Elk Grove Water District

A DEPARTMENT OF THE
Florin Resource Conservation District

2015 Urban Water Management Plan

Adopted: June 22, 2016

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Elk Grove Water District
2015 Urban Water Management Plan

Final Document
Adopted June 22, 2016

Prepared By:

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Comprehensive Water Planning

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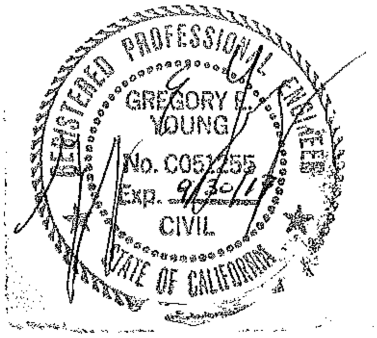
This Elk Grove Water District 2015 Urban Water Management Plan was prepared under the direction of a California licensed civil engineer.



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Appendix D

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CHAPTER 1. INTRODUCTION

The Elk Grove Water District (District) has been a water purveyor in the southern part of Sacramento County for over 115 years, and previously went by the names Elk Grove Water Service and Elk Grove Water Works. The District is a department of the Florin Resource Conservation District (FRCD), which purchased the water system in 1999.

The District services its customers in two service areas with Service Area 1 being served by pumped groundwater and Service Area 2 served by treated water purchased from the Sacramento County Water Agency (SCWA). SCWA delivers to the District both surface water and groundwater that is derived from its conjunctive use operations. The District service area covers approximately 13 square miles and 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.

Serving a population of over 42,000, 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's services are coordinated and managed within FRCD.

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. FRCD was formed in 1953 and purchased Elk Grove Water works (the predecessor to the District) in 1999 to serve urban populations with water.

The District has prepared this 2015 Urban Water Management Plan (2015 UWMP) to comply with the Urban Water Management Planning Act (UWMPA) requirements for urban water suppliers.

Note to DWR

The Elk Grove Water District has written this UWMP primarily as a water resources planning tool and secondarily to satisfy the requirements of the UWMPA.

The body of the document provides narratives and discusses data that DWR requests in its 2015 UWMP Guidebook, including changes to the California Water Code since 2010.

To facilitate review by DWR for compliance with the UWMPA, data from the body of the document has been transferred into DWR Tables consistent with the organization of the tables in Section E of the 2015 UWMP Guidebook Appendices. These tables are in **Appendix A-1**

Also, this UWMP has been reviewed for adequacy according to the UWMP Checklist as contained in Section F in the 2015 UWMP Guidebook. A completed checklist is included in **Appendix A-2**.

This 2015 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 2015 UWMP specifically assesses the availability of its supplies to meet forecast

demands during average, single-dry and multiple dry 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 2015 UWMP.

The 2015 UWMP is an update to the District's 2010 UWMP and presents new data and analysis as required by the California Department of Water Resources (DWR) and the California Water Code (CWC) since 2010. It is also a comprehensive water planning document which describes existing and future supply reliability, forecasts future demands, presents demand management progress, and identifies local and regional cooperative efforts to meet projected water use.

The current four-year drought has 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 2015 UWMP, which also addresses the evolving impact of drought on the District's water supply and operations.

1.1 Urban Water Management Planning Act

The Urban Water Management Planning Act (UWMPA) requires every urban water supplier to prepare an urban water management plan pursuant to CWC Section 10610 et seq.[1] Because the District is an urban water supplier, it is preparing its 2015 UWMP consistent with the UWMPA. The 2015 UWMP provides a framework for water planning to minimize the negative effects of potential water shortages, and provides useful information to the public about the District and its water management programs.

Specifically, the 2015 UWMP describes and evaluates the reliability of the District's existing and planned water supplies to meet short-term and long-term customer water demands; especially the availability and sufficiency of surface and recycled water assets, and the vulnerability of these supplies to seasonal and climactic conditions.

The 2015 UWMP also revisits baseline per-capita water use data and target conservation values, first developed and presented in the 2010 UWMP as required by CWC §10608 et seq., and assesses compliance with those targets. This 2015 UMWP also includes narratives describing water demand management measures,[2] its long-term plan for efficient water use, and estimated future water savings based on water use projections, where available. Also included are discussions regarding distribution system water loss, information on the potential use of recycled water as a water source for the District, and

[1] An "urban water supplier" is a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually." CWC § 10617.
[2] As detailed in the CWC § 10631(f)(1) and (2).

the District's comprehensive water shortage contingency analysis, which details stages of action to be undertaken by the District in response to water supply shortages.[3]

In short, this 2015 UMWP allows the District to assess and plan for on-going effective management of its water supplies to meet its evolving water demands.

1.2 Public Participation and Agency Coordination

The UWMPA requires a water purveyor to coordinate the preparation of its UWMP with other appropriate agencies in and around its service area. This includes other water suppliers that share a common source, water management agencies, and relevant public agencies. The District has prepared this 2015 UWMP in coordination with water utilities supplying wholesale water to the District, and has appropriately notified and coordinated with other appropriate local government agencies as listed in **Table 1-1**. Copies of correspondence are included in **Appendix B-3**.

Table 1-1 – Public and Agency Coordination

Coordinating Agencies	Coordinate regarding Demands	Sent Copy of Draft UWMP	Sent 60-Day Notice	Notice of Public Hearing
Cities, Counties, Retail Customers and Interested Parties				
Sacramento County			√	√
Sacramento County Water Agency	√	√	√	√
City of Elk Grove (Planning Dept.)	√	√	√	√
City of Elk Grove (Public Works Dept.)	√	√	√	√
Cosumnes Community Service District			√	√
Elk Grove Unified School District			√	√
Sacramento County Regional Sanitation District			√	√
General Public				√
Shared Groundwater Resource Interests				
Cal-Am Water Company			√	√
Sloughhouse Resource Conservation District			√	√
Golden State Water Company			√	√
Rancho Murrieta Community Service District			√	√
Omochumne Hartnell Irrigation District			√	√

1.2.1 Sacramento County Water Agency

The District's service area is completely encompassed by the Sacramento County Water Agency (SCWA). Due to its contractual and geographical relationship, SCWA plays a significant role in the District's water management. SCWA currently provides water to a portion of the District's service area; i.e., Service Area 2, through a mix of surface water and groundwater deliveries.

[3] A recent amendment to CWC § 10632 includes defining water features that are artificially supplied with water as part of this contingency analysis.

1.2.2 Central Sacramento County Groundwater Management Plan

SCWA was also a participant in the development of the Central Sacramento County Groundwater Management Plan (CSCGMP). In 2006, the CSCGMP was created in an effort to promote regional water supply planning and identify the groundwater basin's safe yield. As described in **Section 3.2**, the plan focused on the Central section of the Sacramento groundwater basin to ensure that water supplies were successfully managed and available into the future. The District extracts groundwater from the Central Basin for use by its customers. The full text of this plan can be found in **Appendix C-3**.

1.2.3 Water Forum

Community leaders, along with water managers from Sacramento, Placer and El Dorado counties negotiated the Water Forum Agreement (WFA), which is a comprehensive package of linked actions that will achieve two coequal objectives: (1) Provide a reliable and safe water supply for the region's economic health and planned development through to the year 2030; and (2) Preserve the fishery, wildlife, recreational, and aesthetic values of the Lower American River. Pursuant to the Water Forum provisions, the District has also developed best management practices that are consistent with the Demand Management Measures in the 2015 UWMPA.

1.2.4 Regional Water Authority

The Regional Water Authority (RWA) is a joint powers authority that serves and represents the interests of 22 water providers in the greater Sacramento, Placer, El Dorado and Yolo County regions. The Authority's primary mission is to help its members protect and enhance the reliability, availability, affordability and quality of water resources. RWA has launched significant programs and services on a regional scale, including: (1) A water efficiency program designed to help local purveyors implement best management practices on a regional basis; (2) implementation of the American River Basin Regional Conjunctive Use Program to build and upgrade water facilities throughout the region to better manage surface and groundwater resources; and (3) development of an Integrated Regional Water Management Planning Program to continually identify the regional projects and partnerships that will help the region best meet its future water needs.

1.2.5 Additional Entities

The District has shared water interests with a several other entities due to its groundwater basin and conveyance facilities. These neighboring entities include Sacramento County, City of Elk Grove, Cosumnes Community Service District, Elk Grove Unified School District, and Sacramento County Regional Sanitation District. All of these entities, including the general public and adjacent water suppliers, were sent 60 day notices and

encouraged to attend the public hearing prior to the adoption of the 2015 UWMP. A copy of the letter is provided in **Appendix B-3**.

1.3 Plan Adoption

Prior to adoption, the District held a public hearing regarding its 2015 UWMP on June 22, 2016. Before the hearing, the District made a draft of the 2015 UWMP available for public inspection at the District's office and on the District's website. Pursuant to CWC Section 10642, general notice of the public hearing was provided through publication of the hearing date and time,[4] and posting of the hearing at the District's office.

As part of its public hearing, the District received community input regarding its implementation plan for complying with the water conservation requirements contained in CWC § 10608.20 et seq., including the implementation plan's economic impacts.[5] Also, at the public hearing, the District presented the method for determining its urban water use target pursuant to CWC § 10608.20(b).

The District adopted this 2015 UWMP on June 22, 2016.[6] A copy of the adopted 2015 UWMP will be provided to the County and the California State Library, and posted onto the District's website.

1.3.1 Additional Compliance

The District plans to submit all required documentation related to the UWMPA soon after adoption. These include the required DWR UWMP Tables as **Appendix A-1**, the DWR Checklist as **Appendix A-2**, the SB 7-7X compliance forms as **Appendix A-3**, and the AWWA Water Audit worksheet as **Appendix A-4**.

1.4 Previous Reports

The 2015 UWMP has been prepared using a number of related planning documents and previous reports, including, but not limited to:

- Elk Grove Water District 2010 UWMP;
- Central Sacramento County Groundwater Management Plan;
- City of Elk Grove's General Plan

[4] See **Appendix B-2** for copies of the published notices.
[5] CWC § 10608.26
[6] The resolution adopting the 2015 UWMP is in **Appendix B-1**.

1.5 Plan Organization

This UWMP is organized as follows:

- Chapter 2 provides a description of the District's (a) service area, including climate; demographic and population characteristics; and current and projected land-use changes integral to the demand forecasts, and (b) water system, including the potable and non-potable delivery systems.
- Chapter 3 describes the District's current and future water supplies and the reliability of the supplies.
- Chapter 4 details the demands on the District's system, including the past and future estimated demands.
- Chapter 5 provides information regarding the District's demand management measures.
- Chapter 6 discusses the District's water shortage contingency plan.
- Chapter 7 compares the District's supplies and demands in normal and dry years.

The appendices include background information, details, and necessary supporting documents.

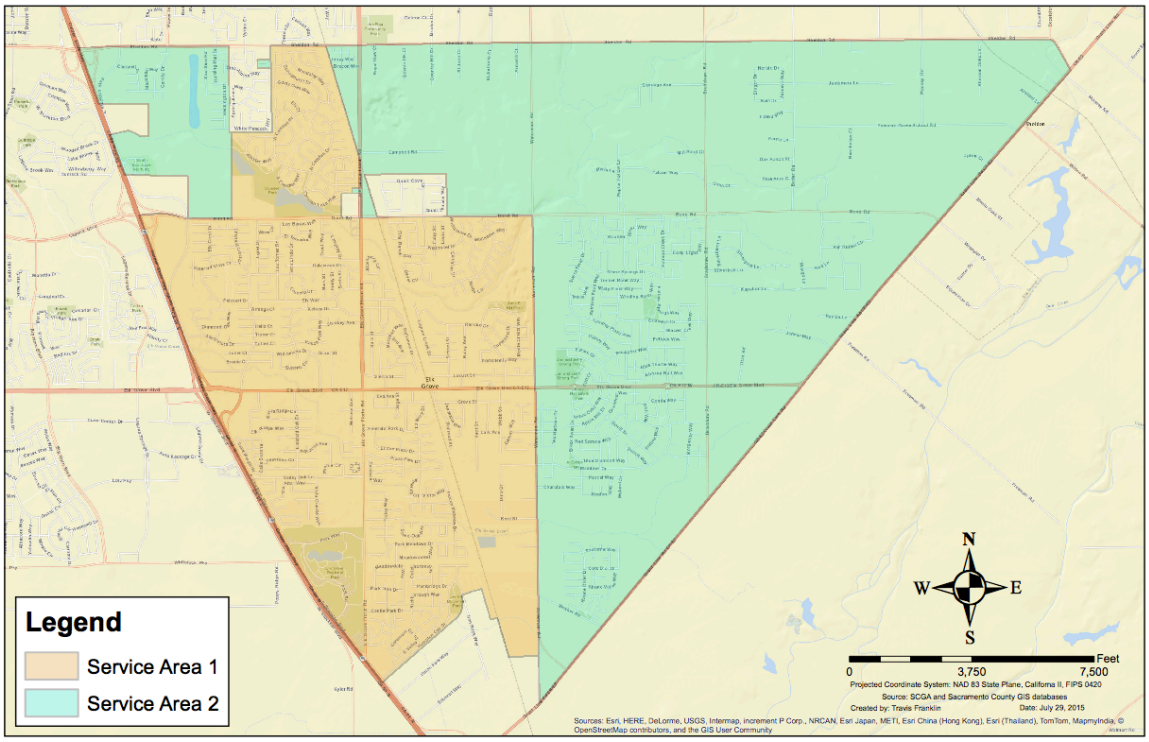
CHAPTER 2. WATER SYSTEM INFORMATION

2.1 District Service Area General Description

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 District boundary. The District and surrounding area overlay 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 operates as a department within the Florin Resource Conservation District (FRCD) and is surrounded by the SCWA on all sides.

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 the District's service areas.

Figure 2-1 – Elk Grove Water District Service Area



2.1.1 Climate

Elk Grove Water District's climate is typical of California's Central Valley with hot, dry summers, and cool, wet winters. Climate data for the District 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 District's service area. The average annual temperature is about 61 degrees Fahrenheit. Typically, July and August are the hottest months of the year with an average daily temperature of about 75 degrees, though daytime high temperatures average close to 92 degrees. There are approximately 73 days a year when the high temperature exceeds 90 degrees. December and January are generally the coolest months of the year, with a mean annual temperature of about 46 degrees, and the average minimum dipping down to 38 degrees. Historically, there are about 18 days per year in which temperatures go below 32 degrees.

Precipitation data is also documented from the WRCC Sacramento Executive Airport station. For the period 1941-2015, average rainfall was measured at 17.21 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 by sufficient precipitation. The District 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 District's service area. Average annual ETo for the period 1998-2015 measured 50.56 inches.

Additional ETo data from California Model Water Efficient Landscape Ordinance (MWELO) is also reported in **Table 2-1**. 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.[7]

All evapotranspiration (ETo), rainfall, and temperature data is provided in **Table 2-1**.

2.1.2 Demographics and Population Characteristics

The population served by the Elk Grove Water District includes a mix of users and user classes, and follows the same demographic and population trends as the City. The District is comprised of single-family residential (84 percent), multi-family residential (2 percent), commercial (11.5 percent), with 2.5 percent of the area designated as industrial. The build out of the service area will consist of mainly residential, multi-family, and

[7] 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, Department of Water Resources, 1999.

commercial land uses. The service area's currently averages about 3.7 persons per connection.

Table 2-1 – Elk Grove Water District Climate Information[8]

Month	MWELO Appendix A ETo (inches)	CIMIS Standard Monthly Average ETo (inches)	Average Precipitation (inches)	Average Temperature (Fahrenheit)	Average Maximum Temperature (Fahrenheit)	Average Minimum Temperature (Fahrenheit)
January	1.00	1.12	3.56	45.7	53.5	37.8
February	1.80	1.70	3.07	50.4	59.9	41
March	3.20	3.29	2.44	53.9	64.6	43.1
April	4.70	4.49	1.17	58.6	71.4	45.9
May	6.40	6.36	0.5	65.3	79.9	50.7
June	7.70	7.40	0.18	71.3	87.2	55.4
July	8.40	7.95	0.03	75.5	92.7	58.2
August	7.20	7.05	0.06	74.6	91.5	57.8
September	5.40	5.17	0.25	71.8	87.7	55.8
October	3.70	3.37	0.93	63.9	77.7	50.2
November	1.70	1.63	2.04	53.1	63.7	42.6
December	0.90	1.05	3.02	46	53.8	38.2
Annual :	52.1	50.56	17.25	60.8	73.6	48.1

MWELO Appendix A data from Sacramento, CA
ETo data from DWR CIMIS Data, Fair Oaks Station 131, 1998-2015
Precipitation and Temperature data from WRCC, Sacramento Executive Airport (047630) 1941-2015

Historical and 2015 service area population estimates were generated using DWR's WUE data application. This application uses census data, service area boundaries, and person per connection data to calculate population estimates.[9]

Projected population and build-out estimates were derived using various SACOG reports and City General Plan data.[10] The historic and 2015 population as well as projected populations are presented in **Table 2-2**. The District service area is expected to reach build out by 2045, with most growth occurring prior to 2025, followed by a slow growth rate of less than 0.5 percent annually.

[8] From MWELO Appendix A data from Sacramento, CA. The ETo data taken from DWR CIMIS Data, Fair Oaks Station 131, 1998-2015. Precipitation and Temperature data from WRCC, Sacramento Executive Airport (047630) 1941-2015.
[9] Elk Grove Water District service area falls into Category 2 of DWR Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use.
[10] City of Elk Grove General Plan with Amendments as of March 2015. Land Use Element, Housing Element, Economic Development Element data.

Table 2-2 – Historic and Projected Population

Year	Population	Year	Population
1995	22,234	2009	38,135
1996	22,776	2010	39,694
1997	23,319	2011	40,326
1998	23,863	2012	40,960
1999	24,408	2013	41,594
2000	24,954	2014	42,230
2001	26,444	2015	42,867
2002	27,940	2020 (est.)	44,902
2003	29,339	2025 (est.)	49,549
2004	30,831	2030 (est.)	50,530
2005	32,321	2035 (est.)	50,604
2006	33,817	2040 (est.)	50,678
2007	35,315	2045 (est.)	50,752
2008	36,567	Reached Build-out	

2.1.3 Current and Projected Land Use

As previously indicated, the District currently serves a variety of land use including residential, industrial, retail and commercial customers. The current and projected population shown in **Table 2-2** are a reflection of these land uses, with the increased population reflecting proposed development, as well as continued growth as represented by the City's General Plan and related documents. These anticipated land use changes are the foundation for forecasting the District's future water demands.

To develop a basis for the demands forecast in **Chapter 4**, the District sought and received input from the City's Planning Department regarding its desired representation of the City's General Plan within the District's service areas. **Table 2-3** presents the anticipated growth by land-classification and 5-year horizon that the District will develop demand estimates to serve.

Table 2-3 – Expected Growth within the District

Land-class		Future (Accounts or Acres)					
		2020	2025	2030	2035	2040	2045
Service Area 1	Residential						
	RD-5, new	16	36	44	44	44	44
	RD-20/Apt,	0	75	75	75	75	75
	Non-residential						
	Future Commercial Center	10	25	45	45	45	45
	Future Industrial	5	25	45	60	60	60
Service Area 2	Residential						
	Future No Yards	100	261	261	261	261	261
	Future RD-10	92	172	172	172	172	172
	Future RD-5	300	1000	1242	1242	1242	1242
	Future Large Lots	42	62	77	97	117	137
	Future Apartments	0	200	200	200	200	200
	Non-residential						
	New Commercial	10	20	27	27	27	27
	New Industrial	10	30	50	64	64	64
	Future Bus/Prof	2	2	2	2	2	2
	Future Schools	0	10	10	10	10	10
	Future Parks	10	21	21	21	21	21

2.2 Water Delivery System

The District has two service areas (see **Figure 2-1**). Service Area 1 utilizes water developed by the District and directly delivered to its customers. Service Area 2 obtains water from Sacramento County Water Agency (SCWA) that is either produced from SCWA's groundwater facilities or diverted and delivered through its surface water system. Both of these systems are described in greater detail in **Chapter 3**.

2.2.1 Potable Delivery System

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, the 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 District'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. In 2014, fluoride was at optimal levels in the SCWA distribution system. The optimal fluoride level and control range for the system is based on an annual average maximum daily air temperatures. In accordance with Title 22, Section 64433.2 of the State Board regulations, the optimal fluoride level is 0.8 mg/L and the fluoride control range from 0.7 mg/L - 1.3 mg/L.[11] The District is also 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.

2.2.2 Non-Potable and Recycled Water Systems

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

[11] Elk Grove Water District 2014 Consumer Confidence Report

CHAPTER 3. WATER SUPPLY CHARACTERISTICS

As discussed in **Section 2.1**, the District has limited options for water supplies given its boundaries and available resources. Although the Sacramento County Water Agency surrounds the District, it still has access to a large quantity of water through groundwater pumping. Through its groundwater pumping and a wholesale water contract with SCWA, the District meets its customer water needs.

3.1 Existing Water Supplies and Entitlements

The District has historically received its water supply through self-supplied groundwater and water purchased through the SCWA. The District relies solely on groundwater as the source of supply for Service Area 1, whereas Service Area 2 uses water supplied by SCWA (although this supply is also predominantly groundwater).

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. Historically, the wells and underlying subbasin have not been categorized as an overdraft risk. However, new groundwater legislation – the Sustainable Groundwater Management Act (SGMA) – may impact the availability of groundwater to the District. Nevertheless, **Table 3-1** provides the historical supply produced by the Service Area 1 wells, accompanied by each wells maximum pumping capacity.

Table 3-1 – Historical Groundwater Production By Well[12]

Annual Well Production (AFY)										
	Well 14D	Well 4D	Well 11D	Well 1D	Well 3	Well 8	Well 12	Well 9	Well 13	Total
Capacity (GMP)	1630	1900	1850	1750	850	850		475	1000	
2010	1579	1079	730	0	133	246	37			3804
2011	1422	1367	848	718	42	182	37			4615
2012	896	1280	948	1007	194	706	396	155		5582
2013	804	1327	1185	249	594	337	0	698		5194
2014	271	1260	1375	90	268	418	Out of Service	437		4117
2015	313	1202	642	139	393	22		342	346	3398

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 almost entirely derived from SCWA's production wells located within the service area.

[12] Based on recorded well production rate data.

Service Area 2 is supplied water from the SCWA through a wholesale master water agreement with SCWA (see **Appendix C-1)**. The original agreement was signed in 1995. In 2002, the parties "restated" the master water 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.[13] 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.[14] 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.

In 2015, SCWA delivered 1,914 acre-feet of water to the District under this agreement.[15] 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. 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. SCWA also delivers Aerojet remediated groundwater supplies derived from foreign sources of groundwater in the American River Watershed through the FRWA system.

Through the contract, the District agreed to purchase water from SCWA to serve its expanded retail area (Service Area 2). 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 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, Zone 40's conjunctive use water supply is considered a permanent and reliable source based upon the language of the Agreement.[16]

3.2 Groundwater

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 groundwater

[13] 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 http://www.egws.org/index.html.
[14] Agreement at Article VI.
[15] Based on water supply data from the District for 2015 delivery of water under SCWA contract.
[16] Agreement at Articles I and III.

appropriative water rights to all groundwater supplies derived from its wells that are delivered to its customers.[17]

The District is located in 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 (CSCGMP). The Central Basin boundary was defined by CSCGMP and incorporated into the Sacramento County groundwater model used in the Water Forum process. The CSCGMP was formally adopted by the participating agencies in 2006. This document is attached in **Appendix C-2**. As stated in the CSCGMP, the Water Forum estimated the long-term average annual sustainable groundwater pumping yield from the entire Central Basin to be 273,000 acre-feet per year.

Numerous public and private water purveyors within Sacramento County pump groundwater through groundwater wells. This well pumping data is collected as part of the Water Forum Successor Effort's "Central Sacramento County Groundwater Forum," and is presented in the CSCGMP. This UWMP presents the expected groundwater pumping rates through 2030, if the groundwater extraction is not supplemented with additional surface water contracts. SCWA also completed a separate GMP under California Water Code Section 10750 for Zone 40[18] and there is a South Basin Sacramento County Groundwater Management Plan as well.[19] These two documents are informative to the CSCGMP analysis that constitutes the basis of the District's groundwater usage.

3.2.1 Groundwater Characteristics and Conditions

Groundwater elevations are regularly monitored within the region by DWR. 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.

The aquifer system within the Central Basin consists of continental deposits of the late Tertiary to Quaternary age (DWR Bulletin 118). The major fresh water bearing geologic units are the Laguna Formation and the Mehrten Formation. The District has wells constructed in both of these formations. The Laguna Formation, which extends to a total

[17] Groundwater derived from its wells and applied to "overlying lands" that are owned by the District are based on overlying groundwater rights.
[18] Developed in 2004.
[19] Developed in 2011.

depth of approximately 300 feet within the Central Basin, is used for private domestic wells and municipal water supply wells.

In total the District has eight wells producing water for Service Area 1, though one is offline (see **Table 3-1**).

Combined with SCWA groundwater production, the District's customers have been served the total groundwater volumes shown in **Table 3-2**. It should be noted that the State's mandates reducing and restricting water use in light of the drought has impacted the volume of water used since 2013.

Future groundwater projections are estimated to mimic these recent values (absent the significant reductions in 2015) as explained in more detail in **Chapter 4** (demands) and **Chapter 7** (integration of supply and demand).

Table 3-2 – Historical Groundwater Volume Pumped

Annual Production (Acre-feet)			
Year	Self Procured	Purchased from SCWA	Total
2010	4,440	2,502	6,942
2011	4,615	2,885	7,500
2012	5,582	2,535	8,117
2013	5,194	2,718	7,912
2014	4,118	2,297	6,415
2015	3,398	1,914	5,312

3.2.2 Groundwater Management

To address the groundwater management of the District's current supplies, the analyses of both the Water Forum Agreement and the Central Basin Groundwater Management Plan must be assessed. In addition, the emerging rules associated with the Sustainable Groundwater Management Act – that will require formation of a Groundwater Sustainability Agency (GSA) and adoption of a Groundwater Sustainability Plan (GSP) – may impact the long-term management of the Central Basin. Nevertheless, because of the sustainable yield assessments and SCWA's and the District's conjunctive use operations functioning within those parameters, it is likely that groundwater cutbacks to the District will not be realized.

3.2.2.1 Central Sacramento County Groundwater Management Plan

As described above, the District overlies and extracts groundwater from the Central Basin from seven wells that range in total depth from 450 to 1,075 feet below ground surface. The public water systems and water service providers that extract water from the Central Basin besides the District include: the California American Water Company, City of Sacramento, SCWA, the Golden State Water Company, and numerous private

landowners that possess overlying groundwater rights linked to their property ownership. The Central Basin water providers and the groundwater basin boundaries are shown on **Figure 3-1** and **Figure 3-2**, respectively.

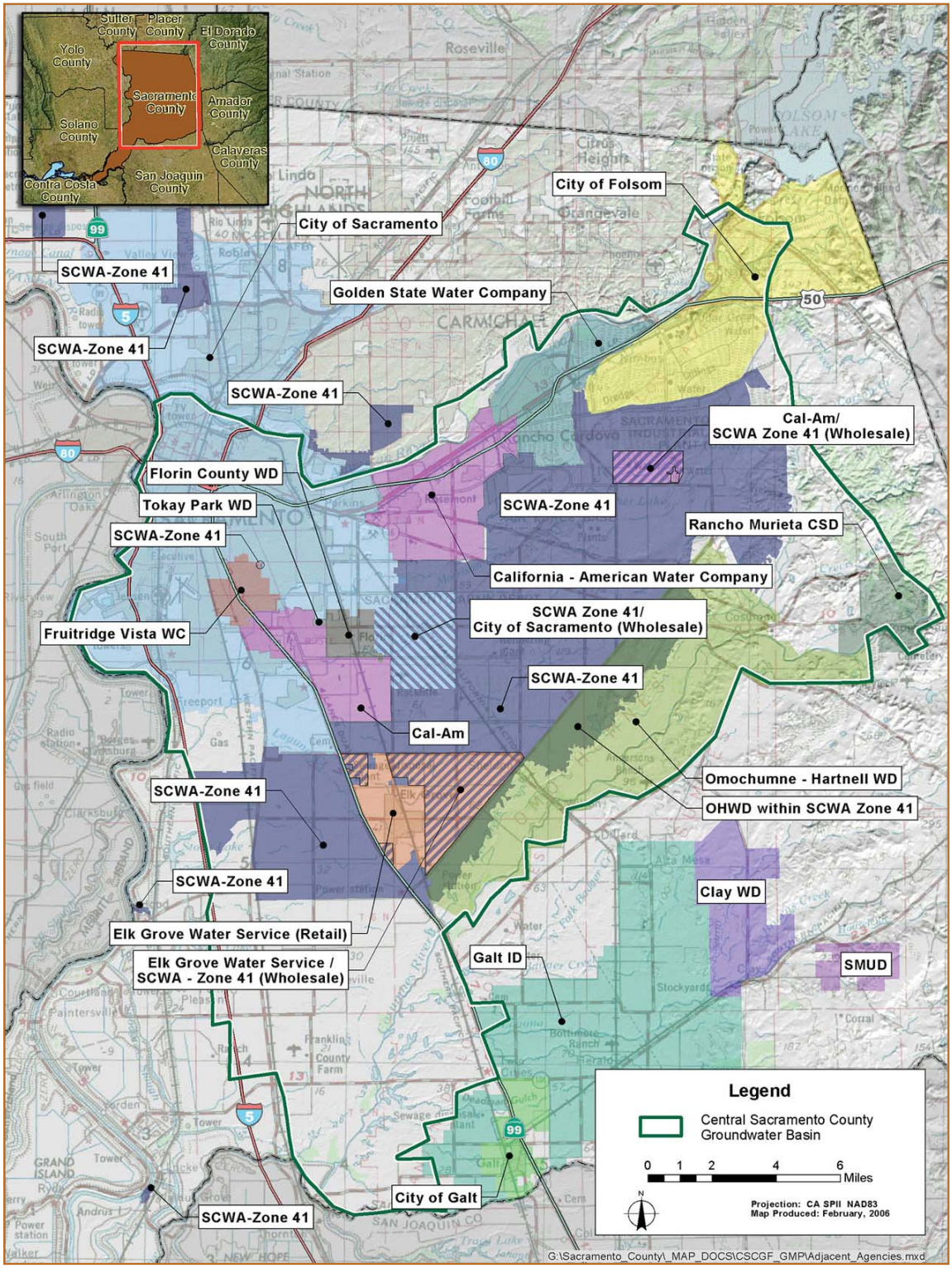
The Central Basin is not adjudicated or considered to be in a state of overdraft. Due to the active planning by water agencies and conjunctive use efforts, the basin will remain stable in the future. The CSCGMP provides for the long- term protection of groundwater quantity and quality within the region, and contains policies directing the development of surface water supplies, conservation, and other measures to service urban development as it occurs, thereby protecting the sustainable annual groundwater yield threshold of 273,000 AF.

Based upon the Central Basin's total projected water supplies for normal, single-dry, and multiple-dry years over a 20-year projection, as demonstrated in **Section 7**, the Central Basin will have sufficient water to meet estimated water demands for the build-out of the District's Service Area 1 and Service Area 2.

3.2.2.2 Sustainable Groundwater Management Act

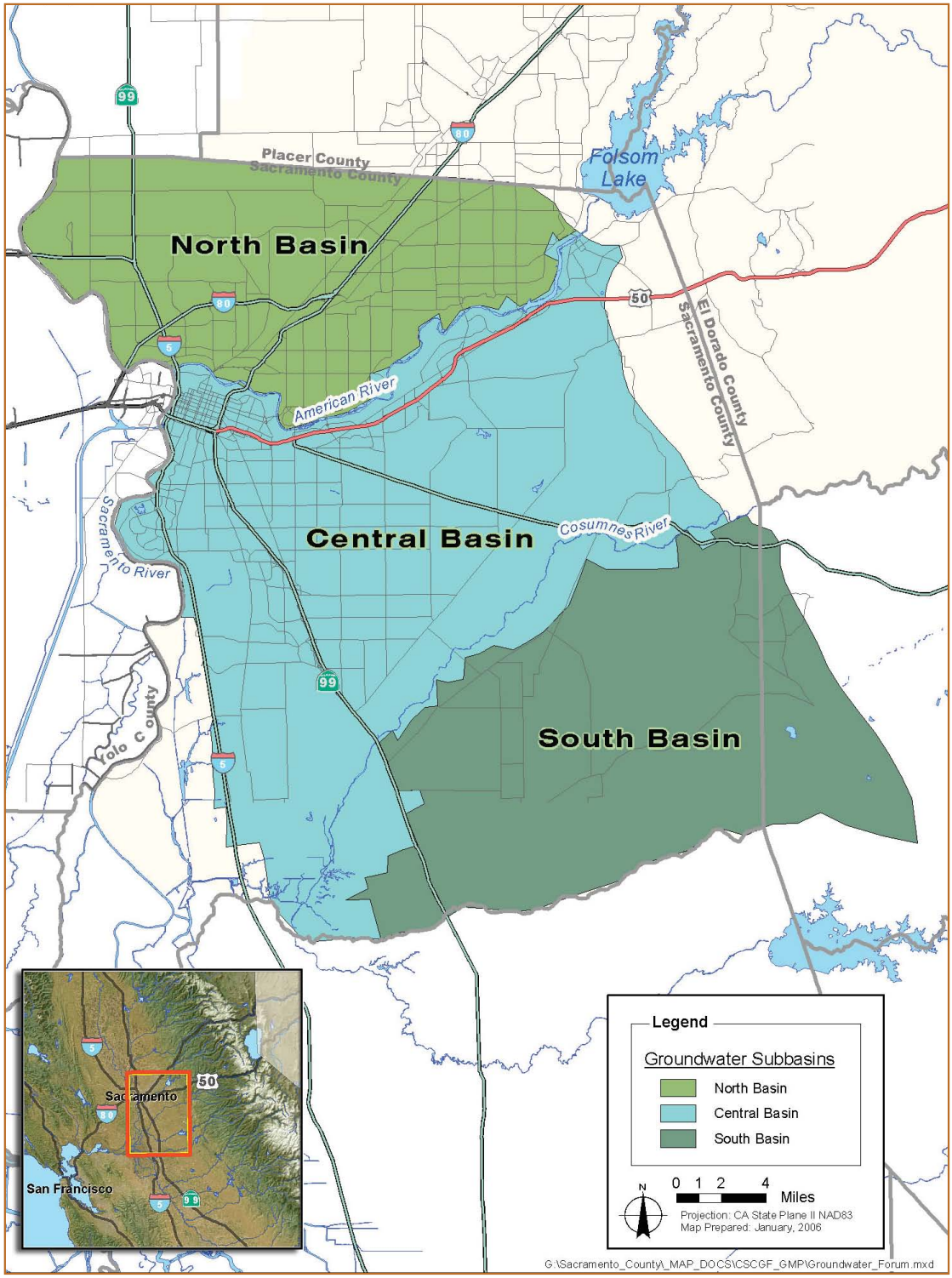
Under the Sustainable Groundwater Management Act, as discussed above, new state laws require the establishment of a GSA and a GSP. Although the Central Basin has an existing Groundwater Management Plan, the CSCGMP, that outlines planning protocols associated with current management efforts, the CSCGMP may not be the controlling planning document in the future. Moreover, the CSCGMP participating agencies have not yet been chosen to act as GSA. Once a GSA is formed, they will be required to develop a GSP. This may mimic the CSCGMP fundamental analyses but it is too early to tell if those analyses will meet the states' more stringent regulations.

Figure 3-1 – Sacramento County Central Basin Water Purveyors[20]



[20] 2006 CSCGMP Figure 1-2.

Figure 3-2 – Regional Sacramento County Groundwater Basins[21]



[21] 2006 CSCGMP Figure ES-1.

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 do not require treatment to meet drinking water standards.

3.3 Recycled Water

The District does not currently receive any recycled water. SCWA currently obtains and serves recycled water with its Zone 40 service area and expansion into the District's service area is feasible. However, at this time, 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.[22] 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.

3.4 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.

[22] Sacramento Regional County Sanitation District, Water Recycling Opportunities Study, February 2007.

3.5 Transfer and Exchange Opportunities

The District has opportunities for limited potable water transfers or exchanges. All of these transfer 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 generally keeps closed. 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.[23] 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. 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

[23] There are different regulatory steps needed for different types of water rights and assets which would be further detailed at the time the transfer was proposed.

years but also in long term groundwater basin recovery and management of costs related to FRWA and Vineyard system operations.

3.6 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.

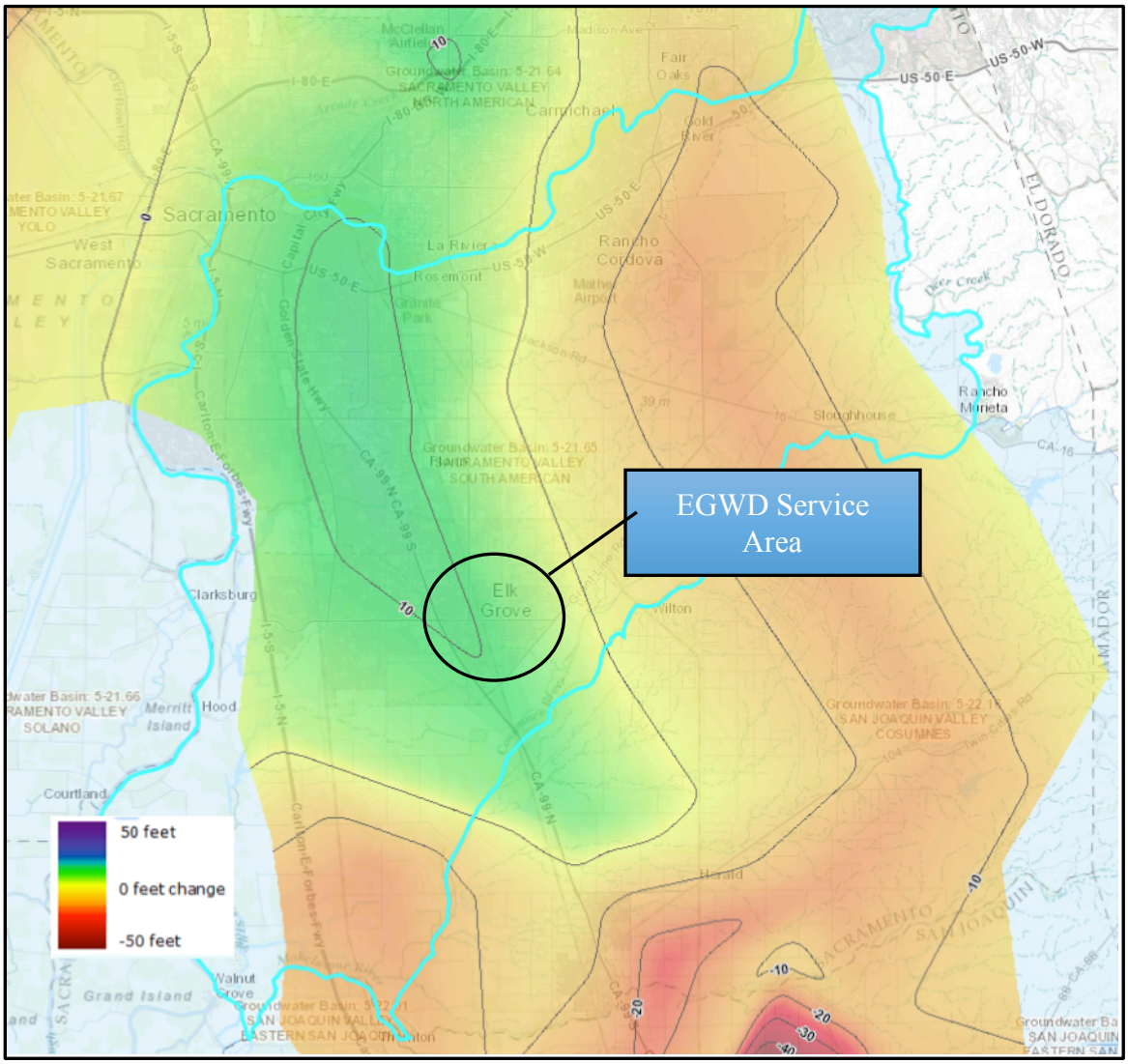
Under the CSCGMP, long-term groundwater quantity and quality protective measures have been performed throughout the basin by various agencies, including the District, in order to preserve groundwater assets. As shown in **Figure 3-5**, the District's service area overlays a sustainable reliable groundwater source. This figure shows the boundaries of the South American Sacramento Valley sub basin outlined in blue. The color gradation demonstrates that from 2005-2015, there has been no decrease to the basin's overall groundwater levels, and that, in fact, the groundwater levels in the District's service area have increased by approximately 10 feet during this 10-year period.

The groundwater supply's reliability for the District is further demonstrated in **Figure 3-6.** This figure confirms that the Central Basin's water levels have remained stable over the last two decades with the implementation of sound management practices. The stability of the groundwater wells has been further documented by SCGA's March 7, 2016 Board of Director's meeting, which concluded that each well has maintained stable levels. Graphic's of the most recent historical trends for each well can be found in **Appendix C-3.** 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.

The District covers approximately three percent of the entire Central Basin, taking this into account with CSCGMP overall estimated sustainable groundwater yield of 273,000 AFY, the District has 9,168 AFY of groundwater available within its service area.[24] 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**.

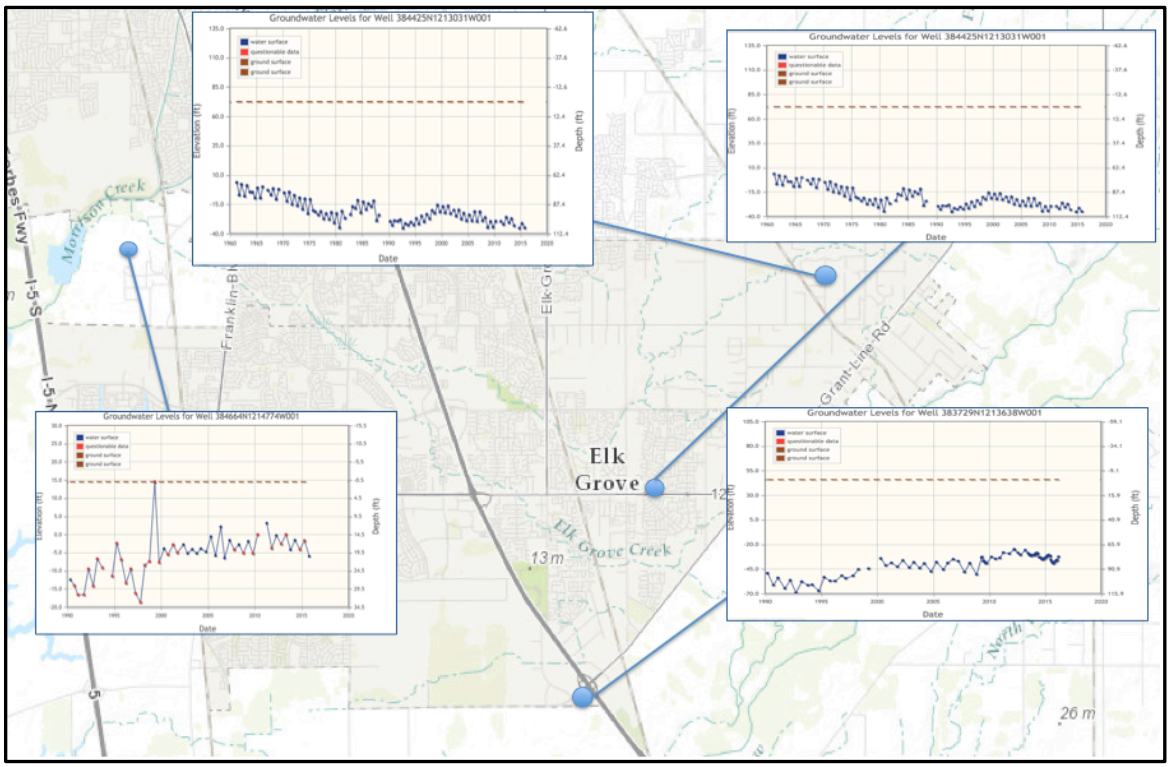
[24] Total groundwater calculated based on the acreage of the Central Basin and the District Service Area in conjunction with the SCSGMP groundwater safe yield amount.

Figure 3-5 – Groundwater Level Changes from 2005 -2015[25]



[25] Figure created using the GICIMA tool available on DWR website at: https://gis.water.ca.gov/app/gicima/

Figure 3-6 – Groundwater Historical Well Data[26]



In addition to the District's groundwater supply, its supply from SCWA is also reliable. As the Restated Master Water Agreement confirms, the District will be supplied water for Service Area 2 by SCWA under all conditions. There are no limits on the quantity of water available under this contract nor are there exceptions for drought or other forms of hydrological variability. The term of the contract is for 50 years (until 2052) and requires five years notice for any deduction or interruption in service. For the purpose of this 2015 UWMP, the estimate for the future water supply under contract provided by SCWA will be set to match the projected demand for Service Area 2, as presented in **Chapter 4**.

This permanent supply under the SCWA contract is comprised of groundwater and/or surface water. Any of the supplied water made up with groundwater would be drawn from within the Central Basin and as discussed above, the Central Basin has historically been maintaining approximately the same levels for over the last decade. Minimal surface water is used to make up the deliveries to the District. For the surface water portion of any water supplied, SCWA is in the process of developing FRWA to greatly increase its surface water supplies. This expansion of their surface water supply and planned increases in their recycled water capacities indicates that SCWA is a reliable water source.

[26] Groundwater level data and graphics obtained from DWR's water groundwater data website.

3.6.1 Normal Year Water Supply Availability

The District's total available water supply will not vary in a normal year from what was discussed in **Section 3.2** and **Figure 3-1**. It is evident based on **Figure 3-5** and **Figure 3-6** that the groundwater supply would be stable in a normal year and that the basin may even gain an increase in its groundwater levels based on the trend of the last ten years. Similarly, the District's contract with SCWA for supplying water to Service Area 2 would not be impacted during a normal year.

3.6.2 Single Dry-Year and Multiple Dry Year Water Supply Availability

The District anticipates no change in the available water supply during a dry year. Dry-year supplies include supply reductions attributable to hydrologic droughts and regulatory curtailments. Should any supply issues arise with SCWA, the District would be able to ensure its supply needs are met by increasing its groundwater pumping. A more likely scenario is if SCWA has reductions in its surface water supply, it will increase groundwater production to meet its water needs including its contractual obligation with the District.

3.6.3 Water Supply Summary

The District has two water sources; pumped groundwater and wholesale water purchased from SCWA. For Service Area 1, all the water is provided through the District's eight groundwater wells. These wells are located within the Central Basin that is hydrologically stable and shows no signs of overdraft. Furthermore, the groundwater level underlying the District's service area has increased by approximately 10 feet in the last decade, as shown in **Figure 3-5**. These facts demonstrate that the groundwater supply is stable and will provide the District with reliable supplies to meet projected demands in all year types.

Service Area 2 is supplied through a wholesale water contract with SCWA. The water provided by SCWA is composed of both groundwater and surface water. SCWA is currently engaged expanding its available water sources through recycled water and greater surface water capacity, which may eventually result in more surface water in the wholesale delivery to Service Area 2. Moreover, transfer arrangements as described in **Section 3.5** may also provide long-term benefits to the District and SCWA in furthering its common interest in encouraging regional water supply reliability.

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CHAPTER 4. WATER DEMAND CONDITIONS

Understanding water demand characteristics enables the Elk Grove Water District to reliably and cost-effectively manage its water supplies to meet customer needs. This section characterizes the District's retail customer demands over the next few decades. Specific water demand characteristics such as how demands vary among different land use classifications and under differing hydrologic conditions, all help illustrate customer needs under variable conditions. As such, this section is organized as follows:

- Review and refinement of the *2020 Urban Water Use Target* - This subsection presents the review and refinement of 2015 and 2020 water use targets as allowed under CWC §10608.20(g).[27]
- Compliance with *Interim 2015 Urban Water Use Target* – This subsection documents the derivation of the 2015 GPCD value and comparison to the 2015 interim target.
- Historic and Current Water Demands – This subsection presents data reflecting the historic and current water demand conditions for residential and non-residential customers in the District.
- Future Water Demands – This subsection presents the derivation of future demands for potable and non-potable water within the District's service area, including land-use classifications, unit demand factors, and estimation of non-revenue water.
- Summary of Water Demands – This subsection presents a summary of the projected current and future water demands in five-year increments.

4.1 Review and Refinement of GPCD Targets

As detailed in the District's 2010 UWMP, population, residential connections, and water production data were used to generate a gallon per capita day (GPCD) baseline of 253 gpcd. From this GPCD baseline, the District assessed and determined a *2020 Urban Water Use Target* and an *Interim 2015 Urban Water Use Target*. These values were determined to be 202 and 227, respectively, as presented in the 2010 UWMP.[28]

[27] 10608.20(g): *An urban retail water supplier may update its 2020 urban water use target in its 2015 urban water management plan required pursuant to Part 2.6 (commencing with Section 10610).*
[28] Elk Grove Water District 2010 UWMP, p. 11 (available at: http://www.water.ca.gov/urbanwatermanagement/2010uwmps/Elk%20Grove%20Water%20District/FINAL%20Elk%20GroveWD_2010-UWMP_6-22-11_Text.pdf).

According to the DWR Guidebook, a retail water purveyor who did not use actual 2010 Census data must re-calculate its baseline using the available 2010 Census data.[29] For the District's 2010 UWMP, the 2010 Census data was not fully available, causing the District to use other methods to estimate 2010 population.[30] Thus, the District must recalculate its baseline GPCD and re-establish its target and interim-target values with the available 2010 Census data.[31] Additionally the UWMP Guidebook added detail to the population analysis procedures.

To recalculate the annual GPCD values using the 2010 Census data, the District utilized the available population tool from DWR. Use of this tool requires uploading of specific files that define the District's service area for 1990, 2000, and 2010 – as each of those periods potentially have varied service area boundaries. The result of the analysis provided a new population value for 2010 and, based upon the prior connection data, new population estimates for the period 1995 through 2010. New population values divided into the previously determined gross water values (as documented in the 2010 UWMP) provided revised GPCD values for this period. **Table 4-1** provides a comparison of the yearly population and GPCD estimates from the 2010 UMWP and as revised using 2010 Census data.

Notable, the population from 1995 to 2000 was recalculated higher than the original values presented in the 2010 UWMP. This resulted in lower annual gpcd values than previously determined. Using the revised annual GPCDs, new values were calculated for five of the six 10-year time periods ending no earlier than December 31, 2004 and no later than December 31, 2009.[32] The comparative results are shown in **Table 4-2**. As expected, the use of 2010 Census data did have a significant effect on the estimated baseline values, lowering the highest average baseline value from 253 gpcd to a new value of 239 gpcd. Using the Method 1 target approach, the modified baseline results in a modified 2015 Interim GPCD Target and 2020 GPCD Target.

[29] "If an agency did not use 2010 U.S. Census data for its baseline population calculations in the 2010 UWMP (the full census data set was not available until 2012) the agency must re-calculate its baseline population for the 2015 UWMPs using 2000 and 2010 Census data. This may affect the baseline and target GPCD values calculated in the 2010 UWMP, which must be modified accordingly in the *2015 UWMP*." (2015 Urban Water Management Plans: Guidebook for Urban Suppliers, DWR, January 2016, p. 5-8).

[30] The District's 2010 UWMP used U.S. Census data, but calculated 2010 population based on residential connection information.

[31] According to CWC Section 10608.20(g), the City may also re-assess the methodology chosen to determine its 2015 and 2020 GPCD targets and update these targets, even if the 2010 population data was appropriate.

[32] The District did not include gross water use data beyond 2007, so only the first four of the six timeframes were averaged.

Table 4-1 – Revised Annual GPCD using 2010 Census Data[33]

	From 2010 UWMP			For 2015 UWMP	
Year	Gross Water Use	Population	GPCD	Revised Population	Revised GPCD
1995	6,116	20,205	270	22,234	246
1996	6,189	19,615	282	22,776	243
1997	5,938	20,458	259	23,319	227
1998	5,686	21,300	238	23,863	213
1999	6,476	21,065	274	24,408	237
2000	6,411	24,390	235	24,954	229
2001	6,958	24,390	255	26,444	235
2002	7,880	28,525	247	27,940	252
2003	7,972	30,040	237	29,339	243
2004	8,494	31,800	238	30,831	246
2005	7,915	32,950	214	32,321	219
2006	9,388	33,495	250	33,817	248
2007	9,962	33,900	262	35,315	252
2008	9,437	Not in 2010 UWMP		36,567	230
2009				38,135	n/a
2010	6,941	34,550	179	39,694	156

Table 4-2 – Comparison of baseline and target values

Baseline Period	Baseline Values		2015 Target		2020 Target	
	Original	Revised	Original	Revised	Original	Revised
1995-2004	253	237	228	213	202	190
1996-2005	248	234	223	211	198	187
1997-2006	245	235	220	211	196	188
1998-2007	245	237	221	214	196	190
1999-2008	n/a	239	n/a	215	n/a	191

Pursuant to CWC 10608.20(g) the District may choose to select a different method for calculating its 2020 GPCD target. Upon review of the analysis in the 2010 UMWP that resulted in the choice of Method 1, the District finds no reason to vary from the prior method choice. Thus, the District is officially using Method 1 to establish its 2020 GPCD target. However, to accurately reflect the use of the 2010 Census data, the District will modify its 2020 GPCD Target to be 191 gpcd and its 2015 Interim GPCD Target to be 215 gpcd (see **Table 4-2**).

[33] The 2010 UWMP did not include values for 1997, citing lack of data. This table presents 1997 as the average between 1996 and 1998 for simplicity. Also, the 2010 UWMP did not provide population data for 2008 or 2009, nor gross water use values for 2009.

4.2 Compliance with 2015 Interim Target

Pursuant to CWC Section 10608.40, the District is to report to DWR on its progress in meeting its urban water use targets as part of its 2015 UWMP. As part of the progress reports, the District should include its "compliance daily per capita water use" (Compliance Value), which is the gross water use during the final year of the reporting period, reported in gallons per capita per day (gpcd).[34] Documentation of the Compliance Value must include the basis for determining the estimates, including references to supporting data. Furthermore, pursuant to CWC Section 10608.24(a), the District must demonstrate that it has met its 2015 Interim GPCD Target as of December 31, 2015 through its calculation of its 2015 Compliance Value.

Extending the population analysis that was revised during the reassessment of the baseline GPCD, the District is able to calculate its 2015 Compliance Value. **Table 4-3** presents the extended population calculation for 2011 through 2015, the associated gross water use in each year, and the resulting annual GPCD. As demonstrated, the District's 2015 Compliance Value is 111 gpcd, which is significantly below the 2015 Interim GPCD value of 215.

Table 4-3 – Annual GPCD for 2010 through 2015

Year	Population	Gross Water Use (af/yr)	GPCD
2010	39,694	6,941	156
2011	40,326	7,499	166
2012	40,960	8,117	177
2013	41,594	7,912	170
2014	42,230	6,414	136
2015	42,867	5,311	111

Though the 2015 Compliance Value seems impressive, the District does not believe it represents the actual progress toward its 2020 GPCD Target conditions due to two factors: (1) weather conditions in 2015, and (2) mandatory conservation requirements imposed by the State Water Resources Control Board. While normalizing for weather is recognized and suggested in statute[35], with a tool available from DWR to perform the calculation, the State mandated conservation likely had a greater downward effect on the 2015 Compliance Value.

Although adjustments for weather are allowed, they are not required.[36] Because the District's 2015 Compliance Value demonstrates that the District is in compliance with the statutes, it has elected to not adjust the 2015 Compliance Value for weather. However, it

[34] CWC § 10608.12(e).
[35] CWC Section 10608.24(d)(1)(A).
[36] CWC Section 10608.24(d)(2).

has chosen to adjust the value to understand what 2015 GPCD conditions may have been absent the State conservation mandate so that it can appropriately assess progress toward its 2020 Target GPCD.

One option for the District to understand its progress toward the 2020 Target GPCD is to look at the most recent "average" year, which would be 2012 or 2013. In both of these years there were no mandatory conservation measures, weather was not significantly different than average conditions (though 2013 was the beginning of the current drought cycled), and the region was recovering from the recent recession. The GPCD values for 2012 and 2013 were 177 and 170 gpcd respectively, already well below revised 2020 Target GPCD value of 191 gpcd and the revised 2015 Interim GPCD Target of 215 gpcd (see **Table 4-3**).

Another option is to adjust the 2015 GPCD value to remove the conservation achieved by the District during its efforts to comply with the State's mandate. The State had mandated the District meet a 28 percent conservation goal between June 2015 and February 2016. Through December 2015, the District successfully achieved a 36.1 percent cumulative savings (compared to 2013 conditions – which was the State's baseline).[37] There are multiple methods to normalize the 2015 water use for the months of June through December. Using a few simple multiplier approaches the actual gross water production in 2015 of 5,311 acre-feet would increase to between 6,500 and 7,000 acre-feet. Using an average of 6,750 acre-feet of normalized 2015 gross water production, the 2015 GPCD would adjust from 111 gpcd to 141 gpcd. This normalized value is still well below the 2015 Interim GPCD Target and the 2020 GPCD Target. From this information, the District concludes that it is on track to achieve its 2020 GPCD Target when it reports the 2020 Compliance Value in its next UWMP update. The District recognizes that a primary factor in this early success was efforts to becoming fully metered and charge customers based upon volumetric use, coupled with the District's strengthen conservation education and outreach programs.

4.3 Current and Forecast Water Demands

Based on available records for water production, water sales and deliveries, the District's water demands for the past five years were previously presented in **Table 4-3**. As demonstrated by the populations presented in the table, the District experienced about an 8 percent overall growth since the 2010 UWMP, about 1.5 percent annually. And, as described in **Chapter 2**, the District will continue to experience some modest growth during the 2015 UWMP planning horizon, primarily in Service Area 2.

[37]Based on report from the SWRCB available at: http://www.waterboards.ca.gov/water_issues/programs/conservation_portal/docs/2016feb/suppliercompliance_020216.pdf.

Forecasting future demand requires assessing several factors: the future water use habits of existing customers that will lower their existing use, the land use plans demonstrating types of anticipated growth, and the various laws and regulations that govern future water use demand factors such as water-efficient fixtures, appliances, and landscaping.

4.3.1 Existing Customers

As described in **Chapter 2**, the District serves two primary areas within the City of Elk Grove with a variety of residential and non-residential customers with varying uses. Existing potable water customers are categorized into discrete residential and non-residential land-use classifications as presented in **Table 4-4**.

With account numbers and meter data, the existing unit demand factors for each potable water classification can be determined. This information provides a baseline for estimating the future demands of existing customers. **Table 4-4** provides the baseline demand factors for each land use category using 2013 account and meter data. The District believes 2013 was more representative of average conditions, and understood that the data would be skewed if 2014 or 2015 customer use data were used for baseline conditions. This is confirmed further when reviewing the GPCD values in **Table 4-3**.

Because a vast majority of the existing customers reside in Service Area 1 in homes built before the last decade, existing customers' future unit demand factors are assumed to change mostly from drivers such as fixture replacement, the District's conservation awareness and incentive programs, and other factors affecting a general increased awareness of water conservation. A reflection of the impact of these drivers is presented as the unit demand factors for new residences also provided in **Table 4-4**. The future demand factors reflect a reduction from the current value in all categories resulting from expected conservation. This reduction is reasonable as it reflects expected benefits of on-going customer conservation efforts, coupled with the use of 2013 for baseline conditions.

Table 4-4 – Existing Customer Characteristics

	Land-class	Existing Customers: Current (Accounts or Acres)	Existing Customers: Current Demand Factors (af/account)	Existing Customers: Future Demand Factors (af/account)	Existing Customers: Conservation
Service Area 1	Residential				
	RD-5 Late 80s	2889	0.58	0.50	14%
	RD-5 Late 70s	2301	0.51	0.43	15%
	RD-7	2308	0.44	0.38	13%
	Mobile Home Park	20	1.42	1.28	10%
	Apartments	37	3.79	3.35	12%
	Non-residential				
	Offices	60	0.28	0.26	5%
	Business Parks	89	1.50	1.35	10%
	Shopping Centers	75	2.63	2.25	14%
	General Commercial	7	3.85	3.30	14%
	Limited Commercial	9	1.22	1.04	14%
	Stand Alone Fast Food	2	4.87	4.17	14%
	Heavy Industry	12	1.62	1.38	14%
	Light Industry	93	0.29	0.25	14%
	Schools	61	1.86	1.77	5%
	Elk Grove HS	41	0.41	0.39	5%
	Exist Parks	46	1.97	1.78	10%
	Open Areas	18	3.58	3.07	14%
Service Area 2	Residential				
	RD-7	838	0.40	0.35	12%
	RD-3	625	0.57	0.48	17%
	RD-5	2269	0.49	0.42	14%
	Large Lots	205	1.35	1.14	15%
	No Yards	141	0.14	0.13	5%
	Apartments	8	3.93	3.37	14%
	Non-residential				
	Offices	2	0.17	0.16	5%
	Business Parks	4	1.84	1.58	14%
	Shopping Centers	42	2.14	1.83	14%
	Grocery Centers	10	3.63	3.45	5%
	Schools	99	2.34	2.11	10%
	Exist Parks	44	3.14	2.99	5%
	Open Areas	17	4.48	3.84	14%

4.3.2 Future Customers

There are several factors that affect the development of future unit water demand, which in turn affect the forecasted water demand for future customers. These factors range from state mandates such as the Cal Green Code and MWELO (discussed later in this section), to changes in the types of housing products being offered. These are

incorporated into the determination of future unit water demand factors, discussed later in this chapter. Characteristics of the most important factors are described below.

4.3.2.1 Factors Affecting Future Water Demands

These following factors are generally recognized to result in lower per unit demand factors for future residential and non-residential customers. A brief discussion of each follows:

Water Conservation Objectives

On November 10, 2009, Governor Arnold Schwarzenegger signed SBX7 7, which required each urban water supplier to reduce their per-capita water use by 2020, with a statewide goal of achieving a 20-percent reduction by 2020.[38] As discussed previously, the District has established a 2020 Target GPCD in response to this requirement and is already in compliance with that target.

Achieving the District's 2020 conservation target will require the District to continue its on-going conservation efforts. But, as illustrated by the compliance analysis previously discussed, the District has already achieved its goal – even when normalizing the data for the last normal water year (2012 and 2013). New customers will likely further reduce the District's annual GPCD since the factors described below are designed to further reduce per capita water use.

Indoor Infrastructure Requirements

In January 2010, the California Building Standards Commission adopted the statewide mandatory Green Building Standards Code (hereafter the "CAL Green Code") that requires the installation of water-efficient indoor infrastructure for all new projects beginning after January 1, 2011. The Cal Green Code was revised in 2013 with the revisions taking effect on January 1, 2014. However these revisions do not have substantial implications to the water use already contemplated by the 2010 Cal Green Code.[39] The CAL Green Code applies to the planning, design, operation, construction, use and occupancy of every newly constructed building or structure.

All new developments must satisfy the indoor water use standards directed by the CAL Green Code, which essentially require new buildings and structures reduce overall potable water use by 20 percent. Expected future customers will satisfy the standards

[38] California Water Code § 10608.20.
[39] "The 2010 CAL Green Code was evaluated for updates during the 2012 Triennial Code Adoption Cycle. The state evaluated stakeholder input, changes in technology, implementation of sustainable building goals in California, and changes in statutory requirements. As such, the scope of the CAL Green Code was increased to include both low-rise and high-residential structures, additions and alterations." *Guide to the 2013 California Green Building Standards Code (Residential)*, California Department of Housing and Community Development, 2013.

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

The Water Conservation in Landscaping Act was enacted in 2006, requiring the California Department of Water Resources (DWR) to update the Model Water Efficient Landscape Ordinance (MWELO).[40] In 2009, the Office of Administrative Law (OAL) approved the updated MWELO, which required a retail water supplier or a county to adopt the provisions of the MWELO by January 1, 2010, or enact its own provisions equal to or more restrictive than the MWELO provisions.[41]

In response to the Governor's executive order dated April 1, 2015, (EO B-29-15), DWR updated the MWELO and the California Water Commission approved the revised MWELO on July 15, 2015. The changes include a reduction to 55 percent for the maximum amount of water that may be applied to a landscape for residential projects, which reduces the landscape area that can be planted with high water use plants, such a turf. The MWELO applies to new construction with a landscape area greater than 500 square feet (the prior MWELO applied to landscapes greater than 2,500 sf).[42] For residential projects, the coverage of high water use plants is reduced to 25 percent of the landscaped area (down from 33 percent in the 2010 MWELO).

It is difficult to predict the ultimate impact of the MWELO requirements on future water demand. While the requirement is for development of a landscape design plan that uses plants and features that are estimated to use no more than 55 percent of ETo, some provision must be made for the inherent tendency to over-water even with irrigation controllers installed, piecemeal changes in landscape design, reductions in irrigation efficiency through product use, and limited resources for enforcement in the absence of dedicated irrigation meters.

California Urban Water Conservation Council BMPs

The District is a signatory to the California Urban Water Conservation Council (CUWCC) Best Management Practices (BMP) Memorandum of Understanding (MOU). Due to this affiliation, the District has modified existing BMPs and implemented others

[40] Gov. Code §§ 65591-65599.
[41] California Code of Regulations (CCR), Tit. 23, Div. 2, Ch. 27, Sec. 492.4. The MWELO provides the local agency discretion to calculate the landscape water budget assuming a portion of landscape demand is met by precipitation, which would further reduce the outdoor water budget. For purposes of this 2015 UWMP, precipitation is not assumed to satisfy a portion of the outdoor landscape requirement because the determination of an appropriate effective precipitation factor is highly uncertain given the various landscape slopes, terrain composition, concurrent watering schedules, etc.
[42] CCR Tit. 23, Div. 2, Ch. 27, Sec. 490.1.

to follow that of the CUWCC. These practices further reduce the District's demands. Further details on the District's conservation efforts can be found in **Chapter 5**.

4.3.2.2 Future Unit Demand Factors

When considering the various factors discussed above, coupled with a review of current customer use characteristics, the District has established the demand factors presented in **Table 4-5** for estimating future customer demand. With Service Area 1 mostly built-out, the majority of growth is expected in Service Area 2.

Table 4-5 – Future Customer Accounts and Demand Factors

Land-class		Future (Accounts or Acres)	Future Demand Factors (af/account)
Service Area 1	Residential		
	RD-5, new	44	0.38
	RD-20/Apt,	75	0.21
	Non-residential		
	Future Comm. Center	45	1.20
	Future Industrial	60	1.50
Service Area 2	Residential		
	Future No Yards	261	0.12
	Future RD-10	172	0.21
	Future RD-5	1242	0.38
	Future Large Lots	137	0.95
	Future Apartments	200	0.21
	Non-residential		
	New Commercial	27	1.20
	New Industrial	64	1.50
	Future Bus/Prof	2	0.70
	Future Schools	10	2.00
	Future Parks	21	3.00

4.3.3 Demand Forecast Summary

Water demand projections within the District's service area reflect the combination of continued conservation by existing customers and the addition of new customers over the planning horizon.

Table 4-6 provides the summation of this analysis and the resulting expected demands for each 5-year planning horizon.

4.3.4 Distribution System Water Losses

The demand factors presented earlier in this chapter represent the demand for water at each customer location. To fully represent the demand, distribution system losses must also be included. Often, distribution system losses represent water that is lost due to system leaks, fire protection, construction water, unauthorized connections, and inaccurate meters. Essentially, this is the water that is produced by the District's groundwater production wells or purchased from SCWA that does not make it to the customer – either as a real loss or an apparent loss (e.g. such as may result when a customer meter underreports actual use).

In most instances, the predominant source of distribution system losses is from leaks that inevitably exist throughout the many miles of pipes that bring water to the District's customers.

Pursuant to CWC 10631(e)(3)(B), the District must quantify and report the distribution system loss for 2015 using methodology developed by the American Water Works Association (AWWA) and provided as a worksheet through DWR. Using the available worksheet, the District calculated a loss equal to 6.6 percent of the water supplied into the distribution system for Service Area 1. The AWWA spreadsheets are included as **Appendix A-4**. Because of the numerous unmetered interties with SCWA where the District takes delivery of SCWA purchased supplies, the District assumes Service Area 2 system losses are equivalent to those calculated for Service Area 1.[43]

For purposes of estimating future demand from new connections, the distribution system loss is assumed to remain at 6.6 percent to reflect on-going District programs to address maintain meters, and find and fix identified system leaks.[44]

[43] SCWA reflects an additional 3 percent loss for the delivery infrastructure between SCWA's supply sources (e.g. local wells) and the interties with the District. This loss is not within the District's control, but is reflected by SCWA as an additional increment of supply necessary to deliver water to the District, above the system losses experienced by the District's own infrastructure within Service Area 2.

[44] For purposes of estimating this quantity when viewed from the customer meter looking back to the "beginning" of the water supply distribution system, a slightly higher value is multiplied by the customer demands, then added to those demands to reflect a total projected demand.

Table 4-6 – Projected Water Demands

Land-class			Forecast Demand (af/yr)					
			2020	2025	2030	2035	2040	2045
Service Area 1	Single Family	Existing	3,563	3,385	3,320	3,320	3,320	3,320
		Future	6	14	17	17	17	17
		Subtotal	3,570	3,399	3,337	3,337	3,337	3,337
	Multi-Family	Existing	161	153	150	150	150	150
		Future	0	16	16	16	16	16
		Subtotal	161	169	166	166	166	166
	Non-Residential	Existing	419	399	386	386	386	386
		Future	20	68	122	144	144	144
		Subtotal	439	466	507	530	530	530
	Public	Existing	270	263	260	260	260	260
		Future	0	0	0	0	0	1
		Subtotal	270	263	260	260	260	261
		Subtotal	4,440	4,297	4,270	4,293	4,293	4,294
		System Loss	314	304	302	304	304	304
		Service Area 1 Total	4,753	4,601	4,572	4,596	4,596	4,598
Service Area 2	Single Family	Existing	1,924	1,836	1,779	1,779	1,779	1,779
		Future	173	475	581	600	619	638
		Subtotal	2,097	2,311	2,361	2,380	2,399	2,418
	Multi-Family	Existing	31	30	28	28	28	28
		Future	12	73	73	73	73	73
		Subtotal	43	103	102	102	102	102
	Non-Residential	Existing	127	122	118	118	118	118
		Future	28	70	109	129	129	129
		Subtotal	155	192	226	247	247	247
	Public	Existing	421	407	403	403	403	403
		Future	30	84	84	84	84	84
		Subtotal	451	490	487	487	487	487
		Subtotal	2,746	3,097	3,175	3,215	3,234	3,253
		System Loss	194	219	224	227	229	230
		Service Area 2 Total	2,940	3,316	3,400	3,442	3,462	3,483
Total District Demand			**7,694**	**7,917**	**7,972**	**8,038**	**8,059**	**8,080**

4.3.5 Low Income Water Demands

CWC Section 10631.1 requires water suppliers to include a projection of water use by lower income households as defined by Health and Safety Code Section 50097.5. The housing element of the City of Elk Grove General Plan provides the income distribution used for this analysis along with info from the US Census website.[45] This housing element, adopted in February of 2014, uses data from the American Community Survey and provides that the household median income in the City was $79,457. The income

[45] City of Elk Grove General Plan 2013-2021 Housing Element, pg. 22.

limits for "lower income" come from U.S. Department of Housing and Urban Development's 2009 income guidelines.[46]

The percentage of low income was derived from the American Community Survey DP03 table. The DP03 table indicated 23,195 of the 48,737 households were below about 80 percent of median income level which approximates to about 48 percent of all households. For lack of more detailed income distributions, this 48 percent is assumed to remain constant into the future. Using 48 percent of the projected population, a blended demand factor for a mix of single family and multi-family housing units of approximately 0.3 acre-foot per year, and the City's average of 3.2 people per housing unit, the current and future demand from "lower income" customers is estimated (see **Table 4-7)**.

Table 4-7 – Lower Income Demands

AF/Yr	2020	2025	2030	2035	2040
Total Retail Treated	8,059	8,116	8,183	8,204	8,226
Lower Income	2,021	2,230	2,274	2,277	2,280
% of Treated	25.1%	27.5%	27.8%	27.8%	27.7%

[46] The income guidelines place households who make less than 80% of the median family income for an area as "low income". This is in line with the CWC 10631.1 income threshold.

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CHAPTER 5. WATER DEMAND MANAGEMENT MEASURES

5.1 District Participation

CWC § 10631 requires that an UWMP include a description of the urban water supplier's water demand management measures. CWC § 10631 also provides that members of the California Urban Water Conservation Council (CUWCC) shall be deemed in compliance with the UWMPA demand management measure requirements by complying with all the provisions of the CUWCC MOU and by submitting the annual reports.[47]

The CUWCC MOU for Best Management Practices (BPM) is organized into five categories. Two categories, utility operations and education, are "Foundational BMPs" because they are considered to be essential water conservation activities by any utility and are adopted for implementation by all signatories to the MOU as ongoing practices with no time limits. The remaining BMPs are "Programmatic BMPs" and are organized into residential indoor and landscape, commercial/industrial/institutional (CII) indoor and landscape, and CII dedicated large landscape categories.[48] All the categories are outlined in **Table 6-1**.

The District is a current member of CUWCC and has submitted annual reports to the Council, complying with CWC § 10631. A copy of the most recent report from 2013-2014 is available in **Appendix D-1**. As a signatory to the CUWCC MOU, the District is committed to implementing best management practices (BMP) designed to achieve water conservation across existing and future demand sectors. The CUWCC MOU requires that a water utility implement only the BMPs that are economically feasible. The District's continued implementation of the CUWCC BMPs should reduce some of the unit demand factors for its existing connections and help maintain the unit demand factors for future connections.

[47] CWC § 10631(j).
[48] https://www.cuwcc.org/Resources/BMP-Resources.

Table 5-1 – CUWCC BPM Requirements[49]

FOUNDATIONAL BMPS
1. Utility Operations Programs
1.1 Operations Practices
Staff and maintain the position of a trained conservation coordinator
Enact and enforce an ordinance designed to prevent water waste
Enact and enforce an ordinance designed to promote water efficient design in new development
Enact and enforce an ordinance designed to facilitate water shortage response measures
1.2 Water Loss Control
Compile a standard water audit and balance annually
Improve data accuracy and completeness of water audit during first four years
During 5th through 10th year, demonstrate progress in water loss control
1.3 Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections
Initiate volumetric billing for all metered customers within one year after signing MOU
Complete meter installations for all connections no later than July 1, 2012
Assess feasibility of moving mixed-use metered landscape uses to dedicated landscape meters
Develop a written plan, policy or program to test, repair or replace meters
1.4 Retail Conservation Pricing
Develop water rates such that 70% of revenue is generated from volumetric billing
Develop conservation pricing for retail sewer service
2. Education Programs
2.1 Public Information Programs
Implement public information programs to promote water conservation and water-conservation benefits
2.2 School Education Programs
Educate students about water conservation and efficient water use
PROGRAMMATIC BMPS
3. Residential
Develop a Residential Assistance Program - including leak detection assistance, conservation surveys, and efficiency suggestions, as well as provision of high-efficiency appliances
Perform site-specific landscape water surveys
Provide financial incentives for, or institute ordinances requiring, purchase of efficient clothes washers
Provide incentives or ordinances for replacement of toilets using 3.5 or more gallons per flush
4. Commercial, Industrial and Institutional
Implement measures to achieve water savings for Commercial, Industrial and Institutional (CII) accounts of 10% compared to baseline water use (i.e., 2008 water use by CII accounts)
5. Landscape
Identify accounts with at least one dedicated irrigation meter and assign an ETo based budget of no more than an average of 70% of ETo for metered irrigation uses; "Recreational" areas may be so designated and may use up to 100% of ETo
Provide notices to irrigation meter customers comparing actual use to the water budget
Offer site-specific technical assistance to those accounts at least 20% over budget
Target and market landscape surveys to CII accounts with mixed-use meters, and those CII accounts with large landscapes and offer financial incentives to both

[49] https://www.cuwcc.org/Resources/BMP-Resources.

CHAPTER 6. WATER SHORTAGE CONTINGENCY PLAN

As an urban water purveyor, the District must meet the minimum health and safety requirements of a drinking water purveyor at all times. The District has created a Water Shortage Contingency Plan (WSCP) to help meet this goal during water shortages. The full version of this plan can be found in **Appendix D-2**.

The strategy for allocating water during shortages for the District is complex. Detailed discussion of water supply, water shortage actions, catastrophic failure, financial impacts, and prohibitions during shortages is also provided in the District's WSCP. The District adopted its Water Shortage Contingency Plan through Ordinance No. 07-23-14-01. The ordinance provides for emergency water supply management related to general supply shortages due to severe droughts, infrastructure failure, or any other cause. While the current ordinance provides an adequate framework for managing supply shortages, it was also updated to reflect current conditions including the current drought and 20x20 legislation.[50] The District also coordinates regionally through the SCWA with respect to emergency water shortage planning and response.

6.1 Water Shortage Contingency Resolution

The District's current water shortage contingency plan allows for declaration of water shortages by the Board of Directors. When a shortage occurs, the District Board assesses if the stages of action discussed in **Section 6.2** should be implemented. In 2014, Ordinance No. 07-23-14-02 modified the outdoor irrigation schedule for the WSCP.[51] The Board of Directors further modified the emergency drought regulations on May 26, 2016, to modify the normal water supply conditions, as well as water use prohibitions and recommended practices. A copy of this update can be found in **Appendix D-2**.

6.2 Stages of Action and Reduction Goals

The District has developed a five-stage shortage contingency plan as shown in **Table 6-1**. Each stage corresponds to an increased demand reduction target to align with anticipated supply availability. The shortage contingency plan includes voluntary and mandatory actions that expand under each stage, depending on the cause, severity, and anticipated duration of the water supply shortage. The details of these stages are provided in the WSCP found in **Appendix D-2**.

[50] FRCD Ordinance 07-23-14-02.
[51] FRCD Ordinance 07-23-14-02.

Table 6-1 – Drought Stages Contingency Plan

Stage	Water Supply Conditions	Response Actions
Stage 0 - Normal Water Supply	Normal water supplies	Regular water efficency measures
Stage 1- Water Alert	Slightly restricted water supplies	Added irrigation restrictions and up to a 10% water use reduction
Stage 2 - Water Warning	Moderatly restricted water supplies	Greater landscape irrigation restrictions, increased mandatory prohibited uses and up to a 25% water use reduction
Stage 3- Water Crisis	Highly restricted water supplies	No new water connections, excessive usage rate surcharge and up to a 50% water use reduction
Stage 4 - Water Emeregency	Severly restricted water supplies	Public health and safety restrictions and over 50% water use reduction

6.3 Mandatory Prohibitions on Water Waste

As part of the WSCP, intentional or unintentional water waste is prohibited and the beneficial use of water is encouraged.[52] Allowing cooling fixtures to leak, maintaining water features without recirculation devices, watering after a rainfall event, and the use of open hoses are a few examples of actions that would qualify as water waste under the regulation. Details on the prohibited types of use for each stage of action are also outlined below in **Section 6.5**.

6.4 Penalties

The District provides the stages of penalties for violators of the water waste regulation. The penalties are enforced through the application of FRCD Ordinance No. 06-24-15-01. Under normal water supply conditions, for the first violation the District shall issue a written notice of the violation to the customer. For the subsequent violation, a written warning of the violation is sent to the customer. For the third violation within the preceding 12 calendar months a $100 fine will be imposed and a mandatory water audit will occur.

Under conservation stages, for the first violation the District shall issue a written notice of the violation to the customer. For the subsequent violation, a written warning of the violation is sent to the customer. For the third violation within the preceding 12 calendar months a $200 fine will be imposed and a mandatory water audit will occur. Customers will also have the option of attending water school instead of owing the fine. For the fourth violation within the preceding 12 calendar months a $500 fine will be imposed and

[52] See **Appendix D-2**

a flow restriction device will be installed. For the fifth violation within the preceding 12 calendar months a $500 fine will be imposed and water service will be shut off.[53]

6.5 Consumption Reduction Methods

CWC 10632 (a)(1) requires that all water purveyors establish stages of action to be undertaken in the event of a water shortage. The code section also specifies that a 50 percent reduction in supply must be considered and addressed. This specific supply reduction is addressed at Stage Four in **Section 6.5.4**. It should be noted that the following sections on each stage of action are a summary of the key points established by the District in its WSCP. For the full body of text and all the details of each stage please refer to these documents in **Appendix D-2.**

6.5.1 Stage Zero – Normal Water Supply

Stage Zero during normal water supply does not restrict customer's use of water. Stage Zero does prohibit customers from wasting water. Water waste includes allowing irrigation water to run off onto an adjoining property, ditch, or gutter; watering within 48 hours of measurable rainfall; using hoses without automatic shutoff nozzles; washing down driveways and other paved areas; failing to repair water leaks; and using non-recirculated water in fountains and water features. Customers are also encouraged to limit their landscape irrigation to three days a week.

6.5.2 Stage One – Water Alert

If water supplies become slightly restricted and the District will be unable to meet all of its demands under normal supply conditions, the Plan calls for Stage 1 drought response. During this stage, customers are informed of possible shortages and asked to voluntarily conserve 10 percent. Additionally, some mandatory restrictions including irrigation restrictions by geographic zones based on a set schedule and not allowing any potable water use for dust control, compaction or trench jetting will be implemented.

6.5.3 Stage Two – Water Warning

Stage 2 is implemented in the event the District is unable to meet all its water demands under Stage 1. The District will continue to encourage community-oriented voluntary conservation measures, enforce some conservation measures and implement mandatory water use reduction. The District is also a member of the Regional Water Authority, which undertakes many regionally-based public outreach programs on behalf of its members to assure consistent messaging throughout the greater Sacramento region. Stage 2 activities include a continuation of activities described under Stage 1 and 2, as

[53] See **Appendix D-2.**

well as greater conservation and water use restrictions. Stage 2 also restricts landscape watering to two days a week in a two-hour allowable block.

6.5.4 Stage Three – Water Crisis

Stage 3's primary purpose is to reduce water use by 50 percent. In addition to all the voluntary and mandatory restrictions previously implemented under the earlier stages, no new water connections will be added, the maximum system operating pressure is 40 psi and usage above a customers' allotment is billed at 150 percent the normal rate.

6.5.5 Stage Four – Water Emergency

Stage Four's purpose is to ensure the protection of the water supply for all public health and safety purposes. This stage will require reductions in water demand by over 50 percent. Under this stage, all previous conservation restriction will apply, and landscape irrigation will be allowed once a week within a one-hour window.

6.6 Revenue and Expenditure Impacts

When a drought or water shortage occurs, the District's costs will increase due to the additional activities and duties of instituting a stage of action. Not only will there be costs for materials, and time from permanent staff, but additional staff may need to be hired to assist in implementing the WSCP. As conservation measures and requirements increase and the water supply decreases, the District will potentially see a fall in revenue. To combat this and help pay for the expenses discussed above, a drought surcharge may be implemented by the District. This will help compensate for the loss of water revenue and pay for drought related costs. Additional revenue will further be provided by the penalties incurred by excessive water users as discussed in **Section 6.4** and the 150 percent rate increase in Stage 3.

6.7 Conservation Rate Structures

As discussed above in **Section 6.5.4**, a drought surcharge will be added to rates in the event of a water shortage when a customer exceeds their allocation of water.

6.8 Reduction Measuring Mechanism

The District became fully metered in the last few years, since completion of the 2010 UWMP. The District is now able to better measure and track reductions resulting from on-going conservation efforts or implementation of WSCP stages.

6.9 Catastrophic Supply Interruption

In addition to climate, other factors that can cause water supply shortages are earthquakes, chemical spills, dam failures, canal breaks, waterline ruptures, and energy

outages at treatment and pumping facilities. With an integrated system that includes several groundwater wells and interties with SCWA, the District has taken adequate steps to protect its customers from unforeseen interruptions.

However, in conjunction with RWA and other interests, the District will continue to participate in the following:

- Regional Disaster Preparedness Plans
- Water System Vulnerability Assessment
- Emergency Response Plan

6.10 Minimum Supply Next Three Years

Pursuant to CWC Section 10632(a)(2), the District is required to estimate the water supplies available for the next three years, specifically 2016, 2017 and 2018. Because of diligent planning efforts, the District believes it has ample water supplies available to meet its demand during this time frame as detailed in **Chapter 3**. Any potential shortfall in supply that may occur will be addressed through combinations of demand reductions as detailed in the WSCP and the use of interties with neighboring purveyors.

However, because the District is fully reliant on groundwater and, as detailed in **Chapter 3**, groundwater conditions underlying the District are stable and sustainable, the District's supply during the next three years will simply equal the anticipated demand.

6.11 Current Drought

The current drought has impacted the District's drought and water shortage plans through Executive Orders and new statewide conservation goals. Executive Order B-29-15 required the District to achieve 25 percent water use reduction by June 2015. Similarly, the 2020 goal for a 20 percent reduction in water use encourages districts and end users to conserve more water. To comply with these conservation goals, the District has continued to promote conservation with all users. The District amended the WCSP in July 2014 with greater outdoor irrigation restrictions and implemented Stage 1.[54]

The District then implemented Stage 2 Plus in light of the continuing drought as of May 2015.[55] Stage 2 Plus seeks to have the District achieve a reduction in water usage by 28 percent, consistent with the State's conservation mandate placed upon the District. Furthermore, this stage requires that water shall only be served in dining establishments upon request, no irrigation of medians with potable water and no irrigation during and up

[54] FRCD Ordinance No. 07-23-14-02
[55] See FRCD website.

to 48 hours after rainfall. The District is now in Stage Zero for a normal water supply as of May 26, 2016.

CHAPTER 7. SUPPLY & DEMAND INTEGRATION

The purpose of this chapter is to compare the total water supply sources available to the District with the total projected water use over the next 25 years, in five-year increments, for a normal water year, a single-dry water year, and multiple dry water years.[56] Water supply and demand data presented in this section is presented in prior sections of this 2015 UWMP.

7.1 Average Water Year Conditions

Under this water supply scenario, the District would anticipate full availability of its groundwater supplies, both from SCWA and self-supplied. The resulting total supplies are set to match the forecasted demands from **Table 4-6** as shown in **Table 7-1**. As demonstrated, the District projects adequate water supplies through 2045 during average year conditions.

Table 7-1 – Supply and Demand Comparison (Average Year)

(acre-feet/yr)	2020	2025	2030	2035	2040	2045
Supplies	7,694	7,917	7,972	8,038	8,059	8,080
Demands	7,694	7,917	7,972	8,038	8,059	8,080
Difference	0	0	0	0	0	0

7.2 Single Dry Year Conditions

In a single dry year condition, the District does not anticipate reductions to its groundwater supplies.

For purposes of this UWMP, the District's forecast water demands are expected to increase in a single dry year. This increase represents the generalized expansion of the landscape irrigation season due to limited rainfall – meaning customers begin demanding supplies from the District earlier in the spring than during a normal year when rainfall would otherwise satisfy landscape water needs. Though the increase is dependent on actual conditions, it is represented by adjusting the normal year annual forecast demand value upward by 5 percent for each 5-year increment to 2045. This adjustment reflects rudimentary relationships between, historic use variances and other conditions and is meant only to highlight the anticipated increase in demands for purposes of District planning.

[56] This is consistent with CWC Section 10635, but extends the period an additional 5 years to provide "20 year" analysis coverage for the intervening years between UWMP updates.

As shown in **Table 7-2**, the District anticipates adequate water supplies through 2045 during single dry year conditions.

Table 7-2 – Supply and Demand Comparison (Single Driest-Year)

(acre-feet/yr)	2020	2025	2030	2035	2040	2045
Supplies	8,078	8,313	8,291	8,280	8,300	8,323
Demands	8,078	8,313	8,291	8,280	8,300	8,323
Difference	0	0	0	0	0	0

7.3 Multiple Dry Year Conditions

For purposes of this 2015 UMWP, the District has assessed a three-year series of dry conditions. As detailed in **Chapter 3**, the District does not anticipate reductions in available groundwater supplies during these multiple dry years.

Demand, however, will vary across this planning scenario. This variance is represented by setting the forecast demands for the first of three years equal to the demand used in the single dry year scenario. In the second year, the District would anticipate that its water shortage contingency plan (WSCP) would be triggered, resulting in a demand reduction for that year. The District's WSCP Stage 1 reduction target of 10 percent is assumed (see Chapter 6). Similarly, in the third year, the District would expect further reductions resulting from implementing further WSCP actions. For this third year, the District's Stage 2 reduction target is assumed to reduce demands by 25 percent.

This resulting analysis has been represented in **Table 7-3**. During each multiple dry year period projected in **Table 7-3**, the District anticipates adequate water supplies being available over the course of multiple dry years.

Table 7-3 – Supply and Demand Comparison (multiple dry years)

	(acre-feet/yr)	2020	2025	2030	2035	2040	2045
Year 1	Supplies	8,078	8,313	8,291	8,280	8,300	8,323
	Demands	8,078	8,313	8,291	8,280	8,300	8,323
	Difference	0	0	0	0	0	0
Year 2		2020	2025	2030	2035	2040	2045
	Supplies	7,271	7,481	7,462	7,452	7,470	7,490
	Demands	7,271	7,481	7,462	7,452	7,470	7,490
	Difference	0	0	0	0	0	0
Year 3		2020	2025	2030	2035	2040	2045
	Supplies	6,059	6,234	6,218	6,210	6,225	6,242
	Demands	6,059	6,234	6,218	6,210	6,225	6,242
	Difference	0	0	0	0	0	0