurtenances. The water treatment plant, referred to as the Railroad Street Treatment and Storage Facility, has a maximum day capacity of 10.4 million gallons per day (MGD). The facility can pump up to 16,000 gallons per minute. Groundwater is delivered to the plant from the EGWD's deep production wells, where it is treated before being delivered to customers.

Service Area 2 is provided treated and fluoridated water provided by SCWA-owned and operated groundwater production wells that intertie into the District's Service Area 2 distribution system at multiple locations. This supply is fluoridated. In accordance with Title 22, Section 64433.2 of the State

[23] CA Water Code Section 10631(a).

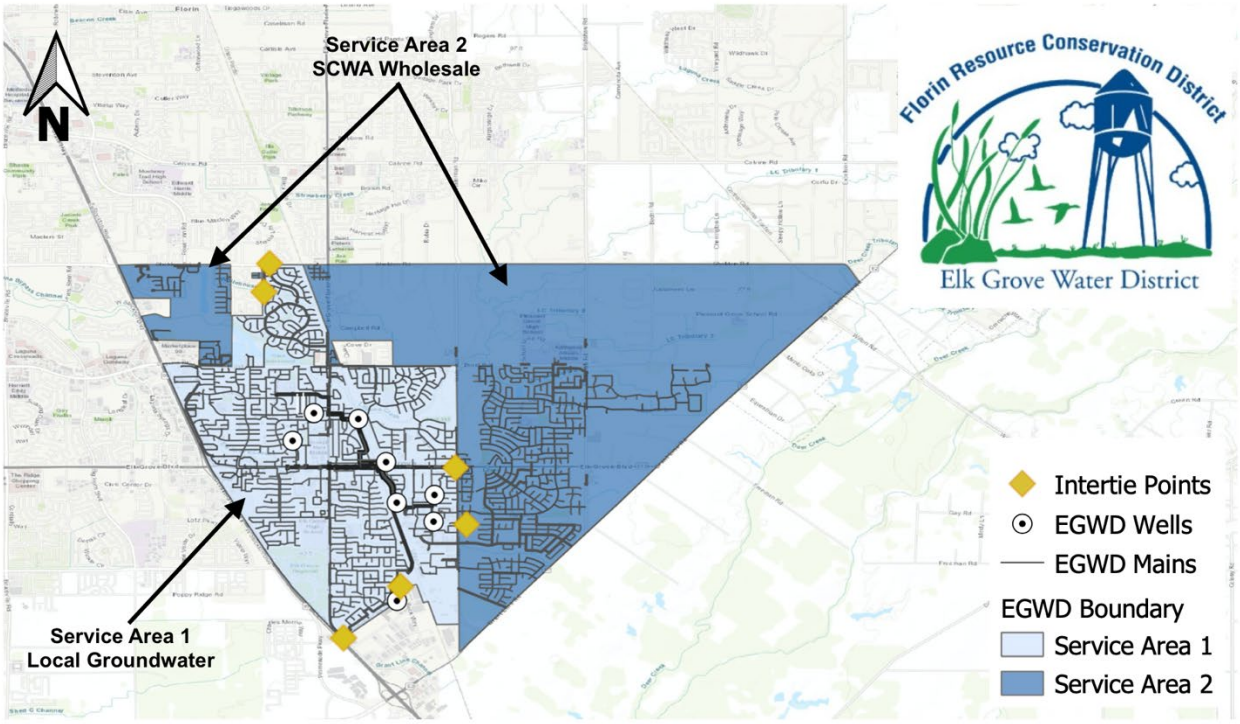
Board regulations, the optimal fluoride level is 0.7 mg/L and the fluoride control range from 0.6 mg/L - 1.2 mg/L.[24]

The District is responsible for the maintenance and operation of the transmission and distribution mains for Service Area 1 and the distribution mains for Service Area 2. There is a single water treatment plant within the Service Area 2 service boundary, however it is owned and operated by SCWA. This treatment plant is commonly referred to as the East Elk Grove Groundwater Treatment Plant.

The primary potable water system facilities are shown in Figure 2-5.

The District does not currently have any recycled water systems, nor does it receive recycled water from its SCWA contract.

Figure 2-5: Potable Water System



[24] https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Fluoridation.html

2.5 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.[25] Referred to as "Energy Intensity Reporting" for urban water suppliers, energy Intensity is defined as: total amount of energy expended in kilowatt-hours (kWh) by the urban water supplier on a per acre-foot basis to take water from the location where the urban water supplier acquires the water to its point of delivery.

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

The total energy intensity is reported in Table 2-9.

Table 2-9: Energy Intensity – Total Utility Approach

Area	Energy Consumed (kWh)	Volume of Water Entering Process (AF)	Energy Intensity (kWH/AF)
Service Area 1	2,714,535	5,043	538
Service Area 2	0	3,065	0
Total kWh/AF	2,714,535	8,108	335

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

Chapter 3 Water Supply

The Elk Grove Water District (EGWD or District) utilizes both groundwater and wholesale water delivered from Sacramento County Water Agency (SCWA). The District has limited options for water supplies given its geographic boundaries and local surface water bodies. Although SCWA surrounds the District and provides water to the District, Elk Grove Water District still has independent access to the groundwater basin and captures those supplies for use in its service area. Through its groundwater pumping and a wholesale water contract with SCWA, the District supplies water to meet its customers water needs.

3.1 Existing Water Supplies and Entitlements

As described in Chapter 2, the District provides water supplies to two service areas – Service Area 1 and Service Area 2 (see Figure 2-1).

The District has historically received its water supply through self-supplied groundwater and water purchased from SCWA. Specifically, the District relies solely on its own groundwater resources as the source of supply for Service Area 1, while Service Area 2 uses water supplied by SCWA. The supplies provided by SCWA may be derived from a number of water sources in SCWA's water supply portfolio.

Groundwater is supplied to Service Area 1 by a series of three shallow wells and four deep wells, all located within the District's service area. The groundwater production from these wells has been relatively stable and reflects the demands within that service area. Table 3-1 provides the last 5 years of historical supply produced by the Service Area 1 wells.

Table 3-1: Service Area 1 Wells and Historical Production

Year	Groundwater
2016	3,398
2017	3,665
2018	4,036
2019	4,131
2020	4,077

Service Area 2, which is located within SCWA's Zone 40, has access to both SCWA's groundwater and surface water resources. But as a matter of practice, water served to customers in Service Area 2 is most likely derived from SCWA's production wells located within the service area. Although SCWA does not trace each source molecule of the water assets provided to the District, the location of SCWA wells in close proximity to EGWD indicates that the delivered supplies are likely derived from groundwater resources.

Service Area 2 is supplied water from the SCWA through a wholesale Master Water Agreement (Agreement) with SCWA. The original agreement was signed in 1995. In 2002, the parties "restated" the Agreement in order to clarify the parties, terms, and conditions. The Agreement provides that SCWA will provide a permanent supply of wholesale treated water to the District for use within the District's service area.[26] The contract has a 50 year term with an automatic renewal clause for another 50 years unless one party provides a 5 year notice of intent not to extend.[27] The Agreement was developed to provide a way for new development in the District's service area and Florin Resource Conservation District's service area to access new water supplies being developed through the Zone 40 conjunctive use program. The delivery language in the Agreement states: "SCWA shall deliver all potable water necessary for FRCD's retail customers in the Expanded Franchise Area, including water or fire protection consistent with SCWA design and operations standards in effect at the time a facility is constructed."[28]

Table 3-2 provides the last 5 years of historical supply delivered to Service Area 2 from SCWA under this Agreement.

Table 3-2: Service Area 2 Historical Water Supply Deliveries from SCWA

Year	SCWA Water
2016	2,107
2017	2,262
2018	2,327
2019	2,304
2020	2,572

3.2 Groundwater Basin and EGWD Groundwater Supplies

Groundwater supplies constitute a major component of the District's water supply portfolio. The groundwater supplies are derived from the District's own production facilities and well systems from SCWA that import water into EGWD's service area. 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 District from the groundwater basin.

3.2.1 Sacramento Valley – South American Subbasin

EGWD derives its groundwater supplies from the South American Subbasin of the Sacramento Valley Groundwater Basin. The South American Subbasin (5-21.65) covers approximately 388 square miles and is defined as the area bounded on the west by the Sacramento River, on the north by the American River, on the south by the Cosumnes and Mokelumne rivers, and on the east by the Sierra Nevada

[26] First Amended and Restated Master Water Agreement Between Sacramento County Water Agency and Florin Resource Conservation District/Elk Grove Water Service, Successors-In-Interest to Elk Grove Water Works, June 28, 2002 at Article I and Article III (Hereafter "Agreement"). Elk Grove Water District is part of FRCD.

[27] Agreement at Article VI.

[28] Agreement at Article III.a.

Range. The eastern basin boundary is defined by the Sierra Nevada foothills and follows a north-south line extending from Folsom Reservoir to Rancho Murieta. Along this line, little groundwater flows into or out of the groundwater basin. The rivers that surround the South American Subbasin generally create a groundwater divide in the shallow subsurface although there is interaction between groundwater basins at greater depths. The western portion of the subbasin consists of nearly flat floodplain deposits from the surrounding rivers and tributaries.

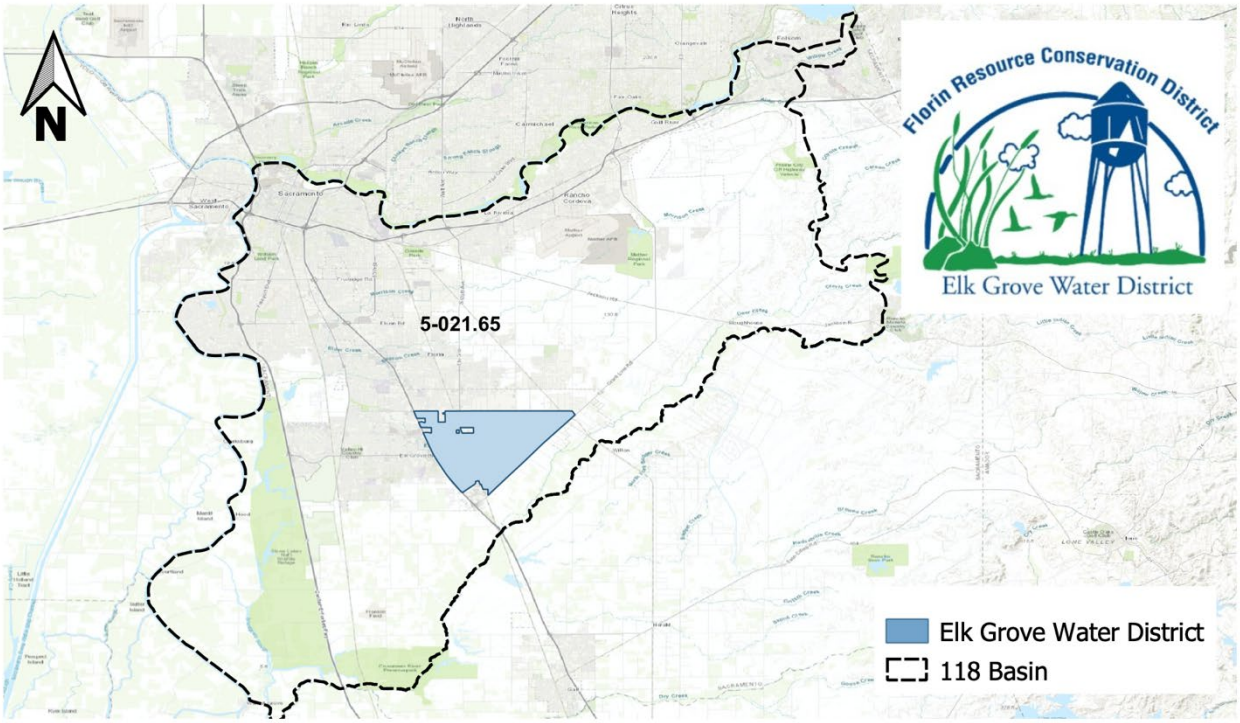
Bulletin 118-3 identifies and describes various geologic formations that constitute the water-bearing deposits underlying the District's service area. These formations include an upper, unconfined aquifer system consisting of the Victor, Fair Oaks, and Laguna Formations (now known as the Modesto Formation), and a lower, semiconfined aquifer system consisting primarily of the Mehrten Formation. These formations are typically composed of lenses of interbedded sand, silt, and clay, interlaced with coarse-grained stream channel deposits. The Mehrten formation outcrops near the Sierra Foothills along the eastern Central Basin boundary and is typically characterized as a black sandy lens.

Groundwater in the South American Subbasin generally occurs in a shallow aquifer zone (Laguna or Modesto Formation) or in an underlying deeper aquifer zone (Mehrten Formation). Within the subbasin, the shallow aquifer extends approximately 200 to 300 feet below the ground surface and, in general, water quality in this zone is considered to be good with the exception of arsenic detections in a few locations. The shallow aquifer is typically used for private domestic wells requiring no treatment unless high arsenic values are encountered, causing owners to possibly target other water-bearing strata.

The deep aquifer is separated from the shallow aquifer by a discontinuous clay layer that serves as a semi-confining layer for the deep aquifer. The base of the potable water portion of the deep aquifer averages approximately 1,400 feet below ground surface (bgs). Water in the deep aquifer typically has higher concentrations of total dissolved solids (TDS), iron, and manganese. Groundwater used in the South American Subbasin is supplied from both the shallow and deeper aquifer systems.

Figure 3-1 shows EGWD's location in the South American Subbasin.

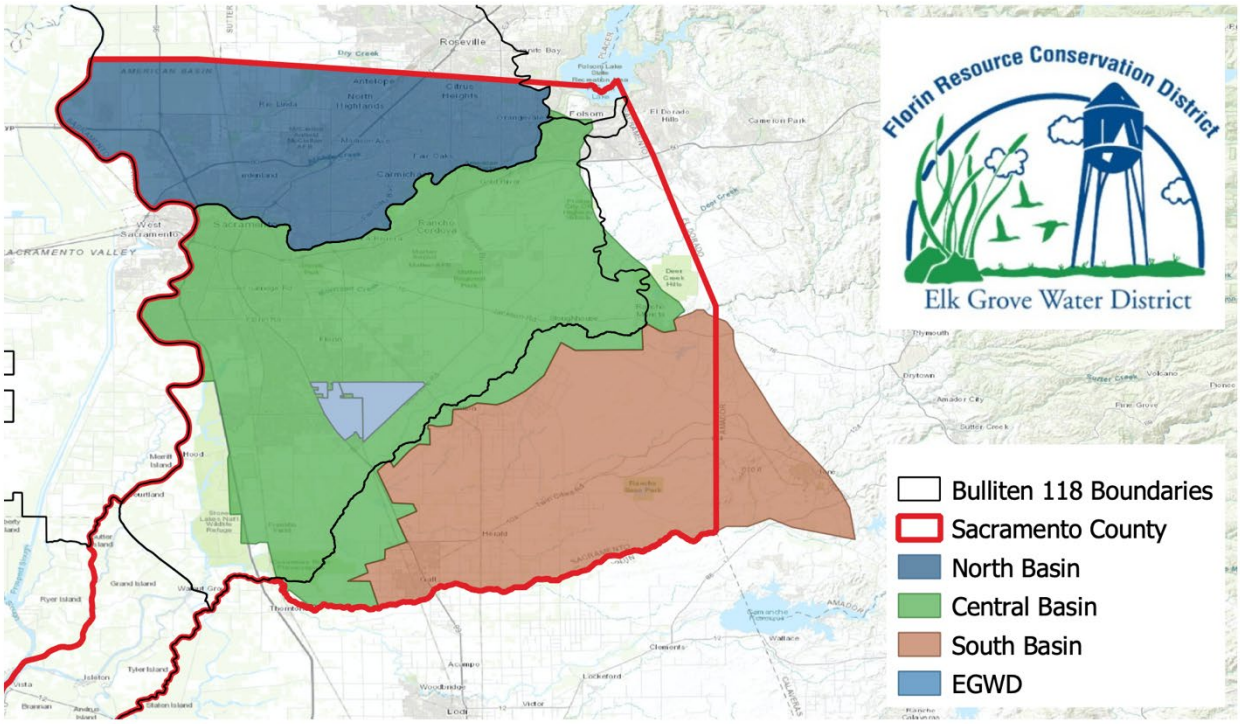
Figure 3-1: EGWD's Location in South American Subbasin



The South American Subbasin was locally renamed under the 2000 Water Forum Agreement as the "Central Basin" and its total area is nearly identical to the area comprising the South American Subbasin.

Figure 3-2 shows the North Basin, Central Basin, and South Basin as characterized in local basin management and EGWD's service area within the Central Basin.

Figure 3-2: Local Groundwater Basin Descriptions in Sacramento County

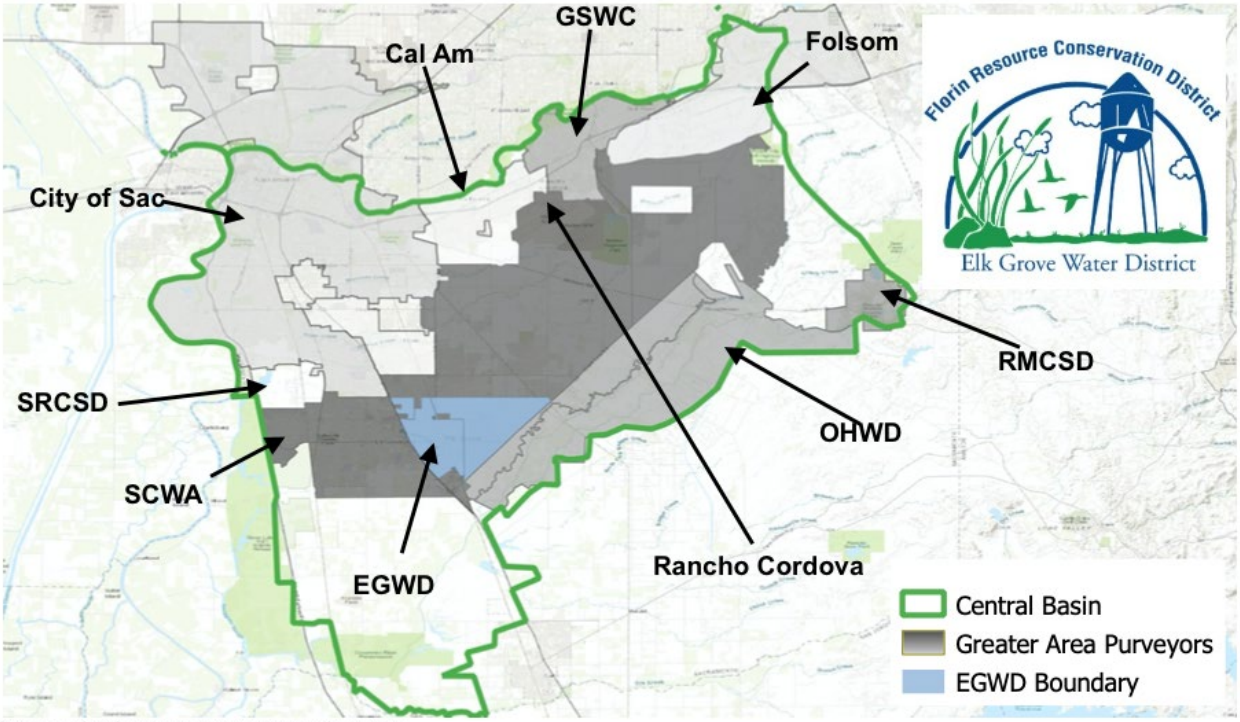


The groundwater wells within the District's system extract water from aquifers between 200 and 1,000 feet below the ground elevation. The District holds appropriative groundwater rights to all groundwater supplies derived from its wells that are delivered to its customers and overlying rights where it pumps water for use on its owned and operated properties. Groundwater elevations are regularly monitored within the region by DWR and the Sacramento Central Groundwater Authority (SCGA). Some of these records date back to the early 1950s. Hydrographs in the vicinity of the District's service areas indicate that the groundwater elevations have declined from the early 1950s through the late 1970s. From approximately 1980, the groundwater elevations have remained relatively consistent, except for a temporary decline in the early to mid-1990s. The static depth to groundwater within the District currently ranges between 60 to 110 feet below the ground surface. These hydrographs are provided in Section 3.9 of this Chapter.

3.2.2 Central Basin Groundwater Management

The Sacramento Central Groundwater Authority (SCGA) was formed as a Joint Powers Authority in 2006 to manage groundwater in the Central Basin. SCGA incorporates a number of water service providers, including EGWD. Figure 3-3 shows the SCGA participating agencies.

Figure 3-3: SCGA Participating Agencies

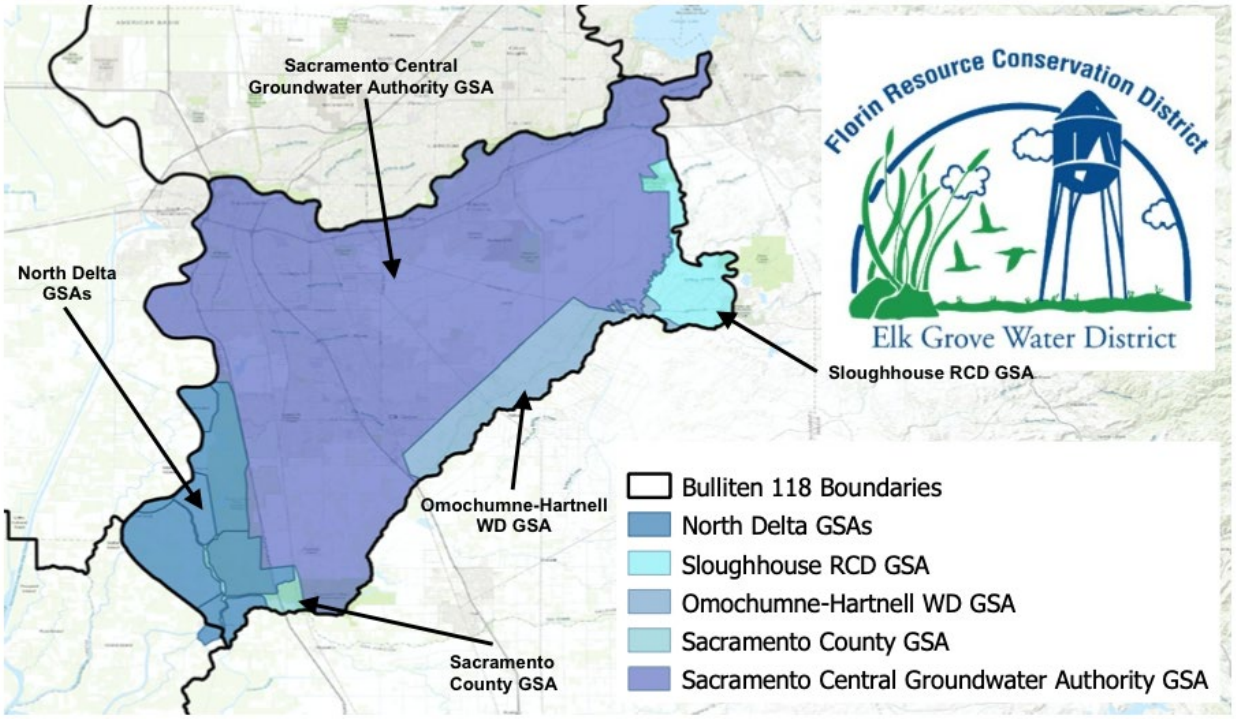


Cal Am - California American Water Company
GSWC - Golden State Water Company
RMCSD - Rancho Murieta Community Service District
OHWD - Omochumne-Hartnell Water District
EGWD - Elk Grove Water District
SCWA - Sacramento County Water Agency
SRCSD - Sacramento Regional Sanitation District

In 2006, SCGA developed a Groundwater Management Plan (GMP) under Assembly Bill 3030 (called an AB 3030 GMP). The 2006 GMP established parameters to maintain the long-term sustainable yield target of 273,000 acre-feet, detailed activities SCGA will take to sustainably manage the Central Basin, and evaluated groundwater management activities and their effectiveness.

The Sustainable Groundwater Management Act (SGMA) was signed into law in September 2014. The Sacramento Valley – South American Subbasin has six Groundwater Sustainability Agencies created to cover the entire basin area. Figure 3-4 shows the GSA's jurisdictional areas. By January 2022, the GSAs must prepare a comprehensive Groundwater Sustainability Plan (GSP) to sustainably manage the South American Subbasin. EGWD groundwater production and use remains within the preliminary standards set in the 2006 GMP – the primary planning document guiding sustainability in the Central Basin subcomponent of the South American Subbasin. As such, at this time, the guiding principles in that document govern EGWD's groundwater planning in the Central Basin.

Figure 3-4: South American Subbasin Groundwater Sustainability Agencies



3.2.3 Groundwater Quality

Water produced from the Laguna Formation and the Mehrten Formation is considered generally good quality with low total dissolved solids. Water produced from the Laguna Formation often meets all water quality standards, but exceeds the Maximum Contaminant Level (MCL) for arsenic within some areas of the Central Basin. The Mehrten Formation often contains manganese and odor, which exceed the MCLs. The upper portion of the Mehrten Formation, (between 300 feet to 700 feet within the District), occasionally exceeds the MCL for arsenic within the Central Basin. The lower portion of the Mehrten Formation, (between 700 feet to 1,300 within the District) generally has concentrations of arsenic that are under the MCL, but still require treatment to remove manganese and odor.

The quality of the groundwater supplied by the district meets the drinking water standards. The District provides centralized water quality treatment to remove manganese for the District's four deep wells. The three active shallow wells require minimal treatment to meet drinking water standards. Tables 3-3, 3-4, and 3-5 show the water quality reports for the groundwater and surface water in Service Area 1 and Service Area 2.

Table 3-3: Service Area 1 Groundwater Quality (2019 Consumer Confidence Report)

CONSTITUENT	UNITS	PHG or (MCLG) or [MRDLG]	MCL or [MRDL]	EGWD Service Area 1 (Groundwater)		
				RANGE	AVERAGE	YEAR SAMPLED
Arsenic	PPB	0.004	10	ND - 6.9	5.8	2018 - 2019
Barium	PPM	2	1	ND - 0.13	ND	2017
Chromium (Total)	PPB	(100)	50	ND	ND	2017
Hexavalent Chromium	PPB	0.02	N/A (a)	ND - 5.4	3.6	2017
Fluoride (Natural Source)	PPM	1	2	ND - 0.12	ND	2017
Nitrate (as N)	PPM	10	10	ND - 4.4	1.0	2019
Gross Alpha	pCi/L	0	15	ND - 6.3	ND	2017
Radium 226	pCi/L	0.05	5 (b)	ND - 1.1	ND	2017
Radium 228	pCi/L	0.019	5 (b)	1.3 - 2.9	2.4	2017
Uranium	pCi/L	0.43	20	ND - 2.2	1.0	2017
Control of Disinfection By-Product Precursors (TOC) (treated water) (c)	PPM	N/A	TT = 2	NR	N/A	N/A
CONSTITUENT	**UNITS**	**PHG OR (MCLG)**	**MCL**	**LEVEL FOUND**		**YEAR SAMPLED**
Turbidity - Surface Water (c)	NTU	N/A	TT = 1 NTU	NR		N/A
	% Samples	N/A	TT = ≤0.3 NTU	NR		N/A

Table 3-4: Service Area 2 SCWA Groundwater Quality (2019 Consumer Confidence Report)

CONSTITUENT	UNITS	PHG or (MCLG) or [MRDLG]	MCL or [MRDL]	EGWD Service Area 2 (SCWA Groundwater)		
				RANGE	AVERAGE	YEAR SAMPLED
Arsenic	PPB	0.004	10	ND - 6.2	ND	2015 - 2019
Barium	PPM	2	1	ND - 0.2	ND	2015 - 2019
Chromium (Total)	PPB	(100)	50	ND - 11	ND	2015 - 2019
Hexavalent Chromium	PPB	0.02	N/A (a)	ND - 9.7	2.3	2015 - 2019
Fluoride (Natural Source)	PPM	1	2	ND - 0.36	ND	2019
Nitrate (as N)	PPM	10	10	ND - 3.2	0.72	2019
Gross Alpha	pCi/L	0	15	ND - 3.3	ND	2015 - 2019
Radium 226	pCi/L	0.05	5 (b)	NR	N/A	N/A
Radium 228	pCi/L	0.019	5 (b)	NR	N/A	N/A
Uranium	pCi/L	0.43	20	ND - 2.7	ND	2015 - 2019
Control of Disinfection By-Product Precursors (TOC) (treated water) (c)	PPM	N/A	TT = 2	NR	N/A	N/A
CONSTITUENT	**UNITS**	**PHG OR (MCLG)**	**MCL**	**LEVEL FOUND**		**YEAR SAMPLED**
Turbidity - Surface Water (c)	NTU	N/A	TT = 1 NTU	NR		N/A
	% Samples	N/A	TT = ≤0.3 NTU	NR		N/A

Table 3-5: Service Area 2 SCWA Surface Water Quality (2019 Consumer Confidence Report)

CONSTITUENT	UNITS	PHG or (MCLG) or [MRDLG]	MCL or [MRDL]	EGWD Service Area 2 (SCWA Surface Water)		
				RANGE	AVERAGE	YEAR SAMPLED
Arsenic	PPB	0.004	10	ND	ND	2015 - 2019
Barium	PPM	2	1	ND	ND	2015 - 2019
Chromium (Total)	PPB	(100)	50	ND	ND	2015 - 2019
Hexavalent Chromium	PPB	0.02	N/A (a)	ND	ND	2015 - 2019
Fluoride (Natural Source)	PPM	1	2	ND	ND	2019
Nitrate (as N)	PPM	10	10	ND	ND	2019
Gross Alpha	pCi/L	0	15	ND	ND	2015 - 2019
Radium 226	pCi/L	0.05	5 (b)	NR	N/A	N/A
Radium 228	pCi/L	0.019	5 (b)	NR	N/A	N/A
Uranium	pCi/L	0.43	20	ND	ND	2015 - 2019
Control of Disinfection By-Product Precursors (TOC) (treated water) (c)	PPM	N/A	TT = 2	0.94 - 1.3	1.05	2018 - 2019
CONSTITUENT	**UNITS**	**PHG OR (MCLG)**	**MCL**	**LEVEL FOUND**		**YEAR SAMPLED**
Turbidity - Surface Water (c)	NTU	N/A	TT = 1 NTU	0.099 (d)		2019
	% Samples	N/A	TT = ≤0.3 NTU	100% (e)		

3.2.4 EGWD Groundwater Supplies

EGWD's Service Area 1 is an independent system that is currently served wholly through groundwater deliveries from the District's wells. There are 7 active wells in the Service Area 1 system with an operational capacity of approximately 12 MGD. This translates to an approximate total pumping capacity of 8,000 AF with the consideration of a typical diurnal demand pattern.

The groundwater system makes the supplies available in Service Area 1 100% reliable in all year types. As shown in Table 3-6, EGWD anticipates the following groundwater production for normal, single dry, and five consecutive dry years through 2025. Table 3-7 shows the normal, single dry, and five consecutive dry years of production through 2045. Although the supplies shown in these two tables are the available supply based on the groundwater basin's sustainable yield and EGWD's system capacity, EGWD would only produce as much water as it needs to meet demands in a particular location.

Table 3-6: EGWD Service Area 1 Groundwater Supply through 2025

Year		Service Area 1 Groundwater Supply
Normal		8,000
Single Dry		8,000
Multi-Year Drought	2021 (1st year)	8,000
	2022 (2nd year)	8,000
	2023 (3rd year)	8,000
	2024 (4th year)	8,000
	2025 (5th year)	8,000

Table 3-7: EGWD Service Area 1 Groundwater Supply Potential through 2045

Total Supply		2025	2030	2035	2040	2045
Normal		8,000	8,000	8,000	8,000	8,000
Single Dry Year		8,000	8,000	8,000	8,000	8,000
Multi-Year Drought	Year 1	8,000	8,000	8,000	8,000	8,000
	Year 2	8,000	8,000	8,000	8,000	8,000
	Year 3	8,000	8,000	8,000	8,000	8,000
	Year 4	8,000	8,000	8,000	8,000	8,000
	Year 5	8,000	8,000	8,000	8,000	8,000

3.3 EGWD Contract Supplies with SCWA

As described previously in this chapter, EGWD holds a water service Agreement with SCWA. This Agreement obligates SCWA to deliver water to meet EGWD's water supply needs through 2050. Although SCWA has some surface water and recycled water assets, Service Area 2 is not currently supplied with recycled water and currently does not receive any significant amount of surface water.[29] SCWA is developing substantial surface water supplies as part of the Freeport Regional Water Authority (FRWA), which may become available to Service Area 2 in the future. In addition, SCWA could deliver water derived from its Water Rights Permit, CVP Contracts, other water rights, and Aerojet remediated groundwater supplies derived from foreign sources of groundwater in the American River Watershed through the FRWA system that could reach EGWD. The nature and extent of the parameters that would allow these surface water supplies to reach EGWD is beyond the scope of this document. The District agreed to purchase water from SCWA to serve its expanded retail area in Service Area 2 and SCWA will provide the water supplies to meet that need.

The development within the Service Area 2 is required to pay the Zone 40 Development Fee for new building permits, and a monthly user fee for Zone 40 capital projects, which support conjunctive use in

[29] As noted earlier in this Chapter, although SCWA does not monitor the location of each molecule of water in its delivery system, the proximity of SCWA's wells to Service Area 2 most likely means that EGWD is served with groundwater.

the Central Basin. Importantly, the District does not have a water right other than the contract right to the water delivered through SCWA's system. Nevertheless, SCWA's conjunctive use water supply is considered a permanent and reliable source based upon the language of the Agreement.

The Agreement makes the supplies available in Service Area 2 100% reliable in all year types. As such, EGWD anticipates the following groundwater production for normal, single dry, and five consecutive dry years through 2025 in Table 3-8 and production through 2045 as shown in Table 3-9. These supplies are generally rounded in order to show that EGWD could call on more water from SCWA than it has historically used to meet its service area demands under the terms of the Agreement.

Table 3-8: EGWD Service Area 2 SCWA Agreement Supply through 2025

Year		Service Area 2 SCWA Supply
Normal		5,000
Single Dry		5,000
Multi-Year Drought	2021 (1st year)	5,000
	2022 (2nd year)	5,000
	2023 (3rd year)	5,000
	2024 (4th year)	5,000
	2025 (5th year)	5,000

Table 3-9: EGWD Service Area 2 Projected SCWA Agreement Supply through 2045

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

3.4 Recycled Water

The District does not currently receive any recycled water. Although SCWA currently obtains and serves recycled water within its Zone 40 service area and expansion into the District's service area is feasible, there are no clear plans for this to occur or for the District to develop its own recycled water supply.

The recycled water SCWA does serve is produced from a partnership with Sacramento Regional County Sanitation District (SRCSD) and the Sacramento County Environmental Management Department. The water recycling facility is located within the City of Elk Grove and is being increased from a 3.5 MGD capacity to over 10 MGD. SRCSD performed a Water Recycling Opportunities Study (WROS) that identified five key target areas for potential recycled water uses. The District exists within the Target

Area identified as Target Area 1 South Area. However, this area was found to have a decreased potential for future recycled water use due to its limited overall use potential, and infrastructure costs. Accordingly, based on the WROS, it is not anticipated that the District will use any recycled water for its service area presently and out into the future.

3.5 Desalinated Water

Desalination of ocean water is not physically or financially viable for the District at this time and it has no future plans to develop water supplies derived from desalination activities.

3.6 Transfer and Exchange Opportunities

The District has opportunities for limited potable water transfers or exchanges. All of these transfers or exchanges would likely involve SCWA since SCWA controls the wheeling facilities that could deliver surface water assets to the District. Furthermore, the District could move water between Service Area 1 and Service Area 2 through numerous valves that the District has not activated. Therefore, with some creative thinking and willing partnerships, the District could engage in numerous forms of water transfers that may have long-term regional benefit. Some examples of these are described below.

In Lieu Banking Arrangement with Surface Water Purveyor

The District could engage a water purveyor with surface water assets connected to the Sacramento River watershed and use those surface water assets in lieu of using its groundwater. In this scenario, the District would receive the right to divert water through a temporary water transfer agreement and appropriate regulatory steps. The water would be diverted at the Freeport Regional Water Agency diversion facility and delivered directly to the District through SCWA's wheeling and treatment facilities. The benefit of this sort of transaction is that it would relieve pressure on the groundwater basin and preserve the groundwater supplies for dry periods when surface water assets are less available.

A second form of an in-lieu banking alternative might include assigning the rights to the banked groundwater to another agency. For instance, if Golden State Water Company could deliver some of its surface water assets directly to the District in normal and wet years, the District could assign a portion of its banked groundwater assets to Golden State Water Company for use in dry years. An in-lieu banking and exchange agreement can work where an entity shares resources in the Central Basin.

Third Party Water Exchange Arrangement

In other instances, water exchanges may benefit multiple parties through creative transfer arrangements. For example, if the District were to purchase water and deliver it directly to SCWA for SCWA's broader distribution in its service area, then SCWA is preserving groundwater assets that it might otherwise use for dry year availability that could be used in EGWD's service area. In this situation, SCWA may also reduce its treatment costs, etc. by increasing the utility of the FRWA (which has cost variables) as well as the per acre-foot cost of treatment at its Vineyard Water Treatment Plant. In other words, acquiring an asset and creating an exchange arrangement with SCWA may have multiple benefits

not only to manage water use in dry years but also in long-term groundwater basin recovery and management of costs related to FRWA and Vineyard system operations.

3.7 Climate Change

While the California Water Code does not prescribe specific climate change planning and management measures for water suppliers, it does emphasize that climate change is appropriate to consider when assessing drought risk assessment, water conservation and use efficiency, and demand management and supply – both in an historical and future-projection context. EGWD's 2020 UWMP has incorporated climate change considerations into its water supply analysis, water demand analysis, water supply reliability assessment and water shortage contingency plan. The characterizations are imbedded into the characterizations of supply availability in normal, single dry, and five-consecutive dry year periods as well as the changes in demands that may result from climatological changes in those same periods. Moreover, the climate change characterizations are incorporated into future projected conditions through the 2045 planning horizon. The broad climate change considerations are noted in Chapter 2.

3.8 Planned Water Supply Projects

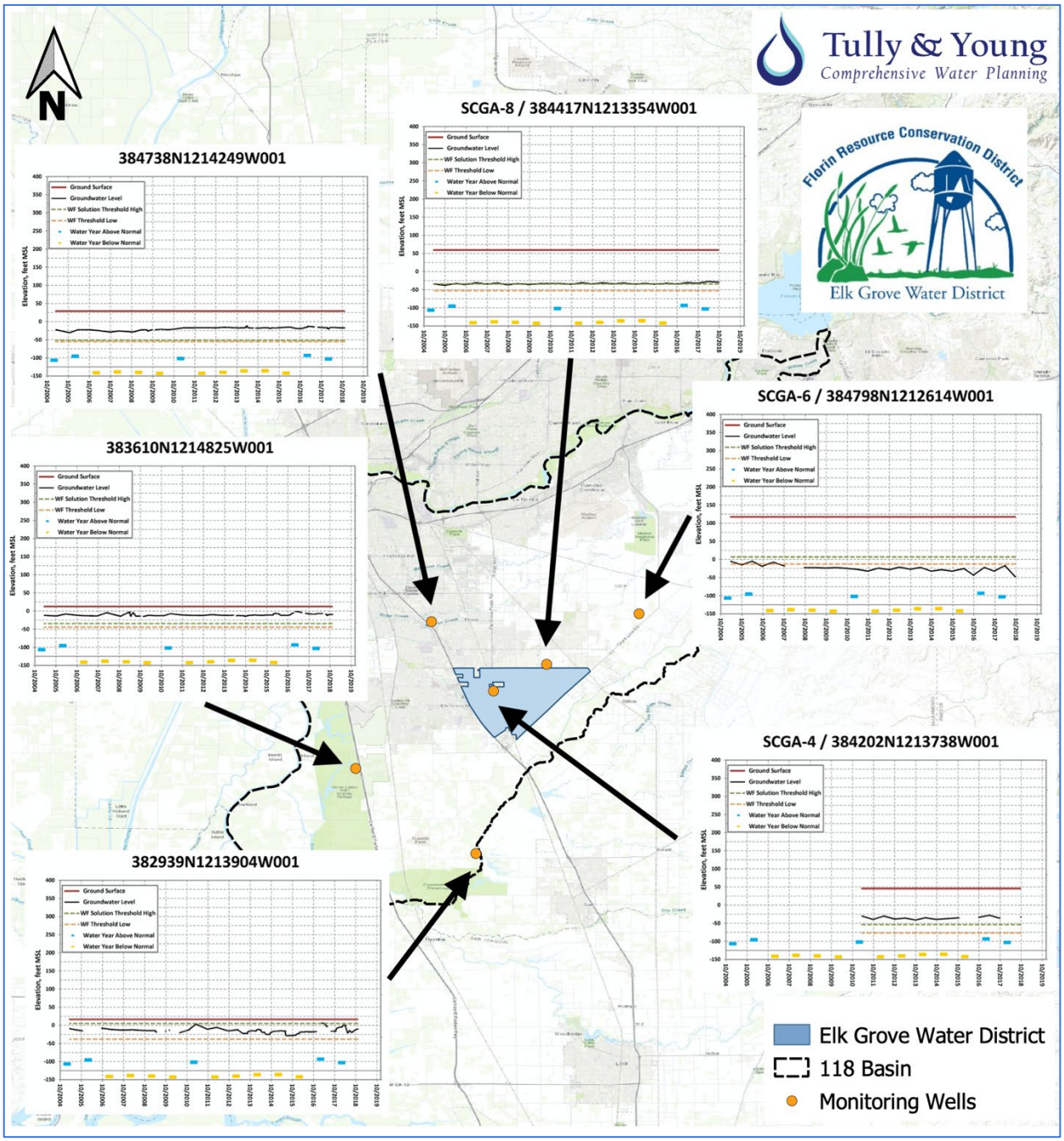
At this time, EGWD is not planning to develop any additional water supply sources in its service area.

3.9 EGWD Supply Reliability

The District's water supplies are stable and reliable. Both the groundwater supply and SCWA's surface water supply are well-preserved. As such, water service to Service Area 1 and Service Area 2 should remain stable in all year types.

Under the CSCGMP, long-term groundwater quantity and quality protective measures have been performed throughout the basin by various agencies, including the District, in order to preserve groundwater assets. As shown in Figure 3-5, the Central Basin's water levels have remained stable over the last two decades with the implementation of sound management practices. The well monitoring data from a sampling of groundwater wells in the basin illustrate the Central Basin's overall good condition. Furthermore, the figures show that the wells closest to the District's actual service area, have actually increased in groundwater levels because of the District's and SCWA's conjunctive use actions.

Figure 3-5: Well Monitoring Data Showing Depth to Groundwater



The District's groundwater supplies and contracted supplies with SCWA account for approximately 13,000 acre-feet per year from Central Basin's estimated sustainable groundwater yield of 273,000 AFY . This quantity of available groundwater is more than sufficient to meet the District's current water needs and accommodate the anticipated future water demands discussed in Chapter 4.

Table 3-10 shows the combined Service Area 1 and Service Area 2 supplies in normal, single dry, and five consecutive years through 2025. Table 3-11 shows the combined Service Area 1 and Service Area 2 supplies through 2045.

Table 3-10: EGWD Total Potential Supplies through 2025

Year		Total Supply
Normal		13,000
Single Dry		13,000
Multi-Year Drought	2021 (1st year)	13,000
	2022 (2nd year)	13,000
	2023 (3rd year)	13,000
	2024 (4th year)	13,000
	2025 (5th year)	13,000

Table 3-11: EGWD Total Potential Supplies through 2045

Total Supply		2025	2030	2035	2040	2045
Normal		13,000	13,000	13,000	13,000	13,000
Single Dry Year		13,000	13,000	13,000	13,000	13,000
Multi-Year Drought	Year 1	13,000	13,000	13,000	13,000	13,000
	Year 2	13,000	13,000	13,000	13,000	13,000
	Year 3	13,000	13,000	13,000	13,000	13,000
	Year 4	13,000	13,000	13,000	13,000	13,000
	Year 5	13,000	13,000	13,000	13,000	13,000

Chapter 4
Water Use

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

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

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

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

This section is organized as follows:

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

4.1 Current Customer Water Use

As described in Chapter 2, the District has been serving potable water to about 12,890 customer connections for the past several years. Under normal operations, all of the water supplied to its customers is drawn from the District's groundwater wells, treated at one of the water treatment plants, and derived through connections to the Sacramento County Water Agency (see Chapter 3), and delivered through an array of pipelines (see Figure 2-5). The current customers, their recent and expected water use trends, and the District's on-going demand management efforts targeting these customers provide a foundational basis for this UWMP's water use forecast to 2045.

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

4.1.1 Customer Water Use: 2016 to 2019

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

relevant to its forecast of future water use. Water Code Section 10631(d)(1) also requires the District to quantify past customer water use.[30]

Table 4-1 presents the District's past potable water use by customer classification for 2016 through 2019. While the District tracks connections using five primary categories (see Table 2-1), it records water use by only two categories:

- Residential
- Commercial, Industrial and Institutional (CII)

This historic data also provides insight into the relative ratio of differing customer classifications to each other as well as seasonal variations. For instance, use across nearly all classifications was relatively consistent for 2016 through 2019. Yet, the CII sector has significantly lower use in winter and spring months compared to summer months. Furthermore, the residential classification illustrates two important characteristics: (1) it represents about 80% of the annual water use, and (2) it has summer demands that are three times the monthly volume needed in winter months.

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

	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Residential	2016	212	211	220	305	393	550	617	607	537	413	243	231	4,538
	2017	206	205	202	235	316	534	646	663	620	531	413	252	4,822
	2018	242	216	240	234	341	504	610	647	587	494	438	305	4,858
	2019	218	213	198	212	378	429	594	641	623	522	457	313	4,799
Commercial/ Institutional/ Industrial	2016	40	34	39	46	104	138	184	171	160	123	65	41	1,145
	2017	40	38	37	46	55	149	180	193	195	160	118	54	1,265
	2018	40	44	42	45	69	155	172	208	212	146	124	84	1,342
	2019	38	38	36	43	84	132	160	191	198	154	135	85	1,295
Total Metered Deliveries	2016	252	245	259	351	497	688	801	778	697	536	307	272	5,683
	2017	245	243	238	281	372	683	826	856	815	690	531	306	6,086
	2018	281	260	283	279	410	659	782	856	799	640	563	389	6,200
	2019	257	250	233	255	462	561	755	832	821	676	592	398	6,094

4.1.2 Customer Use in 2020

Customers served by the District are metered at their connection to the District's potable water distribution system. These metered values are collected periodically for each customer account and summarized into annual reports prepared by the District and for reporting to the SWRCB Division of Drinking Water and to DWR.[31] The 2020 actual customer use presented in Table 4-2 represents the summarized delivery to all the District's customers. It does not, however, include the distribution

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

[31] 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.

system losses inherent in a pressurized water delivery system that occur during the District's efforts to treat, store and route the water throughout the extensive distribution system to each customer's connection.

Table 4-2: Total District Customer Use: 2020 (values in acre-feet)

Use Category	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Residential	220	219	296	277	428	546	662	674	644	566	478	329	5,338
Non-Residential	39	41	67	57	87	140	181	201	180	147	131	75	1,347
Subtotal	258	261	364	333	515	686	843	875	825	713	609	404	6,685

Further, comparing to the total values in Table 4-1, the 2020 annual customer use is about 10% higher than the 2017 through 2019 average use, which was fairly consistent. Comparing the specific customer classifications, the 2020 data displays three unique circumstances: (1) the increase was primarily in the residential sector, as the non-residential use only rose slightly, (2) residential use in March was nearly 40% higher than during prior years, with April and May also higher, and (3) summer use was nearly consistent with prior years, rising only a few percent in each month above average.

While new customers in 2020 would account for some of the increase,[32] the higher-than-average use, especially starting in March, is likely due to the pandemic that dominated 2020 and the multiple advisories and even government-imposed restrictions that resulted in many people working from, learning from, or simply staying at home.

4.1.3 Existing Distribution System Losses

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

Since 2016, the District has been required to quantify its distribution system losses using the American Water Works Association Method (Title 23 California Code of Regulations Section 638.1 et seq.). An electronic copy of the audit in Excel format is to be submitted to the Department by October 1 of each year for the prior year's estimated system losses, using DWR's online submittal tool pursuant to Code of Regulations Section 638.5. The District's submittals for the last 5 years are shown in Table 4-3. The 2020 estimate has not been officially submitted to DWR as of the drafting of this UWMP but is estimated to be approximately 265 acre-feet over the year, or about 3.8% of the water entering the distribution system.

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 District's distribution system loss

[32] As shown in Table 2-1, the District added about 200 residential customers in 2020, accounting for a small increase in use.

represents about 5.1% of the water entering the District's distribution system. This average is conservatively used for purposes of forecasting water use to 2045.

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

2016	2017	2018	2019	2020
6.2%	5.1%	4.7%	5.7%	3.8%
			Average =	5.1%

4.2 Compliance with 2020 Urban Water Use Target

Pursuant to California Water Code Section 10608.24(b),[33] the District must demonstrate its 2020 water use met the GPCD target adopted in its 2015 UWMP. As set forth in the 2015 UWMP, the District's 2020 GPCD target was established as 191 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 District's 2020 actual GPCD must use the same methodology to derive "gross water use" for 2020, then divide by the estimated 2020 population presented in Chapter 2.

As presented in the District's 2015 UWMP, gross water was determined to be the total water produced by the District's wells plus the water purchased from Sacramento County Water Agency. This value was 2,264.288 million gallons – or 6,949 acre-feet. This value represents both the customer deliveries shown in Table 4-2 and the distribution system losses recorded in Table 4-3. As shown in Table 2-5, the District's population in 2020 was estimated to be 45,300. This results in a calculated 2020 compliance value of 137 GPCD, which is less than the District's established target. Thus, the District is in compliance with CWC Section 10608.24(b). The compliance calculation parameters are summarized in Table 4-4.

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

2020 Volume into Distribution System =	6,949	acre-feet
Allowable Adjustments	0	acre-feet
2020 Gross Water Use =	6,949	acre-feet
2020 Population =	45,300	people
2020 Actual GPCD =	137	
2020 Target GPCD =	191	
Compliance Achieved?	Yes	

4.3 Demand Management Measures

Pursuant to California Water Code Section 10631(e), the District needs to provide a narrative discussion of the water demand management measures it has implemented, is currently implementing, and plans to implement. The historic and on-going measures can help the District understand the effectiveness of

[33] 10608.24. (b) Each urban retail water supplier shall meet its urban water use target by December 31, 2020.

managing existing customer uses so as to help guide refinements, emphasis, or augmentation that will help position the District to best meet its to-be-established water use objective.[34]

Demand Management Measures (DMMs) are intended to facilitate the District's management and reduction of customer demands. Further, the DMMs aid in maintaining supply reliability and have been relied upon in meeting customer use targets, including SBX7-7 and mandatory drought conservation targets. The DMMs were a key component in enabling the District to meet the State Water Resource Control Board's mandatory conservation targets imposed during June 2015. For the period January 2015 through March 2017, the District was able to reduce total water use by nearly 5,000 AF of water (compared to 2013 baseline values).[35]

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

4.3.1 Foundational Demand Management Measures

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

From 2009 through 2018, the District was a member of the California Urban Water Conservation Council (CUWCC). The CUWCC was created to increase efficient water use through urban water agencies partnerships, public interest organizations, and private entities. As a signatory to the CUWCC MOU for Best Management Practices (BMP), the District committed to implementing BMPs that were designed to achieve water conservation across demand sectors. The CUWCC required submission of annual reports aimed at reporting compliance with and implementation of the BMPs. As such, the District submitted annual BMP coverage reports from 2009 through 2018. The CUWCC is now merged with the California Water Efficiency Partnership (CalWEP). CalWEP maximizes urban water efficiency and conservation throughout California by supporting and integrating innovative technologies and practices; encouraging effective public policies; advancing research, training, and public education, and building collaborative approaches and partnerships. The original utility-based (foundational) DMMs described below represent standard practices the District has been implementing for many years. Future direction on BMP implementation for the District will be impacted by CalWEP.

Water Waste Prevention Ordinances

Water waste is prohibited in the District's current Water Shortage Contingency Plan (WSCP), adopted April 2010 (Ordinance No. 04-28-10-01). Under the WSCP, customers are encouraged to use water efficiently through all stage declarations. The WSCP 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:

[34] 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.
[35] Elk Grove Water District's Water Usage and Conservation Report dated April 19, 2017.

- Runoff prohibited.
- Watering after rainfall event prohibited.
- Automatic shutoff nozzles are required for all hoses.
- Washing driveways and other paved areas is prohibited.
- Pools, ponds, and fountains are required to use recirculated water.

In addition, the District's website also allows for reporting of waste with the "Report Water Waste" link,[36] allowing for proactive response and improved management. The District 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

All of the District's customers are metered and billed monthly. Metered water service rates are comprised of two parts: a fixed charge and commodity charge. The fixed charge is dependent on the meter size, while the commodity charge is based on volume of usage. In addition to the fixed charge, residential customers are subject to a tiered rate structure, based on metered usage. The District anticipates transitioning to automated metering infrastructure (AMI) within the next 5-10 years to provide more timely information to customers and for the District's management needs.

Conservation Pricing

The District's water rate structure is set to generate the necessary funds to efficiently operate the District's water system and maintain reliable water supplies. In addition to a fixed charge based on meter size, the District utilizes a tiered rate structure for metered residential customer use. Usage above the base amount (Tier 1) is billed at a higher rate. The increased block rate structure promotes conservation by incentivizing use below the base amount. Non-Residential accounts (including Irrigation) are charged a constant per-unit cost for water service. In both rate structures, the total unit cost is the summation of commodity and capacity costs.

Public Education and Outreach

As part of its water conservation and efficiency program, the District implements a public information program through active participation in the Regional Water Authority's (RWA) Regional Water Efficiency Program. In collaboration with 19 water provider members and other wastewater, stormwater and energy partners, RWA formed the Water Efficiency Program (WEP, or Program) 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,

[36] https://www.egwd.org/report-water-waste/

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 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, Raley Field (local 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 day light savings coupled with a message to dial back sprinkler systems. The e-newsletter reaches 6,300 households.

Every year the WEP selects 3 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.

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 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 Raley Field 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 District 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 District conducts annual Distribution System Water Audits (consistent with AWWA M36 methodology using software analysis) to characterize water system losses. The District's reported distribution system losses are presented in Table 4-3. Leak detection methods utilized by the District include monitoring of zone usage, zone pressure, and surface conditions. The District also has a long-term Capital Improvement Program (CIP) that replaces aging water mains. The District validates its water audit data annually to improve the accuracy of actual measured water losses occurring in the system per AWWA M36 methodology.

Water Conservation Program Coordination and Staffing Support

The District's Program Manager Department is also in charge of water conservation efforts. Recent accomplishments include the 2020-2025 Strategic Plan[37] and assistance in drafting and introducing Senate Bill 427[38]. Goals and objectives of the Program Manager Department include:

- Implementation of EGWD's Water Conservation Program
- Seek to obtain available grant opportunities
- Track and monitor State and Federal legislation that may impact conservation efforts
- Work with RWA WEP Advisory Committee to develop and implement beneficial water efficiency programs
- Develop, implement, and conduct the District's Public Information and Outreach Program

The Program Manager Department has been fully staffed beginning in Fiscal Year 2016-17. Since that time, the Program Manager Department has been funded annually. The fiscal year 2020-2021 budget for the Program Manger Department amounts to about $275,000, and includes funding for public outreach, legislation tracking/monitoring, and regional coordination, consistent with program goals and objectives.

Other Demand Management Measures

In addition to the foundational measures discussed previously, the District actively promotes demand management and water efficiency through several other measures.

Regional Water Authority Membership

The District has been a member of the Sacramento Regional Water Authority (RWA) since 2011 and a member of the RWA Water Efficiency Program since 2005. RWA is a member of the California Water Efficiency Partnership (CalWEP, formerly known as CUWCC), promoting conservation and efficient water use. RWA is a joint power agency originally formed in 2001 to assist local water suppliers in implementing the Water Forum Agreement (WFA), specifically the conjunctive use, groundwater management, and water conservation elements of the WFA. Representing the interests of water providers in Sacramento, Placer, and El Dorado counties, RWA's goals, missions, and support efforts have evolved, and now include drought assistance programs, integrated regional water management planning and implementation, and procurement of grant funding. RWA seeks to influence legislative and regulatory policies and actions that may affect the region, including water supply reliability through proactive advocacy. The integrated goals of planning, implementation, communication, and advocacy represent a comprehensive and cohesive approach to identify regional projects and partnerships that help the region meet its future water needs.

[37] https://www.egwd.org/wp-content/uploads/EGWD_StrategicPlan_2020.pdf

[38] "Eggman" Water Theft Legislation to broaden the authority of Water Districts to impose fines and penalties for water theft.

Practical Plumbing Handbook

The District provides the Practical Plumbing Handbook to inform customers on conservation, including solutions to common plumbing problems. Tips on leaky faucets, running toilets, and inefficiency landscaping systems are provided in the handbook. The handbook is offered to all customers.

Water Use Audit

The District offers free landscape irrigation water use audits to customers. A certified technician evaluates the customer's irrigation system and prepares a report summarizing opportunities to increase irrigation efficiency. The District also offers indoor evaluations aimed at identifying inefficiencies. These audits allow customers to better understand conservation opportunities and efficient water use.

4.3.2 Recent DMM Activities

The District implements a robust suite of other demand management measures as described above, both within the District and as a part of the RWA WEP. The District's water efficiency programs are available and tailored to both residential and commercial customers.

4.3.3 Planned DMM Activities

In its commitment to ongoing water conservation and proactive demand management activity, the District is developing a new set of programs and actions which will be used to achieve water use objectives in compliance with California Water Code Section 10609.20. Resources will be dedicated in the District 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.

4.4 Forecasting Customer Use

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.

4.4.1 Representing Current Customer Water Use

Table 4-1 and Table 4-2 provided the actual customer water use for 2016 through 2020 by classification. 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. Applying a slight downward adjustment to the 2020 residential customer use data while maintaining the 2020 non-residential customer use data provides a basis for a proxy that represents "current" water use. This creates a baseline from which to estimate the future use of these existing customers.

Importantly, the 2020 residential actual use was adjusted in estimating representative "current" water use, since it appears to have been skewed by pandemic conditions during 2020 (see subsection 4.1.2). For purposes of the proxy estimate, the 2020 residential actual use was decreased by 5%. This slight adjustment to 2020 conditions may be conservatively high for existing customers, but the District also has a desire to conservatively assure long-term water system reliability (see Chapter 5).

This target total 'current water demand' was then estimated using customer-type demand factors and 2020 connection by classification (see Table 2-1) to generate a comparable estimate. This representative water use for current conditions provides the foundation for estimating the future needs of these existing customers. Table 4-5 provides the representative monthly and annual current water use, including distribution system losses.

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Residential	230	220	230	260	380	530	650	680	630	520	410	290	5,030
Non-Residential	60	60	60	70	100	140	170	180	160	140	110	80	1,330
Subtotal	290	280	290	330	480	670	820	860	790	660	520	370	6,360
Loss	15	14	15	17	25	34	42	44	40	34	27	19	326
Total	305	294	305	347	505	704	862	904	830	694	547	389	6,686

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, 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.[39] As presented previously, the District has met this mandated target.

Furthermore, the efforts undertaken by the District 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 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.[40] Revisions to the CAL Green Code in 2019 modified sections to direct users to MWELO regulations contained in other regulatory sections.[41]

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."[42] Future customers are expected to satisfy one of these two requirements

[39] California Water Code § 10608.20.

[40] 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.

[41] 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.

[42] 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

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 County 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.[43] 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 county to adopt the provisions of the MWELO or to enact its own provisions equal to or more restrictive than the MWELO provisions. The District uses the State's standard.

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 a 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).[44] The District reviews all new development for conformance with these standards.

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.

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.

[43] Gov. Code §§ 65591-65599

[44] CCR Title 23, Div. 2, Ch. 27, Sec. 490.1.

4.4.3 Customer Water Use Forecast

The following subsections detail the assumptions used to forecast customer water use and gross water needs for the District's water service area, separated into the needs of (a) existing water use customers, and (b) new potable water use customers.

Existing Customer Future Use

To be conservative and assure the analysis of water system reliability is adequate (see Chapter 5), the District is maintaining the annual "current" retail customer potable water use as shown in Table 4-5, a total delivered quantity of about 6,360 acre-feet, with a total production need of about 6,690 acre-feet when considering system losses. Additionally, as recognized with the analysis of 2020 gpcd use, the existing customers have undertaken significant reductions to date.

While these existing customers may undertake a variety of conservation measures – actively through decisions to modify a behavior or a water use, or passively through the purchase of appliances and fixtures that simply use less water – they may also maintain their use as-is. Holding the current use as a constant for all existing customers into the future will provide a conservative number that can be re-evaluated prior to the 2025 UWMP and the compliance with forthcoming water use objectives.[45]

New Customer Future Use

Chapter 2 detailed the District's anticipated new residential and non-residential growth over the UWMP planning horizon. This growth provides the basis for the estimated future customer water needs. The District anticipates these new customer connections will be built in accordance with all applicable building codes including the Cal Green Code discussed previously, and relevant District regulations.

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. Non-residential uses are expected to include a blend of commercial, institutional, industrial and active landscapes, such as parks, in ratios similar to the District'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.

New Residential Customer Water Use

Table 2-6 summarized the District's anticipated new residential growth over the UWMP planning horizon – split among single-family and multi-family through 2030 consistent with existing ratios, then only growing as single-family to 2045. This growth provides the basis for the estimated future customer

[45] 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.

water needs, as the non-residential customers will be a ratio of the new residential customers. Table 4-6 presents the relevant growth information.

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

Table 4-6: Anticipated New Residential Units (from Table 2-6)

Customer Class	2025	2030	2035	2040	2045
Residential	1,200	2,400	2,600	2,800	2,900
Single-family (88%)	960	1,920	2,120	2,320	2,420
Multi-family (12%)	240	480	480	480	480

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"). Additionally, as described in Chapter 2, the growth beyond 2030 is presumed to only be single-family residences.

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. 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, though the value is stated to drop to 50 gpcd by 2030.[46]

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

- Single-family residential indoor use: 0.20 acre-feet per year based upon an assumed occupancy of 3.27 people per unit (see Chapter 2).
- Multi-family residential indoor use: 0.12 acre-feet per year based upon an assumed occupancy of 2 people per unit (see Chapter 2)

Outdoor residential water use is primarily a factor of lot size and the type and extent of landscaped area. The District's anticipated growth will likely include a range of residential densities (e.g., houses per acre) and therefore an estimated "typical" lot is assumed for purposes of forecasting.

[46] 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.

For purposes of this UWMP, each new single-family residential unit is anticipated to have a total gross area of 7,000 square-feet, with 3,500 square-feet anticipated to be irrigable after accounting for the home footprint, driveways, walkways, other hardscapes, and non-irrigated areas. Multi-family units, which typically have shared common landscape areas, are assumed to have 400 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 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 52.6 inches per year (4.4 feet per year).[47]

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

- Single-Family Residential – Anticipated single-family dwellings are conservatively assumed to be constructed on lots averaging 7,000 sf, with an average landscape area of 3,500 sf. The resulting outdoor demand factor is forecast to be 0.20 acre-feet per dwelling unit per year.
- Multi-Family Residential – Anticipated multi-family dwellings will have larger common areas, assumed to equate to 400 sf of landscape area per unit. The resulting outdoor demand factor is forecast to be 0.02 acre-feet per dwelling unit per year.

Combining the assumed indoor and outdoor residential demand factors results in the following estimated use for each new connection:

- Single-Family Residential – 0.20 af/du for indoor plus 0.20 af/du for outdoor combines for an annual demand factor of 0.40 af/du.
- Multi-Family Residential – 0.12 af/du for indoor plus 0.02 af/dur for outdoor combines for an annual demand factor of 0.14 af/du.

New Non-Residential Customer Water Use Factors

Non-residential per-connection demand factors were also estimated for purposes of forecasting the water needs of anticipated commercial, institutional, industrial and irrigated landscape customers.

However, since the District does not record water use unique to each non-residential connection classification, a weighted average of the total non-residential connections (see Table 2-1) and the

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

recorded non-residential use was calculated to be representative of future per-connection water needs. For purposes of this 2020 UWMP, this was determined to be 2.5 acre-feet per connection.

The resulting forecast future water use of existing and new non-residential customers is provided in Table 4-7.

4.4.4 Summary of Forecast Water Use

Based upon the estimated water use of the existing and new customers, the District anticipates a continued increase in potable water use over the planning horizon. Table 4-7 presents the resulting customer water use forecast. Values in the table have been rounded to the nearest 10 acre-feet to recognize the approximate nature of this forecast. This information will be used to evaluate the District's water system reliability in Chapter 5.

Table 4-7: Forecast Future Water Use (values in acre-feet per year)

Land-class		2025	2030	2035	2040	2045
Existing	Residential	5,030	5,030	5,030	5,030	5,030
	Non-residential	1,330	1,330	1,330	1,330	1,330
	Subtotal	6,360	6,360	6,360	6,360	6,360
New	Residential	420	840	920	1,000	1,040
	Non-residential	150	300	330	350	360
	Subtotal	570	1,140	1,250	1,350	1,400
Total	Residential	5,450	5,870	5,950	6,030	6,070
	Non-residential	1,480	1,630	1,660	1,680	1,690
	Distribution System Loss	370	410	410	420	420
	Total	7,300	7,910	8,020	8,130	8,180

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 forecasted 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 adjustments are 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.[48]

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 District in understanding the potential effects on long-term reliability, which in turn, allows the District to proactively begin planning appropriate responses. For example, hotter and drier weather may lead to an increased demand in landscape irrigation, especially during spring and fall months, increasing the pressure on water supplies that may have availability restrictions during these periods. Chapter 2 provides a more detailed discussion of potential effects of climate change on the District's supplies and customer water needs.

The potential for water needs to be higher 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 District continues to assess monthly water use trends throughout its service area.

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 in which the Annual Assessment is being performed. The previously presented water use forecasts facilitate both of these planning exercises as described in the following subsections.

[48] California Water Code Section 10632(a)(2) states water suppliers should use "unconstrained demand" when performing their annual water supply and demand assessment.
[49] California Water Code Section 10635(b)
[50] California Water Code Section 10632.1

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

With an initial annual estimate, each year is further adjusted to reflect anticipated increases in the "unconstrained demand" during a single dry year. As noted previously, this is reflected by applying a 5% increase to the total potable water use forecast. The resulting unconstrained demand during a dry year for 2021 through 2025 are shown in Table 4-8.

Table 4-8: 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	330	310	330	370	540	750	920	970	890	740	580	420	7,150
2022	330	320	330	380	550	770	940	980	900	760	600	420	7,280
2023	340	330	340	380	560	780	950	1,000	920	770	610	430	7,410
2024	340	330	340	390	570	790	970	1,020	940	780	620	440	7,530
2025	350	340	350	400	580	810	990	1,040	950	800	630	450	7,690

4.5.2 Projecting Water Use for Annual Assessments

The District will need to perform an Annual Assessment and submit the findings to DWR beginning in 2022. To evaluate the plausible water service reliability conditions 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 District 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 4-9 provides the Normal Year and Single Dry Year current water use for the District's water service area. These are used in Chapter 5.

Table 4-9: 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	305	294	305	347	505	704	862	904	830	694	547	389	6,686
Single Dry	320	309	320	364	530	740	905	949	872	729	574	408	7,020

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 $95,000 for the District.[51] Therefore, 80% of this is estimated to be about $76,000 per year. According to the detailed data, approximately 38% of the households earn at or below this 80-percentile income.

For purposes of estimating the future water needs, 38% of the total single-family and multi-family connections are presumed to represent disadvantaged households, resulting in 28% of the future total potable water use. Applying this condition to the forecast water use for the entire District results in the estimate provided in Table 4-10.

Table 4-10: Estimated Low-Income Water Use Forecast (acre-feet)

	2025	2030	2035	2040	2045
Total Potable Use	7,300	7,910	8,020	8,130	8,180
Low Income Use	2,071	2,231	2,261	2,291	2,307
% of Total Potable	28%	28%	28%	28%	28%

[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/16000US0622020-elk-grove-ca/

Chapter 5
Water System Reliability

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

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

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

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

5.1 Five Year Drought Risk Assessment

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

The District is in a unique position to have ample water supplies to meet current and growing customer demand. Specifically, with the buffering capacity over time of the groundwater basin and its stability coupled with the SCWA contract (see Chapter 3), the District is not susceptible to drought conditions. Nevertheless, the District continues to encourage its customers to use water efficiently and continues to see lowering per-capita water use (see Chapter 4). Although the District has sufficient supplies to meet

its five consecutive dry year demands, other regulatory constraints, like the declaration of a drought emergency by the Governor of the State of California, may require the District to reduce its water service to its customers. Table 5-1 below shows the District's DRA that integrates its supplies for 2021 through 2025 as described in Chapter 3 and reflects the dry year unconstrained water uses described in Chapter 4. As the table shows, the District has sufficient water assets available in years.

Table 5-1: Five Year Drought Risk Assessment

	2021	2022	2023	2024	2025
Supply	13,000	13,000	13,000	13,000	13,000
Demand	7,150	7,280	7,410	7,540	7,670
Difference	5,850	5,720	5,590	5,460	5,330

5.2 Long Term Service Reliability

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

5.2.1 Long Term Service Reliability

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

Normal and Single Dry Conditions 2025-2045

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

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

Normal Year	2025	2030	2035	2040	2045
Supply	13,000	13,000	13,000	13,000	13,000
Demand	7,300	7,910	8,020	8,130	8,180
Surplus Supply	5,700	5,090	4,980	4,870	4,820

Single Dry Year	2025	2030	2035	2040	2045
Supply	13,000	13,000	13,000	13,000	13,000
Demand	7,665	8,306	8,421	8,537	8,589
Surplus Supply	5,335	4,695	4,579	4,464	4,411

Five Consecutive Dry Years 2025 – 2045

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

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

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

		2025	2030	2035	2040	2045
Year 1	Supply	13,000	13,000	13,000	13,000	13,000
	Demand	7,670	8,310	8,420	8,540	8,590
	Surplus Supply	5,330	4,690	4,580	4,460	4,410
Year 2	Supply	13,000	13,000	13,000	13,000	13,000
	Demand	7,793	8,432	8,442	8,562	8,600
	Surplus Supply	5,207	4,568	4,558	4,438	4,400
Year 3	Supply	13,000	13,000	13,000	13,000	13,000
	Demand	7,916	8,554	8,464	8,584	8,610
	Surplus Supply	5,084	4,446	4,536	4,416	4,390
Year 4	Supply	13,000	13,000	13,000	13,000	13,000
	Demand	8,038	8,676	8,486	8,606	8,620
	Surplus Supply	4,962	4,324	4,514	4,394	4,380
Year 5	Supply	13,000	13,000	13,000	13,000	13,000
	Demand	8,161	8,798	8,508	8,628	8,630
	Surplus Supply	4,839	4,202	4,492	4,372	4,370

5.3 Annual Reliability Assessment

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

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

5.3.1 Normal Year Supply and Current Water Use

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

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

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

Table 5-4: Normal Year Water Supply and Demand

Normal Year	Current
Supply	13,000
Demand	6,686
Surplus Supply	6,314

5.3.2 Single Dry Year Supply and Dry-Year Current Demand

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

Single dry year demands include the anticipated demands based upon historical trends in water usage in drought conditions by the District's customers. Demands in dry conditions may increase in the normally wetter months as limited rainfall cause an increase in customer uses for outdoor irrigation. These conditions are described 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 below shows the single dry year water supply and demand conditions.

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

Single Dry Year	Current
Supply	13,000
Demand	7,020
Surplus Supply	5,980

5.4 Water Supply Reliability Summary

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

Chapter 6
Water Shortage Contingency Plan

The Elk Grove Water District (EGWD) is committed to meeting the health and safety requirements of a drinking water purveyor at all times. EGWD maintains this Water Shortage Contingency Plan (WSCP) to help meet this goal during water shortages.

This WSCP provides for emergency water supply management related to general supply shortages due to severe droughts, infrastructure failure, catastrophic supply interruption, or any other cause. EGWD coordinates regionally through Regional Water Authority (RWA) and Sacramento County Water Agency (SCWA) with respect to emergency water shortage planning and response.

This WSCP allows for declaration of supply shortages by the Board of Directors (Board). When a shortage is identified, the Board assesses if a particular shortage stage (and corresponding response actions) should be declared. Upon Board declaration of a shortage stage, restrictions, regulations, prohibitions on uses, and enforcement measures are enacted.

6.1 Legal Authorities

The Florin Resources Conservation District, established and governed by Division 9 of the California Public Resources Code (PRC), owns and operates a water utility called the Elk Grove Water District. EGWD's authority includes the "development and distribution of water" (PRC 9151) and is authorized to manage and administer any water conservation or distribution project within or adjacent to EGWD (PRC §9415). Upon approval by the Board of Directors, EGWD is authorized to include plans and specifications that include terms and conditions with respect to conservation of water (PRC §9816).

The aforementioned powers derived from EGWD's organizing statutes are in addition to 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).

EGWD also coordinates with any city or 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).

6.2 Water Supply Reliability Analysis

EGWD supply consists of both self-supplied groundwater as well as purchased supplies from Sacramento County Water Agency (SCWA). EGWD's Service Area 1 relies on production of groundwater, whereas Service Area 2 relies on purchased supplies from SCWA. Both supply sources can be impacted by climate factors, catastrophic events, and regulatory measures. EGWD evaluates its overall water supply reliability through its Urban Water Management Plan, as well as through other regional and SCWA planning efforts.

EGWD's groundwater supplies are projected to be available for pumping during drought periods. The groundwater supply is the Sacramento Valley South American Groundwater Basin, referred to as the Central Basin Area of the Sacramento County Groundwater Basin, as identified in the Central Sacramento County Groundwater Management Plan. The Central Basin is sustainably managed by all the region's pumpers in coordination with the region's groundwater sustainability agencies. EGWD does not currently project any groundwater shortages during a drought lasting up to five years. However, the ability to pump the groundwater may be limited by regulatory or legal requirements put in place during a drought. EGWD will address these restrictions as they materialize and modify its water shortage supply strategy, as necessary.

EGWD also receives supply from the Sacramento County Water Agency. Although SCWA maintains surface water and groundwater supply for its entire service area, the supply from SCWA is almost entirely from SCWA production wells located within EGWD's service area. SCWA's recent planning efforts indicate no expected limitations in its ability to access the groundwater resources used to serve EGWD's Service Area 2, including during drought conditions. As the case with EGWD's own groundwater production constraints, this supply may be impacted by regulatory or legal requirements imposed during a drought. EGWD will work with SCWA to address these restrictions and develop the appropriate response strategy, as necessary.

6.3 Annual Water Supply and Demand Assessment Procedures

EGWD conducts an annual analysis of supply and demand projections to help inform water resources management decisions for the coming year. The analysis incorporates numerous data sources used as evaluation criteria to project probable demands and supply availability for the coming year. Sources to consider include:

- Projected weather conditions
    - Precipitation versus historical on monthly basis
- Projected Unconstrained Demand
    - Production versus historic on monthly basis
    - New customer growth

  - Identify artificially supplied water features separate from swimming pools and parks
  - GPCD tracking
- Projected Supply Availability
  - SCWA projected supply
  - Groundwater production capacity
- Regulatory Conditions
  - State mandated conservation orders
  - Groundwater Sustainability Agency (GSA) information

The general procedure is listed below. EGWD may modify this process based on available data, significant events, process restrictions, or other external factors that may impact the process.

1. Compile existing weather data to characterize past 12 months conditions. During the dry year scenario, the EGWD anticipates no impact in the ability to produce groundwater supplies, including supplies from SCWA.
2. Estimate unconstrained EGWD demands based on recent and representative customer use data. Development of unconstrained demand will incorporate recent use patterns (unit factors for each customer type) and anticipated customer growth.
3. Assess the wholesaler supply based on wholesaler projections for current year and dry year scenarios.
4. Assess available capacity of groundwater production facilities.
5. Identify and incorporate any applicable constraints (infrastructure, regulatory, etc.) regarding receiving wholesaler supply or groundwater production.
6. Compare projected wholesaler supplies and available groundwater production facilities with anticipated EGWD demands.
7. Develop, analyze, and propose water resource management strategies to address the projected demand to supply comparison, including reference to the water shortage stages identified in this WSCP.
8. Present Annual Water Supply and Demand Assessment (and resulting conservation stage declaration, if applicable) to Board.

The general proposed timeline is as follows:

- Begin assessment by District staff – March/April
- Present assessment to Board of Directors – May
- Submit to State per CWC §10632.1 – No later than July 1

6.4 Water Shortage Stages

The following subsections and tables present information on EGWD's supply scenarios, including Normal Water Supply and the six water shortage stages. Results from the annual Water Supply and Demand Assessment are used to declare a respective shortage stage.

6.4.1 Normal Water Supply

EGWD's water supply and distribution system is able to meet all the water demands of its customers in the immediate future. Regulations for Normal Water Supply are applicable to all stages and include the following:

- Runoff – Irrigation shall not be allowed to run off to adjoining properties or to the roadside ditch or gutter.
- Watering after a Rainfall Event – No irrigation shall be allowed for 48 hours after a measurable rainfall event. A measurable rainfall event shall be defined as an event having 0.10 inches of rain in one day.
- Hoses – Open hoses are not permitted. Automatic shutoff nozzles are required.
- Washing driveways and other paved areas – Use of water to clean sidewalks, driveways, patios, or other hardscapes is not permitted. Washing of streets and commercial parking lots with a hose is not permitted, except to alleviate immediate fire or sanitation hazards.
- Pools, ponds, and fountains – All swimming pools, ponds, fountains, or other decorative water feature shall use recirculated water.

The penalties for water waste during this stage (Normal Water Supply) are as follows:

- First and Second Violation – Customer is notified of a violation.
- Third Violation – Written warning sent to customer.

The following practices are encouraged by EGWD:

- Irrigation – Limit landscape irrigation to not more than 3 days per week.
- Irrigation hours – Landscaping irrigation is discouraged between the hours of 12:00 p.m. and 6:00 p.m. during the summer months (May – October).
- Serving of Water – Restaurants shall serve water to customers only upon request.
- Water Leaks – Leaking pipes, fixtures or sprinklers shall be repaired promptly.

Stage 1 – 10% Supply Shortage
Actions include regulations from Normal stage plus those listed below. When implemented as a whole program, these actions together are expected to eliminate up to a 10 percent gap between supplies and demands.
Customers Actions to Reduce Demand up to 10 Percent • Reduce total water use by 10%. Contact EGWD or visit egwd.org for tips and techniques to reduce indoor and outdoor water use. • Pool draining and refilling shall be allowed only for health, maintenance, or structural considerations. • Users of construction water meters will be monitored for efficient water use. • Restaurants shall serve water only upon request. • Pipeline flushing is prohibited except in the case of an emergency, public health and for essential operations or unless specifically authorized by the District. • Addresses ending in an odd number irrigate on Tuesday, Friday, and Sunday. Customers are encouraged to **voluntarily** reduce irrigation to Tuesday and Friday. • Addresses ending in an even number irrigate on Monday, Thursday, and Saturday. Customers are encouraged to **voluntarily** reduce irrigation to Monday and Thursday.
District Actions • Communicate mandatory reduction targets to customers. • Leak repair receives higher priority. • Increase drought awareness through additional public outreach measures that notify public and customers for declared stage, requirements, and available conservation program support. • Decrease system flushing frequency. • Increased monitoring of customer use. • Accelerate infrastructure repairs and improvements. • Water Shortage enforcement measures, including fines and charges, for non-compliance with this WSCP's requirements will be implemented in accordance with established District Policies and Procedures

Stage 2 – 20% Supply Shortage
Actions include regulations from Stage 1 plus those listed below. When implemented as a whole program, these actions together are expected to eliminate up to a 20 percent gap between supplies and demands.
Treated Water and Municipal Water Customers - Actions to Reduce Demand up to 20 Percent • Reduce total water use by 20%. Contact EGWD or visit egwd.org for tips and techniques to reduce indoor and outdoor water use. • Leaking customer pipes or faulty sprinklers shall be repaired within two working days or less if warranted by the severity of the problem. • Water for flow testing and construction purposes from water agency fire hydrants and blow-offs is prohibited. Use of reclaimed water for construction purposes is encouraged. Reclaimed water is not currently available within EGWD's service area and would have to be obtained elsewhere. • Addresses ending in an odd number irrigate on Tuesday, Friday from 8pm-8am. • Addresses ending in an even number irrigate on Monday, Thursday from 8pm-8am. • Pools, ponds, and fountains – Water use for ornamental ponds and fountains is prohibited. No potable water from EGWD's system shall be used to fill or refill new swimming pools, artificial lakes, ponds, or streams until the Stage 2 – Water Warning has been declared over.
District Actions • Communicate mandatory reduction targets to customers. • Implement water conservation patrols. • Reach out to top consumers about conservation measures.

Stage 3 – 30% Supply Shortage
Actions include regulations from preceding stages plus those listed below. When implemented as a whole program, these actions together are expected to eliminate up to a 30 percent gap between supplies and demands.
Treated Water and Municipal Water Customers - Actions to Reduce Demand up to 30 Percent • Reduce total water use by 30%. Contact EGWD or visit egwd.org for tips and techniques to reduce indoor and outdoor water use. • Leaking customer pipes or faulty sprinklers shall be repaired within 24 hours or less if warranted by the severity of the problem. • Use of reclaimed water for construction purposes is encouraged. Reclaimed water is not currently available within EGWD's service area and would have to be obtained elsewhere. • Installation of new turf lawn and/or landscaping is prohibited. • Automobiles or equipment shall be washed only at commercial establishments that use recycled or reclaimed water. • Addresses ending in an odd number irrigate on Tuesday, Friday from 10pm-4am. • Addresses ending in an even number irrigate on Monday, Thursday from 10pm-4am.
District Actions • Communicate mandatory reduction targets to customers. • No commitments will be made to provide service for new water service connections unless the Department of Water Resources Model Water Efficient Landscape Ordinance, found at: http://www.water.ca.gov/wateruseefficiency/docs/MWELO09-10-09.pdf, is followed and the plans have been approved by the county or city building department which has jurisdiction over the property location. Any authorized landscape for new connections is subject to all restrictions set forth in Stage 3.

Stage 4 – 40% Supply Shortage
Actions include regulations from preceding stages plus those listed below. When implemented as a whole program, these actions together are expected to eliminate up to a 40 percent gap between supplies and demands.
Treated Water and Municipal Water Customers - Actions to Reduce Demand up to 40 Percent • Reduce total water use by 40%. Contact EGWD or visit egwd.org for tips and techniques to reduce indoor and outdoor water use. • No potable water from the District's system shall be used for construction purposes including but not limited to dust control, compaction, or trench jetting. • Addresses ending in an odd number irrigate on Tuesday from 10pm-4am. • Addresses ending in an even number irrigate on Thursday from 10pm-4am.
District Actions • Communicate mandatory reduction targets to customers. • System Pressure – Maximum psi at wells and treatment plants will be reduced to 55.

Stage 5 – 50% Supply Shortage
Actions include regulations from preceding stages plus those listed below. When implemented as a whole program, these actions together are expected to eliminate up to a 50 percent gap between supplies and demands.
Customers - Actions to Reduce Demand up to 50 Percent • Reduce total water use by more than 50%. Contact EGWD for tips and techniques to reduce indoor and outdoor water use. • Leaking customer pipes or faulty sprinklers shall be repaired immediately. Water service will be suspended until repairs are made. • Turf irrigation is prohibited.
District Actions • Communicate mandatory reduction targets to customers. • New connections - No new connections will be added to the system until the Stage 5 has been declared over. • System Pressure – Maximum system operating pressure will be reduced to 50 psi.

Stage 6 – Over 50% Supply Shortage
Actions include regulations from preceding stages plus those listed below. Actions will be identified to address each specific shortage situation to eliminate the gap between supplies and demands.
Customers - Actions to Reduce Demand greater than 50 Percent • Health and safety use of water only. • Landscape irrigation is prohibited.
District Actions • Communicate mandatory reduction targets to customers. • Other actions as identified specific to the shortage condition. • Declare Water Shortage Emergency in accordance with Section 350 of Division 1, Chapter 3 Water Shortage Emergencies of the California Water Code.

6.5 Enforcement and Variances

EGWD provides the stages of penalties for violators of the water waste regulation. The penalties are enforced through the application of FRCD Ordinance No. 06.15.21.02. For each violation within a 12-month period under normal water supply conditions, violations are as follows:

- First and Second Violation – Customer is notified of a violation.
- Third Violation – Written warning sent to customer.

When a conservation stage 1-3 is declared, fines for each violation within a 12-month period are as follows:

- First Violation – Customer is notified of a violation.
- Second Violation – Written warning sent to customer.
- Third Violation – $200 fine and customer is scheduled for mandatory water audit.
- Fourth Violation – $500 fine.
- Fifth Violation – $500 fine and water service is shut off. A Connection fee is assessed to reactivate water service.
- Similar fines and charges may be implemented by EGWD as needed to enforce restriction on specific prohibitions on water uses.

When conservation stage 4 - 6 is declared, fines for each violation within a 12-month period are as follows:

- First Violation – Customer is notified of a violation with a written warning.
- Second Violation – $500 fine and customer is scheduled for mandatory water audit.
- Third Violation – $500 fine and water service is shut off. A Connection fee is assessed to reactivate water service.
- Similar fines and charges may be implemented by the District as needed to enforce restriction on specific prohibitions on water uses.

Once a water shortage stage has been declared, EGWD will enforce compliance through a multitude of measures commensurate with each reduction goal. EGWD will either implement measures per this

Water Shortage Contingency Plan or will provide further discrete requirements through approval of ordinances.

The appeal process regarding this WSCP is found in Section 5 of Ordinance 06.15.21.02.

6.6 Communication Protocols

EGWD maintains an established and effective communications program to inform its customers, neighbors, and other stakeholders of 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 Board meetings addressing the Annual Water Supply and Demand Assessment and/or a potential water shortage declaration will be noticed per 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, EGWD will notify its customers and others through a range of efforts. The stage and restrictions will be identified in a press release, as well as customer billing statements. EGWD's website will be updated to feature the shortage declaration, restrictions, and resources available to customers from EGWD and other entities to help meet the restrictions. Subsequent Board of Directors meetings will include a review of the shortage condition, customer response results, and discussion and recommendations for potential modifications.

EGWD will also coordinate with the City of Elk Grove, Sacramento County, Sacramento County Water Agency, and Regional Water Authority, to declare a local emergency with respect to anticipated water supplies and demands in the event conditions necessitate.

6.7 Financial Consequences of WSCP

EGWD understands the potential for decreased revenues and increased costs during prolonged water shortage conditions and enforcement of excessive residential water use during a drought (compliance with Chapter 3.3, Division 1 of the CWC). The decreased revenues can be expected due to a reduction in water sales. Volumetric revenue is approximately 38 percent of total revenue[52]. Assuming a reduction in sales commensurate with the particular WSCP stage declaration, a decrease in total revenues in the range of 2-4 percent per stage may be expected.

Additional monitoring, public outreach, and enforcement is expected to increase total costs to EGWD in declaring a water shortage. These additional efforts are prioritized for current staff, and other normal work efforts and projects are delayed or reassigned. If conditions warrant, EGWD will seek the assistance through additional staffing from third-party service providers. These costs depend on the level of support and will be evaluated on a case-by-case basis.

[52]EGWD's 2018 Water Rate Study

EGWD maintains a strong financial management position. However, it is reasonable to expect financial impacts or changes in cash flow during a prolonged water shortage condition. EGWD will enact a range of management and financial resources depending on the specific situation that include:

- Capital project deferment
- Operational and maintenance expense deferment
- Increased revenues from fines and penalties
- And others as identified

6.8 Monitoring and Reporting

The WSCP aims to ensure demands are reduced and/or supply is augmented to balance supply and demand. EGWD will enact various actions commiserate with each respective stage. EGWD will then monitor results to maintain the supply/demand balance. Similar to the supply and demand projections used to establish a shortage condition, EGWD will monitor the same data to determine effectiveness and efficacy. District staff will report to the Board of Directors at least quarterly on status and results. Data reporting will include:

- Actual demands to projected demands per customer class and on total.
- Actual supply availability and utilized to projected availability per each supply source.
- Projected supply availability for next 12 months per supply source.
- Any specific requirements identified by the State in the future.
- Data will also be submitted to the State per any future reporting requirements.

Progress and efficacy will be summarized from the results data. EGWD will evaluate the need for any changes or modifications to the declared water shortage stage or actions based on the results. EGWD may determine to enact additional measures, develop ordinances, or update the WSCP as a whole. Any WSCP update or modification will be conducted through the Board of Directors meeting process, unless specific conditions require otherwise.

6.9 Response Action Estimates

The following table presents the individual estimated demand savings of each response action. Actual savings will likely vary greatly based on external influences, shortage stage level, and general customer understanding of drought severity. It is assumed the savings estimates are not additive, but when implemented together as a program with all the actions in each respective stage, they will eliminate the supply to demand shortage gap.

Table 6-1: Shortage Response Action Measures Estimates

Stage	Shortage Response Action	Potential Shortage Gap Reduction
1	**Customer – Asked to reduce total water use by 10%.**	**up to 10%**

Stage	Shortage Response Action	Potential Shortage Gap Reduction
1+	Customer – Pool draining and refilling shall be allowed only for health, maintenance, or structural considerations.	0-1%
1+	Customer – Users of construction meters will be monitored for efficient water use.	0-2%
1	Customer – Limit irrigation to three days per week. Asked to voluntarily reduce to two days a week.	3-8%
1+	District – Leak repairs receives higher priority.	0-3%
1+	District – Increase drought awareness through additional public outreach measures that notify public and customers for declared stage, requirements, and available conservation program support.	3-5%
1+	District – Increased monitoring of customer use.	0-1%
1+	District –Accelerate infrastructure repairs and improvements.	0-3%
1+	District – Increased enforcement measures, including fines and charges, for non-compliance with WSCP.	0-4%
1	District - Flushing is prohibited except in the case of an emergency, public health and for essential operations or unless specifically authorized by the District.	0-2%
2	Customer –Reduce total water use by 20%.	up to 20%
2	Customer – Leaking pipes or faulty sprinklers shall be repaired within two working days or less if warranted by the severity of the problem.	0-1%
2	Customer – Irrigation shall be limited to two days per week.	5-15%
2+	Customer – Water use for ornamental ponds and fountains is prohibited. No potable water from EGWD's system shall be used to fill or refill new swimming pools, artificial lakes, ponds, or streams.	0-1%
2+	Customer – Water for flow testing and construction purposes from fire hydrants and blow-offs is prohibited.	0-1%
2+	District – Implement water conservation patrols.	3-5%
3	Customer – Reduce total water use by 30%.	up to 30%
3+	Customer – Leaking pipes or faulty sprinklers shall be repaired within 24 hours or less if warranted by the severity of the problem.	0-1%
3+	Customer – Use of reclaimed water for construction purposes is encouraged. Reclaimed water is not currently available within EGWD's service area and would have to be obtained elsewhere.	0-1%
3+	Customer – Flushing of sewers and fire hydrants is prohibited except in the case of emergency and for essential operations or unless specifically authorized by EGWD.	0-2%
3+	Customer – Automobiles or equipment shall be washed only at commercial establishments that use recycled or reclaimed water.	0-1%
3	Customer – Irrigation shall be limited to two days per week (within six-hour block).	15-20%
3+	Customer – Installation of new turf lawn and/or landscape is prohibited.	0-3%
3+	District – No commitments will be made to provide service for new water service connections unless the DWR MWELO is followed, and the plans have been approved by the appropriate building department(s).	1-5%
4	Customer – Reduce total water use by 40%	Up to 40%
4	Customer – Irrigation is allowed only once per week (within six-hour block).	20-30%

Stage	Shortage Response Action	Potential Shortage Gap Reduction
4	Customer – No potable water from EGWD's system shall be used for construction purposes including but not limited to dust control, compaction or trench jetting.	0-2%
4	District – Maximum psi at wells and treatment plans will be reduced to 55.	1-4%
5	Customer – Reduce total water use more than by 50%.	Up to 50%
5+	Customer – Leaking customer pipes or faulty sprinklers shall be repaired immediately. Water service will be suspended until repairs are made.	0-1%
5	Customer – Turf irrigation is prohibited.	25-40%
5	District – No new connection will be added to the system.	2-4%
5	District – Maximum system operating pressure will be reduced to 50 psi.	1-4%
6	Customer – Health and safety use of water only.	up to 50%
6	Customer – Landscape irrigation is prohibited.	25-40%
6	District – Other actions as identified specific to the shortage condition.	varies
6	District – Declare Water Shortage Emergency in accordance with Section 350 of Division 1, Chapter 3 Water Shortage Emergencies of the California Water Code.	varies

6.10 WSCP Refinement Procedures

EGWD's WSCP is an adaptive plan that allows for active refinement to particular shortage conditions. The general procedures for refinement are presented below.

1. For each shortage response action, compare expected results with actual shortage response and identify any shortfall or over achievement.

2. Revise expected reduction for a specific shortage response action based on updated information.

3. Assess the aggregate expected reductions (from revised shortage response actions) for each shortage stage.

4. Revise stage declaration or modify stage shortage response actions to balance demands with supplies.

The procedures presented above will be relied upon during all shortage stage declarations, ensuring an adaptive WSCP, capable of being relied upon under various circumstances, is produced.

6.11 Plan Adoption, Submittal, and Availability

The WSCP (including subsequent updates) shall be adopted in accordance with standard EGWD procedures, including requirements for public participation (public hearing), and approval by the Board. Upon adoption, the WSCP will be submitted to DWR no later than 30 days after and made available for inspection at EGWD office and website.

6.12 Seismic Risk Assessment and Mitigation Plan (Catastrophic interruption in supplies)

Sacramento County has completed a Local Hazard Mitigation Plan (LHMP) under the federal Disaster Mitigation Act of 2000 (Public Law 106-390). Per DWR requirements, a copy of the most recent adopted LHMP by each entity is included in EGWD's UWMP (Appendix D).

Sacramento County is currently in the process of updating the LHMP 2016. The update includes participation with other entities, including Cities of Sacramento, Citrus Heights, Elk Grove, Folsom, Galt, Isleton, Rancho Cordova, and other special districts. The update is anticipated to be completed and finalized during 2021. Upon adoption of the LHMP update, EGWD will submit to DWR.

The LHMP 2016 Hazard Identification Assessment for the City of Elk Grove characterizes the earthquake and liquefaction probability as "occasional" (between 1 and 10 % chance of occurrence in the next year or has a recurrence interval of 11 to 100 years) and "unlikely" (less than 1 percent chance of occurrence in the next year, or has a recurrence interval of greater than 100 years), respectively. Earthquake and liquefaction significance is listed to be "medium" (moderate potential impact) and "low" (minimal potential impact), respectively.