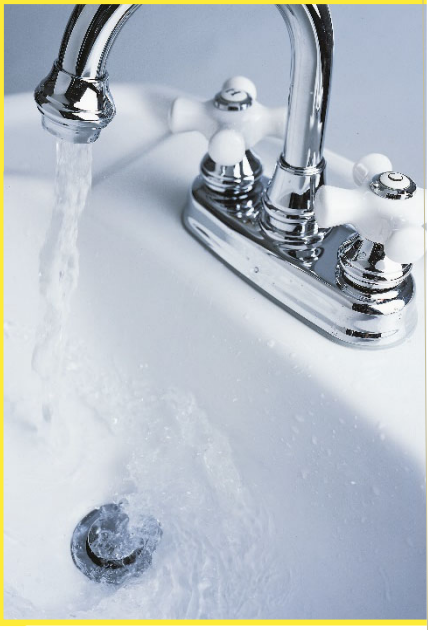
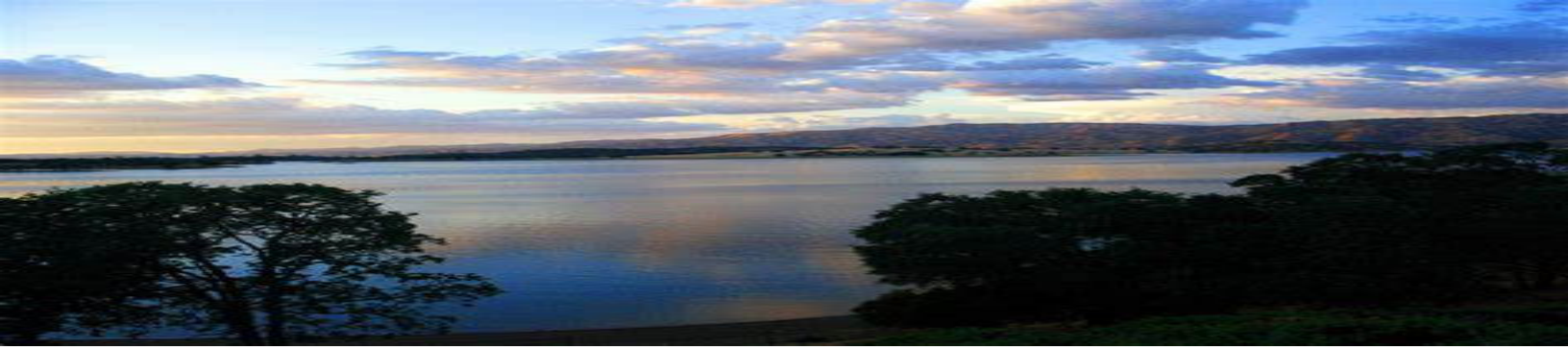


Suisun-Solano Water Authority
Solano Irrigation District
2020 Urban Water Management Plan

May 08, 2023

Prepared by: Maddaus Water Management



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LIST OF ABBREVIATIONS AND ACRONYMS

AB	Assembly Bill
ABAG	Association of Bay Area Governments
ACS	American Community Survey
AF	acre-feet
AFY	acre-feet per year
AMI	Advanced Metering Infrastructure
AWWA	American Water Works Association
AWWARF	American Water Works Association Research Foundation
BMP	Best Management Practice
CalWEP	California Water Efficiency Partnership
ccf	100 cubic feet
CEC	California Energy Commission
CII	Commercial, Industrial, and Institutional
CIMIS	California Irrigation Management Information System
CIP	Capital Improvement Program
CPUC	California Public Utilities Commission
CUWCC	California Urban Water Conservation Council
DCR	DWR State Water Project Delivery Capability Report
DMA	District Metered Area
DMM	Demand Management Measures
DOF	California Department of Finance
DRA	Drought Risk Assessment
DSS Model	Least Cost Planning Decision Support System Model
DWR	California Department of Water Resources
ELT	Early Long Term
ETo	Evapotranspiration
FSSD	Fairfield-Suisun Sewer District
GCM	global climate model
GPCD	gallons per capita per day
gpd	gallons per day
gpf	gallons per flush
gpm	gallons per minute
HET	High-Efficiency Toilet
IPCC	International Panel on Climate Change
kWh	kilowatt hour
LD&R	Leak Detection and Repair
MF	Multi-Family
MG	million gallons
MGD	million gallons per day
MOU	Memorandum of Understanding
MWM	Maddaus Water Management
NAICS	North American Industry Classification System
NBA	North Bay Aqueduct
NIWR	Net Irrigation Water Requirements
O&M	Operations & Maintenance
psi	pounds per square inch
PWSID	Public Water System Identification Number
R-GPCD	Residential Gallons per Capita per Day
RCP	Representative Concentration Pathways
RUWMP	Regional Urban Water Management Plan
SB	Senate Bill
SB X7-7	Water Conservation Act of 2009
SCWA	Solano County Water Agency
SF	Single Family
SFR	Single Family Residential
SID	Solano Irrigation District
SSWA	Suisun-Solano Water Authority
SWEP	Solano County's School Water Education Program
SWP	State Water Project
USBR	United States Bureau of Reclamation
UWCC	Urban Water Conservation Committee
UWMP	Urban Water Management Plan
UWMP Act	Urban Water Management Planning Act of 1983 (AB 797)
WSCP	Water Shortage Contingency Plan
WWTP	Wastewater Treatment Plant
WUE	Water Use Efficiency

1 INTRODUCTION AND OVERVIEW

This report presents the 2020 Urban Water Management Plan (2020 UWMP) for the Suisun-Solano Water Authority (SSWA) service area. This section describes the general purpose of this 2020 UWMP and its organization and implementation as well as its relation to supplier grant and loan eligibility and the California Water Code.

1.1 Lay Description

An UWMP is a report used for local water conservation planning and implementation purposes. This may also include the inclusion of planning for emergency supply interruptions as well as improved alignment with other local planning documents. The UWMP is an important and valuable water management and planning tool because it helps guide the government and managers of a water supplier by creating connections from land-use planning, water supply planning, and local or statewide issues such as climate change. The UWMP also provides a way by which the water supplier can share information about its water management practices with its customers, community, and state.

An UWMP can also provide accurate details about other management actions such as the effectiveness of water shortage contingency planning, necessary infrastructure improvements or emergency connections with neighboring suppliers, trends in water supply consistency (water reliability) related to climate change or regulatory conditions, and opportunities to obtain funding for water management projects.

An UWMP is valuable in collecting and evaluating statewide water supply reliability data as it helps both the Suppliers and the state to plan for future risk of drought. If Suppliers so desire, they can add further details to better describe their area's water supply conditions. Doing so can help improve the evaluation of their water supply consistency and risk of drought. It can also make the UWMP more effective for addressing local, regional, and statewide water planning and management concerns.

1.2 Urban Water Management Plan Organization

This UWMP is organized into the following chapters:

Chapter 1 – UWMP Introduction and Lay Description. This chapter provides a discussion on fundamentals of the UWMP and the newly required lay description.

Chapter 2 – Plan Preparation. This chapter provides information on the processes used for developing the UWMP, including efforts in coordination and outreach.

Chapter 3 – System Description. This chapter describes the SSWA's water system, including maps of the service area, an explanation of the service area and climate, details on the public water system, and an overview of the SSWA's organizational structure and history.

Chapter 4 –Water Use Characterization. This chapter describes and quantifies the 2020 water uses and projected water uses within the SSWA's service area.

Chapter 5 – SB X7-7 Baseline and Targets. In this chapter, the SSWA details its compliance with the 2020 per capita water conservation mandate, the 2020 per capita target value that was adopted in the 2015 UWMP, and the SSWA's compliance status based upon actual 2020 customer water use. Also provided are the target and baseline calculations.

Chapter 6 – Water Supply Characterization. In this chapter, the SSWA describes and quantifies the 2020 and projected potable and non-potable water supplies. Also provided is a narrative description of each supply source and quantification of the supply availability for each source identified.

Chapter 7 – Water Service Reliability and Drought Risk Assessment. This chapter describes the SSWA's water system reliability through a 20-year planning horizon for normal year, single dry year, and five consecutive dry

years. This chapter also includes the Drought Risk Assessment (DRA). The water system reliability differs from the DRA by allowing a different basis for characterizing the five consecutive dry years.

Chapter 8 – Water Shortage Contingency Plan. This chapter provides the SSWA's structured plan for dealing with water shortages, incorporating prescriptive information and standardized action levels, along with implementation actions in the event of a catastrophic supply interruption.

Chapter 9 – Demand Management Measures. This chapter communicates SSWA's efforts to promote conservation and to reduce demand on its water supply, including a narrative describing efforts to implement several demand management measures.

Chapter 10 – Plan Adoption, Submittal, and Implementation. This chapter describes and documents the steps taken to make the SSWA's UWMP publicly available, as well as the steps taken to adopt and submit the UWMP in accordance with the Water Code.

Appendices – In order to produce a well-supported planning document, a number of appendices, as listed in the Table of Contents, are included to supplement information provided in the main chapters.

1.3 UWMPs in Relation to Other Efforts

Effective water supply planning is best achieved when integrated with other urban planning efforts. To that end, SSWA has incorporated relevant data from the following sources into the UWMP:

- *City of Suisun City 2035 General Plan* (2015)
- *Suisun-Solano Water Authority Water System Design Review* (Summers Engineering, 2012)
- *Suisun-Solano Water Authority Updated Master Plan for the Water Supply and Delivery System (*Summers Engineering, 1996)
- *California's Fourth Climate Change Assessment, San Francisco Bay Area Region Report*[1]

1.4 UWMPs and Grant or Loan Eligibility

In order for a water supplier to be eligible for any water grant or loan administered by the California Department of Water Resources (DWR), the supplier must have a current UWMP on file that has been determined by DWR to address the requirements of the California Water Code. A current UWMP also must be maintained by the supplier throughout the term of any grant or loan administered by DWR. A UWMP may also be required in order to be eligible for other state funding, depending on the conditions that are specified in the funding guidelines.

1.5 Demonstration of Consistency with Delta Plan for Participants in Covered Actions

This section is not applicable because the SSWA does not rely on the Sacramento-San Joaquin Delta for any of the water used to supply its service area. The SSWA gets 100% of its water supply from the Solano County Water Agency (SCWA).

1.6 Background and Purpose

This UWMP is the legal and technical water management foundation for supplies throughout California. A well-constructed UWMP can save time and money and provides the SSWA staff, the public, and elected officials with an understanding of past, existing, and future water conditions and management. The UWMP integrates local

[1] Ackerly, David, Andrew Jones, Mark Stacey, Bruce Riordan (University of California, Berkeley). (2018). *California's Fourth Climate Change Assessment San Francisco Bay Area Region Report*. Publication number: CCCA4-SUM-2018-005. https://www.energy.ca.gov/sites/default/files/2019-11/Reg_Report-SUM-CCCA4-2018-005_SanFranciscoBayArea_ADA.pdf

and regional land-use planning, regional water supply, infrastructure, and demand management projects, as well as statewide issues of concern like climate change and regulatory revisions. For this 2020 UWMP, the SSWA has gathered and synthesized water-related information from numerous sources into a plan with local, regional, and statewide practical utility.

Chapter 1 introduces the UWMP, its legislative history, legal requirements and amendments, focus, importance, and purpose. Additionally, in this chapter the SSWA describes its process for integrating information from other documents and coordination with local and regional agencies. The intent of the UWMP is to provide DWR and the public with information on present and future water sources and demands and to provide an assessment of the SSWA's water resource needs.

This UWMP provides the SSWA with a reliable water management action plan that can be confidently referred to continuously, as conditions change and management decisions arise. It also can demonstrate the reliability of the SSWA's water supplies and how that might affect local growth and the economy.

Additionally, the UWMP provides DWR, the State Water Resources Control Board (State Water Board), and the California Legislature with a representation of the SSWA's water reliability so that a full picture of statewide water reliability may be constructed. The UWMP also allows the SSWA to characterize conditions to improve its water reliability assessments, drought risk assessments, and use of the UWMP for addressing local, regional, and statewide water planning and management issues.

The UWMP further provides the opportunity to consider additional options for managing water assets to enhance the SSWA's long-term water reliability and other management objectives. A careful accounting of supplies, uses, and reliability can inform actions for retaining conserved water assets or for leveraging water assets for environmental improvements or financial gain. The more detailed and reliable the accounting, the better SSWA can gauge how much water supply surplus or shortage there may be in any given situation. This information can allow the SSWA to make sound management decisions regarding asset management and infrastructure planning to help mitigate long-term water management conditions attributable to climate change, regulatory change, and local water quality conditions.

For example, where surplus water conditions exist under certain circumstances, these water assets can be used for alternative purposes like instream flow and habitat enhancement, or crisis-related supplies for neighboring urban purveyors, which stabilize the environment or enhance regional water reliability.

In short, the SSWA has prepared this UWMP to provide practical and effective water management guidance for its staff, stakeholders, customers, community, and the state of California water governing bodies and Legislature.

The intent of this plan is to provide DWR and the public with information on present and future water sources and demands and to provide an assessment of SSWA's water resource needs. Specifically, the 2020 UWMP must provide water supply planning for a 20-year planning period in 5-year increments, identify and quantify adequate water supplies for existing and future demands during normal, dry and drought years, and assure efficient use of urban water supplies. This 2020 UWMP addresses all Water Code requirements for such a plan as shown in the completed DWR UWMP checklist provided in Appendix A.

Thoughtful urban water management planning provides the SSWA with the opportunity to integrate supplies and demands in a balanced and methodical planning platform that addresses short-term and long-term water planning conditions. This 2020 UWMP will:

- Assess changes in natural hydrology, climate, and groundwater conditions.
- Anticipate the implications of regional, state, and federal regulations.
- Understand supply conditions and water use variability.
- Identify regional constraints on, or opportunities for, shared water resources.

- Integrate local land-use changes, development, plans, and population growth.
- Prepare for water shortages and unforeseen calamities.
- Anticipate infrastructure improvements.
- Recognize project funding needs and opportunities.

This UWMP will address the following water-planning fundamentals:

- Preparing a detailed look at water use as of 2020 and future water use, including assessing and error-checking available baseline data and examining long-term planning documents like municipalities' General Plans and Specific Plans.
- Analyzing potable and non-potable water supplies, including reviewing water rights and contracts, assessing water deliveries, ascertaining restrictions on water availability under certain regulatory and hydrological conditions, and other opportunities or limitations explained in documentation for each water supply.
- Analyzing water supply reliability by integrating the water use analyses with the water supply analyses to provide a water service reliability picture under normal conditions, single dry year conditions, and five consecutive dry years through at least 2045.
- Preparing a realistic DRA by including integrated water supplies and projected water use in a hypothetical five-year drought condition.
- Developing an effective Water Shortage Contingency Plan (WSCP) that specifies opportunities to reduce demand and augment supplies under numerous, and even unpredictable, water shortage conditions.

Furthermore, this UWMP allows the SSWA to reflect short-term and long-term land-use planning assumptions and goals, account for specific plan and infill development projects over the course of the UWMP planning period, handle the dynamic nature of water supplies and demands through sound water-shortage contingency planning, and inform the state and the SSWA's customers about its water management practices.

Lastly, changes in cultural use patterns, such as the stay-at-home 2020 pandemic-related orders, can alter urban water use patterns and affect future water conservation accounting and analysis. Water data at the time of this report may reflect a temporary or long-term change in water use and could affect evaluation of near-term and long-term management considerations. Within this UWMP, the SSWA will describe such changes and the potential effects on its water use as of 2020 and projected water data.

1.7 Urban Water Management Planning and the California Water Code

In 1983, the California Legislature enacted the Urban Water Management Planning Act (UWMP Act). The law required an urban water supplier[2] to adopt a UWMP every five years demonstrating water supply reliability in normal, single dry, and multiple dry years. The original Act also required DWR to provide a report to the California Legislature on the status of water supply planning in California.

Since the Act was passed, it has undergone significant expansion and revision since the last UWMP Guidebook was prepared in 2015 (see details following). Prolonged droughts, groundwater overdraft, regulatory revisions, and changing climatic conditions not only affect a Supplier's water reliability determinations, but also the broad picture of statewide water reliability overseen by DWR, the State Water Board, and the California Legislature (Legislature). Accordingly, the Act has grown to address changing conditions as it guides California's water resource management.

[2] A "Supplier" is defined as an entity providing water for municipal purposes to more than 3,000 customers or serving more than 3,000 acre-feet annually.

There are numerous additional requirements passed by the Legislature for the 2020 UWMPs, updating the 2015 UWMP guidance. Significant new requirements include the following:

- **Five Consecutive Dry Year Water Reliability Assessment** – The Legislature modified the dry year water reliability planning from a "multiyear" time period to a "drought lasting five consecutive water years" designation. This statutory change requires a Supplier to analyze the reliability of its water supplies to meet its water use over an extended drought period. This requirement is addressed in the water use assessment presented in Chapter 4, the water supply analysis presented in Chapter 6, and the water reliability determinations in Chapter 7.
- **Drought Risk Assessment** – The Legislature created a new UWMP requirement for drought planning in part because of the significant duration of recent California droughts and the predictions about hydrological variability attributable to climate change. The DRA requires a Supplier to assess water supply reliability over a five-year period from 2021 to 2025 that examines water supplies, water uses, and the resulting water supply reliability under a reasonable prediction for five consecutive dry years.
- **Seismic Risk** – The Water Code now requires a Supplier to specifically address seismic risk to various water system facilities and to have a mitigation plan (see Chapter 8). An important aspect of this provision is the intersection of water supply infrastructure planning with a county or regional hazard mitigation plan.
- **Water Shortage Contingency Plan** – In 2018, the Legislature modified the UWMP laws to require a WSCP with specific elements. The WSCP is a document that provides a Supplier with an action plan for a drought or catastrophic water supply shortage. Although the new requirements are more prescriptive than previous versions, many of these elements have long been included in WSCPs, other sections of UWMPs, or as part of a Supplier's standard procedures and response actions (see Chapter 8). Many of these actions were implemented by Suppliers during the last drought, to successfully meet changing local water supply challenges. The WSCP will also have statewide utility for DWR, the State Water Board, and the Legislature in addressing extreme drought conditions or statewide calamities that impact water supply availability.
- **Groundwater Supplies Coordination** – In 2014, the Legislature enacted the Sustainable Groundwater Management Act to address groundwater conditions throughout California. The Water Code now requires 2020 UWMPs to be consistent with Groundwater Sustainability Plans in areas where those plans have been completed by Groundwater Sustainability Agencies.
- **Lay Description** – The Legislature included a new statutory requirement for Suppliers to include a lay description of the fundamental determinations of the UWMP, especially regarding water service reliability, challenges ahead, and strategies for managing reliability risks. These new non-technical UWMP section descriptions could be considered synopses for new staff, new governing members, customers, and the media.

2 PLAN PREPARATION

Lay Description

This chapter describes the basis of the development of the UWMP; the requirements for preparation; the processes used, including efforts in notification, coordination, and outreach; the regional planning involved; and the type of year and units of measure used.

2.1 Plan Preparation

Coordination and outreach are key elements in developing a useful and accurate UWMP. Notification to all interested parties and stakeholders allows those entities to provide information on aspects of the UWMP. It also lets these entities know about the different water management considerations that may affect their own decisions. As such, the SSWA notified surrounding cities and Solano County of its intent to update the UWMP so such feedback could be incorporated as applicable. For further information about this notification process, see Chapter 10 of this UWMP.

Coordination with city and county land use planning agencies can provide information on regional planning, demographics, and expected future development for determining future water use, supply, and reliability assessments. Since the City of Suisun City (City) has authority over land use planning, its planning staff was consulted in the preparation of this UWMP to ensure a complete and accurate representation of potential water demand from land use development.

SSWA also participates in an Urban Water Conservation Committee (UWCC) that includes all of the neighboring water suppliers in the county.

Section 2.6 further describes SSWA's outreach activities.

2.2 Basis for Plan Preparation

California Water Code Section 10617 defines an urban water supplier as "*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. An urban water supplier includes a supplier or contractor for water, regardless of the basis of right, which distributes or sells for ultimate resale to customers. This part applies only to water supplied from public water systems."*[3] In accordance with the California Water Code Section 10621, urban water suppliers are required to prepare a UWMP every five years.[4]

As per the above definition, the SSWA qualifies as an urban water supplier. The SSWA has prepared this plan in compliance with state law and following the guidelines as outlined by DWR in its *Guidelines for Urban Water Suppliers*, posted as Final in April 2021 (DWR, 2021). This 2020 UWMP is the five-year update to the 2015 UWMP and supersedes its contents.

Public water systems are the distribution systems that provide drinking water for human consumption. All public water systems are given a unique Public Water System Identification Number (PWSID). These systems are regulated by the State Water Board Division of Drinking Water. The California Health and Safety Code 116275 defines a public water system as "*a system for the provision of water for human consumption through pipes or other constructed conveyances that has 15 or more service connections or regularly serves at least 25 individuals*

[3] California State Legislature. (1983). Water Code Section 10617, amended 1996. https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=WAT&sectionNum=10617.

[4] Ibid. (1983). Water Code Section 10621. http://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=WAT&sectionNum=10621

daily at least 60 days out of the year."[5] Based on this definition, the SSWA is a Public Water System and therefore operates under a water supply permit issued by the Division of Drinking Water.

Table 2-1 lists the name and number of connections reported in this 2020 UWMP.

Table 2.1. Public Water Systems

Submittal Table 2-1 Retail Only: Public Water Systems			
Public Water System Number	Public Water System Name	Number of Municipal Connections 2020	Volume of Water Supplied 2020 (MG)
4810005	Suisun-Solano Water Authority	8,701	1,173
	TOTAL	8,701	1,173
NOTES: The volume of water supplied in 2020 is total effluent from water treatment plant. The number of connections is the number of active connections as of December 2020.			

2.3 Regional Planning

Regional planning can deliver mutually beneficial solutions to all agencies involved by reducing costs for the individual agency, assessing water resources at the appropriate geographic scale, and allowing for solutions that cross jurisdictional boundaries. Depending on the level of regional cooperation, other possible benefits can include the following:

- More reliable water supplies
- Increased regional self-reliance
- Improved water quality
- Better flood management
- Increased economic stability
- Restored and enhanced ecosystems
- Reduced conflict over resources

In support of regional UWMPs and regional water conservation targets, the UWMP portion of the Water Code provides mechanisms for participating in area-wide, regional, watershed, or basin-wide urban water management planning. The SSWA participates in regional planning, namely through participation with the SCWA as a part of an UWCC. This countywide committee allows for broader distribution of materials and information as well as reduced costs to individual water suppliers by sharing resources.

SCWA is a wholesaler who supplies surface water to the SSWA and Solano Irrigation District (SID), among others. SCWA also is instrumental in generating reliability factors used later in this report to determine the reliability of water sources. Water demand projections developed as part of this plan, in cooperation with the City, have been shared with SCWA. A copy of the 2020 UWMP will be provided to SCWA upon final adoption by the SSWA Board.

2.4 Individual or Regional Planning and Compliance

The SSWA has developed this UWMP to report solely on its distribution service area. Individual UWMPs address all requirements of the Water Code including water use targets and baselines (for SB X7-7 Water Conservation

[5] Ibid. (1995). Health and Safety Code Section 116275. https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=HSC&sectionNum=116275.

Act of 2009 reporting). The SSWA has notified and coordinated with the appropriate regional agencies and constituents.

Table 2-2 defines the type of plan for this 2020 UWMP.

Table 2.2. Plan Identification Type

Submittal Table 2-2: Plan Identification			
Select Only One	**Type of Plan**		**Name of RUWMP or Regional Alliance**
☑	**Individual UWMP**		
	☐	Water Supplier is also a member of a RUWMP	
	☐	Water Supplier is also a member of a Regional Alliance	
☐	**Regional Urban Water Management Plan (RUWMP)**		

2.4.1 Regional UWMP

A group of suppliers agreeing among themselves to plan, comply, and report as a region on the urban water use target requirements of SB X7-7 is referred to as a Regional Alliance. A Regional Alliance allows water suppliers to work toward cooperatively developing programs and meeting regional water conservation targets, but not necessarily submitting a Regional Plan. Since the SSWA does not have a Regional Alliance, this section does not apply.

The UWCC, of which SCWA is the lead agency, meets monthly to plan the implementation and management of collaborative water conservation programs at the residential and commercial customer levels. The regional effort has resulted in an increase in water conservation values for each member agency and improved the ability for each agency to meet its conservation targets. In 2015, the UWCC discussed options for forming a Regional Alliance to comply with the Emergency Drought Regulations on a collaborative basis. With consideration to the varied levels of conservation standards among the member agencies, and diverse climates that exist in Solano County, the UWCC determined that a Regional Alliance would not be successful in achieving compliance with meeting water use targets. Although a Regional Alliance provides an opportunity for a collaboration to set its own conservation standards, it was determined that a weighted average of Solano cities and the SSWA would not meet acceptable monthly and cumulative targets due to the wide range of goals and attainment.

2.5 Fiscal or Calendar Year and Units of Measure

Since the SSWA reports on a calendar year basis rather than fiscal, it is required to include the water use and planning data for the entire calendar year of 2020, which is reflected in this 2020 UWMP. In addition, the SSWA utilizes million gallons (MG) throughout this plan as the unit of measure when reporting water volume.

Table 2-3 provides agency identification information, type of year reporting, and units of measure used by the SSWA in this 2020 UWMP to report water data and assessments.

Table 2.3. Supplier Identification

Submittal Table 2-3: Supplier Identification	
Type of Supplier (select one or both)	
☐	Supplier is a wholesaler
☑	Supplier is a retailer
Fiscal or Calendar Year (select one)	
☑	UWMP Tables are in calendar years
☐	UWMP Tables are in fiscal years
Units of Measure Used in UWMP (select from drop down)	
Unit	MG

2.6 Coordination and Outreach

This section describes the coordination and outreach efforts of the SSWA during preparation of the 2020 UWMP.

2.6.1 Wholesale and Retail Coordination

When a water supplier relies upon a wholesale agency for a water supply, both are required to provide each other with information regarding projected water supply and demand. Retail agencies that receive their water supply from one or more wholesalers are required to provide their wholesaler(s) with the retail agency's projected water demand from that source in 5-year increments for 20 years or as far as possible based on the data available.

During the preparation of the 2020 UWMP and WSCP, the SSWA coordinated information regarding projected water supply and demand with its water supplier, SCWA, as listed in Table 2-4. Since the SSWA does not use groundwater, no coordination with groundwater sustainability agencies was necessary. More information about coordination and notification efforts is in Chapter 10.

Table 2.4. Water Supplier Information Exchange

Submittal Table 2-4 Retail: Water Supplier Information Exchange
The retail Supplier has informed the following wholesale supplier(s) of projected water use in accordance with Water Code Section 10631.
Wholesale Water Supplier Name (Add additional rows as needed)
Solano County Water Agency under contract to City of Suisun City for Solano Project water. (1)
Solano County Water Agency under contract to City of Suisun City for State Water Project water. (2)
Solano County Water Agency under contract to Solano Irrigation District for Solano Project water. (3)
NOTES: 1. Represents the water supplies delivered to Suisun-Solano Water Authority (SSWA) by City of Suisun City (City) under the Solano Project Entitlement. The City's SSWA's Bureau entitlement is 1,600 AF each year. The City does have an entitlement from the SWP but to date it has never been used. The transferred water is supplemental – Solano Irrigation District (SID) water is purchased directly from SID after the city entitlement of 1,600 AF federal water has been used. This is a variable amount from year to year. 2. As of 2020, the City SWP allocation of 1,300 AFY is not being diverted and treated by SSWA as no infrastructure is in place to convey water from the North Bay Aqueduct (NBA) to the Cement Hill Water Treatment Plant. However, in dry years, SSWA has exchanged the NBA allocation to other NBA contractors for a portion of their Solano Project allocation. 3. This represents water supplies delivered to SSWA by SID under the Solano Project entitlement and the 1990 SSWA Implementation Agreement. The main water supply for SSWA is from Lake Berryessa.

2.6.2 Coordination with Other Agencies and the Community

On February 16, 2023, notices of preparation and intent to update the UWMP were sent to the Cities of Benicia, Dixon, Fairfield, Rio Visa, Suisun, Vacaville, and Vallejo, as well as Solano County. A copy of the notice is in Appendix D of this UWMP.

Notification to the general public was published in *The Daily Republic* for two successive weeks, as per DWR requirements (at least 14 days and 7 days in advance of the public hearing). Copies of the notice can be found in Appendix E of this UWMP. Notification was also posted at the Solano Irrigation District office, at City Hall in Suisun City, and on the SID and SSWA websites.

On May 8, 2023, the SSWA convened a public hearing to receive comments on the 2020 UWMP prior to its final adoption by the Board of Directors and submittal to the California DWR. Prior to the hearing, copies of the 2020 UWMP were made available for public review at the Solano Irrigation District office and at City Hall in Suisun City.

The Final 2020 UWMP was submitted to both the City and SID, comprising the two agency areas served by the SSWA, and to its wholesaler, SCWA.

2.6.3 Notice to Cities and Counties

The California Water Code 10621(b) requires that agencies notify cities and counties to which they serve water that the 2020 UWMP and 2020 WSCP are being updated and reviewed. The California Water Code specifies that this must be done at least 60 days prior to the public hearing. The SSWA's notification to cities and counties is reported in Table 10-1 in Chapter 10 of this UWMP.

3 SYSTEM DESCRIPTION

Lay Description

This chapter describes SSWA's water system, service area, climate, projected population, and other factors that might affect water management planning. It discusses potential uncertainties, such as the impacts of climate change.

3.1 General Description

The City of Suisun City (City) and Solano Irrigation District (SID) formed a Joint Exercise of Powers Agreement in 1976 intended to provide a long-term water supply for the City. In 1990, the City and SID strengthened their partnership by becoming a full Joint Powers Authority, the Suisun-Solano Water Authority. This change sparked a reconstruction and modernization of the old Suisun Water System which served the older neighborhoods in Old Town Suisun, the Marina, and Laurel Creek.

3.1.1 City of Suisun City

The City of Suisun City is a small Californian community of approximately 30,000 residents. It is an active, inclusive, sustainable, and flourishing community committed to maintaining harmony between its urban and rural areas. The City is dedicated to fostering opportunities for current and future generations by supporting the City's history, arts, natural environment, and thriving waterfront district.

The City is situated midway between San Francisco and Sacramento in Central Solano County. The Old Town section of the City is located on the Suisun Channel, which empties into Suisun and Grizzly Bays, the connecting point for the Sacramento River and the San Francisco Bay. A map of the City and surrounding municipalities is shown in Figure 3-2.

The City was established in the 1850s during the California Gold Rush as a trading route between the foothills of the Sierra Nevada and the San Francisco Bay Area. The town continued to prosper with the introduction of the transcontinental railroad in 1869, linking the City to the East Coast. The City remained the bustling hub of

agricultural in Solano County until Interstate 80 opened in the 1960s, effectively switching commercial traffic away from the railroad and the waterfront area and into nearby Fairfield.

Since 1989, the City has implemented an aggressive redevelopment program centered on the Old Town Waterfront and Historic Main Street Shopping District. After decades of isolation, the waterfront is once again accessible to the general public via a new Public Marina, Public Promenade, and Harbor Plaza. The channel has been deepened to allow boating excursions from San Francisco Bay and the Sacramento Delta.

The City is recreating itself as a prosperous waterfront community from a more relaxed time. Buildings along Main Street have been remodeled to reflect the hometown charm of one-of-a-kind shops and restaurants. The City is destined to become a thriving destination for business gatherings, family daytrips, and people looking for a singular and relaxing waterfront atmosphere.

The future of the SSWA shows some growth, but the City has geographical constraints, including a marsh and a common boundary with the City of Fairfield. The 2011 Capital Improvement Plan outlined several planned changes to water infrastructure facilities. As of the writing of this 2020 UWMP, some of those Capital Improvement Projects have been completed including rebuilding three clarifiers, constructing a new 2 MG tank, installing a new pipeline up to existing tanks, and replacing more than 8,500 meters with AMI. Capital Improvement Plans as of 2020 include replacing large meters, rehabilitating existing tanks, and installing a new chemical feed system at Cement Hill Water Treatment Plant. Upon the completion of the treatment plan chemical feed system rehabilitation project, SSWA will perform a new condition assessment to re-evaluate projects and priorities for its Capital Improvement Plan.

Since the 2015 Urban Water Management Plan, the SSWA has mostly grown in the areas of single family and landscape accounts. Single family homes have changed from approximately 7,770 accounts in 2005 to 8,030 accounts in 2010, 8,210 in 2015, and 8,286 accounts in 2020, a change of 516 accounts in 20 years. The service area as of 2020 is shown in Figure 3-1 and Figure 3-2.

3.1.2 Solano Irrigation District

The Solano Irrigation District (SID) is an independent special district organized in 1948 under provisions of the California Irrigation District Law for the purpose of contracting surface water supplies from the U.S. Bureau of Reclamation's (USBR's) Solano Project. SID is governed by a five-member Board of Directors, each of which are elected by registered voters within the boundaries of the district. SID has entitlements and agreements for 141,000 AF of agricultural and domestic water for service to many areas in Solano County each year. SID uses the majority of this water for agricultural irrigation service to approximately 42,000 acres. It also provides non-potable water service for urban landscape irrigation in the Solano County cities of Fairfield and Vacaville and potable-treated surface water in several public water systems, the largest of which is the SSWA. SID, under contract with SCWA, operates and maintains the Solano Project, which delivers Lake Berryessa water to four cities, the Maine Prairie Water District, and the SID customers. SID owns and operates an 11.5-megawatt hydroelectric power plant at the base of Monticello Dam. SID employs 85 staff members, operates on a $11 million annual budget of its own, and partners with the City in water delivery, utilizing another $6 million to accomplish this partnership's objective.

3.2 Service Area Boundary Maps

Figure 3-1 and Figure 3-2 show the boundaries of SID and an overview of the SSWA service area.

Figure 3-1. Potable Water Service Area

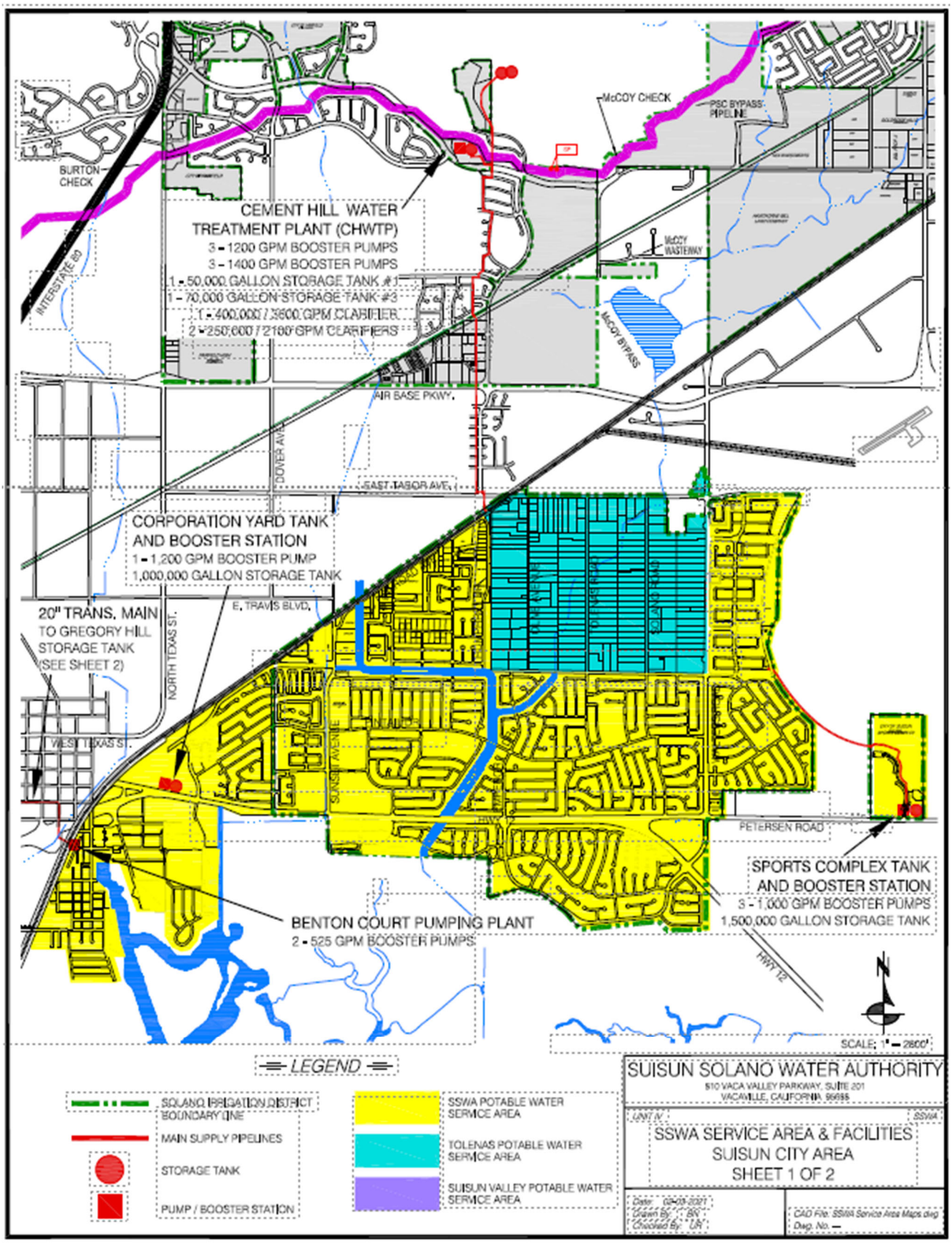
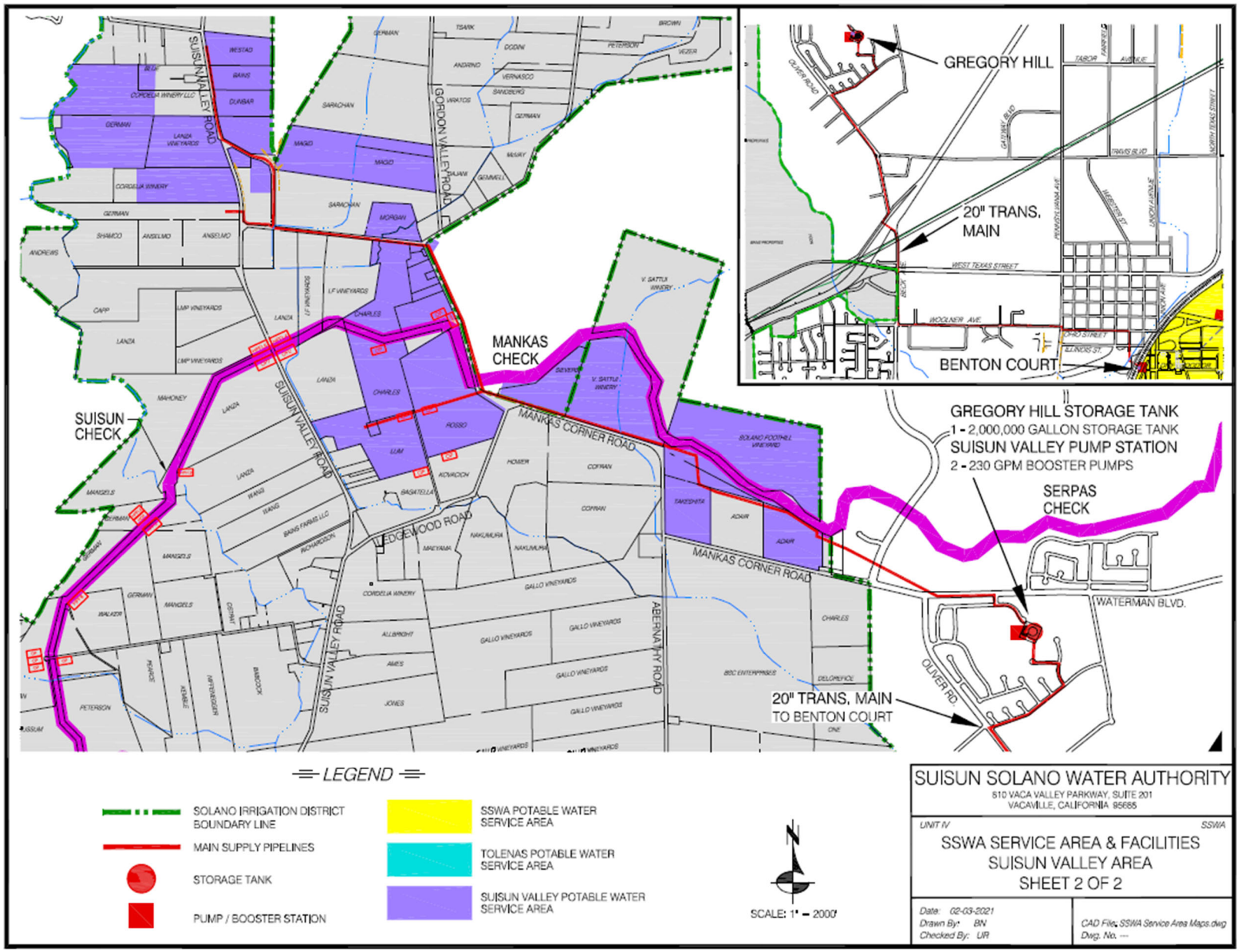


Figure 3-2. Public Water System



3.3 Service Area Climate

Solano County has a mild, temperate climate throughout the year. A prevailing wind from the west, across the bay, tempers the climate. The annual mean daily temperature is 60.5°F. Predominant wind directions are from the southwest. There is an average of 344 frost-free days per year. The rainy season extends from October through April. Total average annual rainfall is 25 inches (1995–2020). In comparison, 2020 received 8 inches of rainfall for the year.

The following rainfall data are from National Weather Service Station 042934 for the City of Fairfield, which is the closest available station to the SSWA service area for the years 1950 to 2020:

- Annual evapotranspiration (ETo)[6] from California Irrigation Management Information System (CIMIS) site 123 is approximately 50 inches/year. This Suisun Valley CIMIS site 123 became inactive in 2010.
- Nearby Concord CIMIS site 170 has data available from 2001 and estimates an average annual ETo of 50 inches/year. This Concord CIMIS site is in ETo zone 6 and is characterized as a densely urbanized area of the East Bay.
- Another nearby CIMIS site is Hastings Track East site 212 has data available from 2009 and estimates an average ETo of 57 inches/year. This Hastings Track East CIMIS site is in the Sacramento Valley region in Solano County.

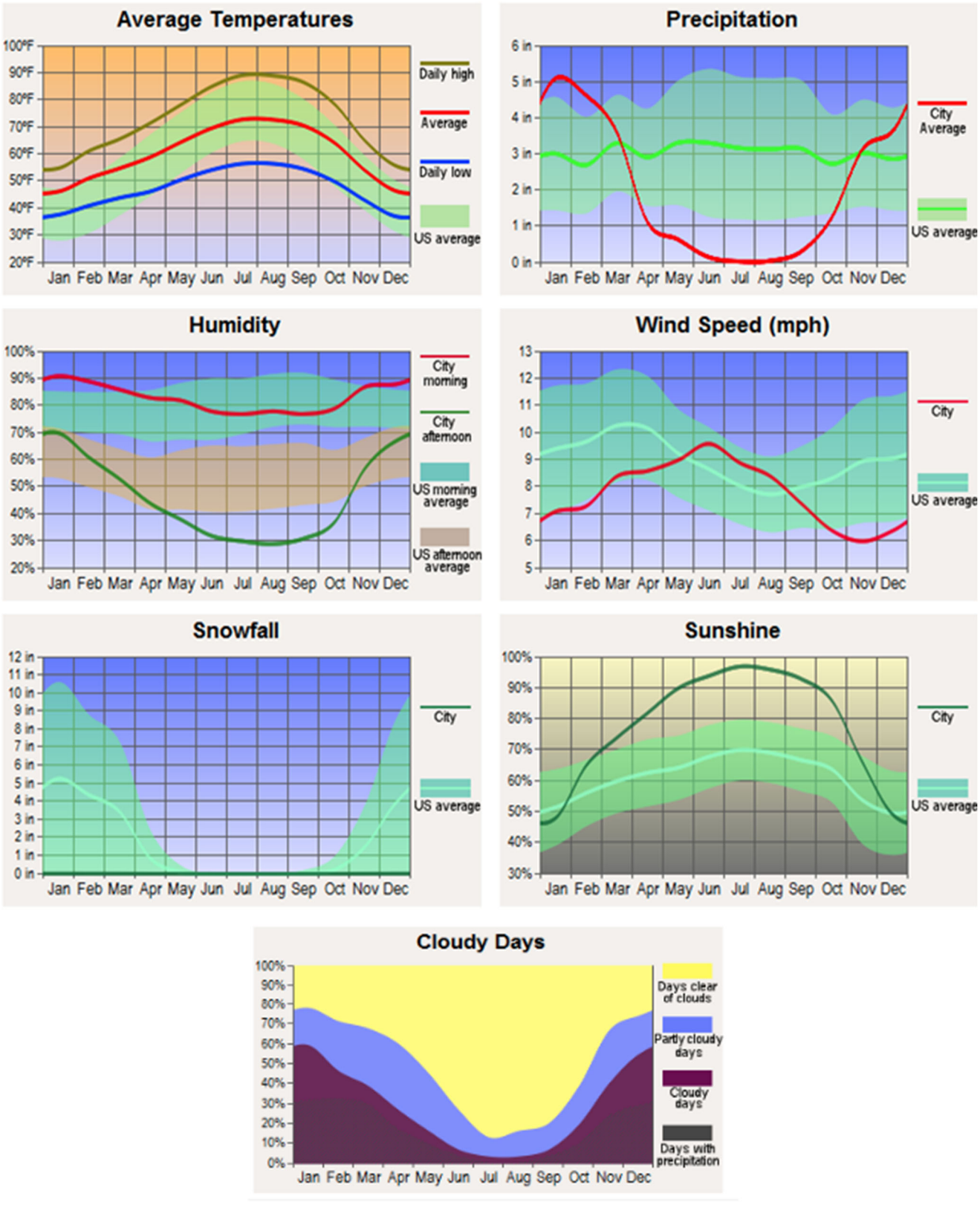
Table 3-0. Climate Characteristics

	Jan	Feb	Mar	Apr	May	Jun	
Suisun Valley Standard Monthly Average ETo Demand (inches)[1]	1.05	1.72	3.47	4.69	6.32	7.30	
Concord Standard Monthly Average ETo Demand (inches)[2]	1.27	1.92	3.34	4.69	6.30	7.23	
Hasting Track East Monthly Average ETo Demand (inches)[3]	1.25	2.08	3.40	5.16	7.15	8.34	
Average Rainfall (inches)[4]	4.80	4.94	3.17	1.60	0.78	0.17	
Average Temperature (Fahrenheit)[5]	46.93	51.63	54.82	58.76	64.27	69.53	
	July	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**
Suisun Valley Standard Monthly Average ETo Demand (inches)[1]	7.66	6.80	5.16	3.55	1.71	1.05	**50.48**
Concord Standard Monthly Average ETo Demand (inches)[2]	7.50	6.66	5.00	3.34	1.73	1.10	**50.08**
Hasting Track East Monthly Average ETo Demand (inches)[3]	9.03	7.83	6.17	3.83	1.86	1.20	**57.30**
Average Rainfall (inches)[4]	0.00	0.03	0.08	1.08	2.54	5.46	**24.65**
Average Temperature (Fahrenheit)[5]	72.76	72.57	70.74	64.32	54.44	47.25	**60.64**

[1] Suisun Valley CIMIS site 123 became inactive in 2010. https://cimis.water.ca.gov/Default.aspx
[2] Concord CIMIS site 170 has data available from 2001. https://cimis.water.ca.gov/Default.aspx
[3] Hastings Track East CMIS site 212 is in Solano County and has data available from 2009. https://cimis.water.ca.gov/Default.aspx
[4] National Climate Data Center Station 042934 for the City of Fairfield for years 1995 -2020, rainfall. https://www.ncdc.noaa.gov/cdo-web/
[5] National Weather Service Station 042934 for the City of Fairfield, temperature. http://www.wrcc.dri.edu/WRCCWrappers.py?sodxtrmts+042934+por+por+avgt+none+mave+5+01+F

[6] ETo is an abbreviation of evapotranspiration which is the summation of evaporation and transportation.

Figure 3-3. City of Suisun City Climate Characteristics



Source: City-Data website, accessed August 2021: http://www.city-data.com/city/Suisun-City-California.html. Information based on data collected from over 4,000 weather stations.

3.3.1 Climate Change Impacts on Water Demands, Supplies, and Reliability

According to the National Academy of Sciences, climate change refers to any significant change in measures of climate (such as temperature, precipitation, or wind) lasting for an extended period (decades or longer). Climate change may result from:

- Natural factors, such as changes in the sun's intensity or slow changes in the Earth's orbit around the sun.
- Natural processes within the climate system (e.g., changes in ocean circulation).
- Human activities that change the atmosphere's composition (e.g., through burning fossil fuels) and the land surface (e.g., deforestation, reforestation, urbanization, desertification, etc.).

Climate change has the potential to directly impact the SSWA's surface water supply and to indirectly impact groundwater supplies. SID is committed to adapting to climate change in a manner that protects the water resources for the maximum benefit while continuing to maintain a reliable, affordable, high quality water supply for agriculture.

Several potential effects of climate change have been identified by the scientific community, including reduced winter snowpack, more variable and extreme weather conditions, shorter winters, and increased evaporative demand. Additionally, climate change could affect water quality through increased flooding and erosion; greater concentration of contaminants, if any, in the water supply; and warmer water, which could lead to increased growth of algae and other aquatic plants. Rising sea level and increased flooding are also potential effects of climate change. The source of the SID water supply, Putah Creek watershed, is in the coastal range, and thus, reduced snowpack and related runoff timing issues will not impact SID water supply. Also, the SID service area is not located in the Sacramento-San Joaquin River Delta and will not be affected by rising sea levels and the related flooding and salinity effects. Thus, this discussion of climate change focuses on climate change effects and impacts related to SID's water demand and does not discuss potential effects of reduced winter snowpack, changes in precipitation patterns, or rising sea level.

In the 2018 SID Agricultural Water Management Plan accepted by the USBR in 2021 (Davids Engineering, 2018),[7] sources of information describing potential climate change effects on agricultural water supplies in SID are presented. This includes the results of the study West-Wide Climate Risk Assessment: Irrigation Demand and Reservoir Evaporation Projections (USBR, 2015) developed by the USBR to evaluate the potential effects of climate change on crop ETo and irrigation water requirements. Chapter 6 (Climate Change) of the 2018 SID Agricultural Water Management Plan includes a discussion of the potential effects of climate change on the SSWA and its water supply, followed by a description of the resulting potential impacts on water supply, water quality, and water demand. Also identified are actions underway as of 2021 or that could be implemented to help mitigate future impacts.

Changes in precipitation, temperature, and atmospheric carbon dioxide affect crop ETo and net irrigation water requirements (NIWRs). Global climate models (GCMs) have been used to project future climate change and impacts on crop water demands. Future conditions of warm-dry, warm-wet, hot-dry, hot-wet, and central tendency were used. Three future periods for these five conditions were selected to project climate change effects and impacts, including the 2020s (2010-2039), 2050s (2040-2069) and 2080s (2070-2099). Changes in precipitation timing and amounts could result in greater or lesser irrigation requirements to meet ETo demands.

Although there is consensus that climate change is occurring, and the effects of climate change are being observed, the timing and magnitude of climate change impacts remain uncertain. SSWA will mitigate climate change impacts with this uncertainty in mind through an adaptive management approach in cooperation with other regional stakeholders, municipalities within the SSWA, and neighboring water management agencies.

[7] https://www.sidwater.org/DocumentCenter/View/1695/2018-Agricultural-Water-Management-Plan-AWMP

Under adaptive management, key uncertainties will be identified and evaluated (e.g., April-July runoff as a percentage of annual runoff, total runoff, average temperature, and reference evapotranspiration), and strategies will be developed to address the related climate change impacts. As the actual impacts occur, the strategies will be prioritized, modified as needed, and implemented. Some strategies that are being implemented or could be implemented to adapt to climate change are summarized in the 2018 SID Agricultural Water Management Plan in Table 6-1. Strategies to Mitigate Climate Change Impacts.

Additional Resources for Water Resources Planning for Climate Change

Much work has been done at state and regional levels to evaluate the effects and impacts of climate change and to develop strategies to support effective statewide, regional, and local water management in the future. For more information, see Section 4.5.1.

The 2015 Water Supply Shortage Risk Assessment discusses climate impacts on water availability from SID.[8] In addition, Section 6 of the SID Agricultural Water Management Plan includes a discussion on Climate Change impacts.

Additionally, the following resources provide supplementary information describing water resources planning for climate change:

- Progress on Incorporating Climate Change into Planning and Management of California's Water Resources. California Department of Water Resources Technical Memorandum, July 2006 (DWR, 2006).
- Climate Change and Water. Intergovernmental Panel on Climate Change, June 2008. (IPCC, 2008)
- Managing An Uncertain Future: Climate Change Adaptation Strategies for California's Water. California Department of Water Resources Report, October 2008. (DWR, 2008)
- 2009 California Climate Change Adaptation Strategy. California Natural Resources Agency Report to the Governor, December 2009. (CNRA, 2009)
- Climate Change and Water Resources Management: A Federal Perspective. U.S. Geological Survey, 2009. (USGS, 2009)
- Managing an Uncertain Future. California Water Plan Update 2009. Volume 1, Chapter 5, March 2010. (DWR, 2010a)
- Climate Change Characterization and Analysis in California Water Resources Planning Studies. California Department of Water Resources Final Report, December 2010. (DWR, 2010b)
- Climate Change Handbook for Regional Water Planning. Prepared for U.S. Environmental Protection Agency and California Department of Water Resources by CDM, November 2011. (CDM, 2011)
- Climate Action Plan—Phase 1: Greenhouse Gas Emissions Reduction Plan. California Department of Water Resources, May 2012. (DWR, 2012)
- Climate Change and Integrated Regional Water Management in California: A Preliminary Assessment of Regional Perspectives. Department of Environmental Science, Policy and Management, University of California at Berkeley, June 2012. (UCB, 2012)
- Managing an Uncertain Future. California Water Plan Update 2013, Volume 1, Chapter 5, October 2014. (DWR, 2014)
- West-Wide Climate Risk Assessments: Irrigation Demand and Reservoir Evaporation Projections, Technical Memorandum No. 86-68210-2014-01, U.S. Bureau of Reclamation, 2015. Available at https://www.usbr.gov/watersmart/baseline/docs/irrigationdemand/irrigationdemands.pdf. (USBR, 2015)

[8] https://www.sidwater.org/DocumentCenter/View/998/2015-Water-Shortage-Risk-Assessment?bidId=

- California Climate Adaption Planning Guide. California Natural Resources Agency. Available at https://resources.ca.gov/CNRALegacyFiles/docs/climate/01APG_Planning_for_Adaptive_Communities.pdf. (CNRA, 2012)
- 2018 SID Agricultural Water Management Plan (Davids Engineering, 2018 – SB x7-7 appended information to the 2015 AWMP). 2015 SID Agricultural Water Management Plan (Davids Engineering, 2016).
- Perspectives and Guidance for Climate Change Analysis. California Department of Water Resources Climate Change Technical Advisory Group (DWR, 2015).

3.4 Service Area Population, Demographics, and Socioeconomics

Suppliers are required to report their current and projected service area populations in their UWMP. The Water Code does not require a specific methodology for projecting future populations, but it does require that the estimates of future population be based upon data from state, regional, or local service agency population projections.

3.4.1 Service Area Population

SSWA population figures for 2020 and projected are shown in Table 3-1 and Figure 3-8. Between 2010 and 2020, the SSWA service area population increased approximately 3.5%. In developing the 2020 UWMP, the SSWA and Maddaus Water Management (MWM) evaluated several data sources available for historical and projected population. They opted to use the Department of Finance (DOF) population data, as it represented the most recent population information for the service area at that time. SSWA and MWM further refined the DOF data by comparing the DOF boundary to the SSWA service area boundary, accounting for the actual percentage of included area and adding the community water use of Mankas Corner and Tolenas as an additional population served.

A person-per-connection method was used to calculate the population for the communities of Mankas Corner and Tolenas for 2020 and historical population data. For population projections, SSWA used 2019 Association of Bay Area Governments (ABAG) data. SSWA and MWM further refined the ABAG population data by comparing the ABAG boundary to the SSWA service area boundary, accounting for the actual percentage of included area and adding the community water use of Mankas Corner and Tolenas as an additional population served.

Mankas Corner, a rural area served by the SSWA, has 23 residential parcels with an approximate household size of 3.1 (ABAG, 2019). The community of Tolenas has 191 connections with an approximate household size of 3.1. Population numbers were adjusted to ensure that the population data used were consistent with the actual area served. ABAG population data were further evaluated in comparison to other data sources (e.g., 2010 census) to identify any anomalies, all of which were addressed.

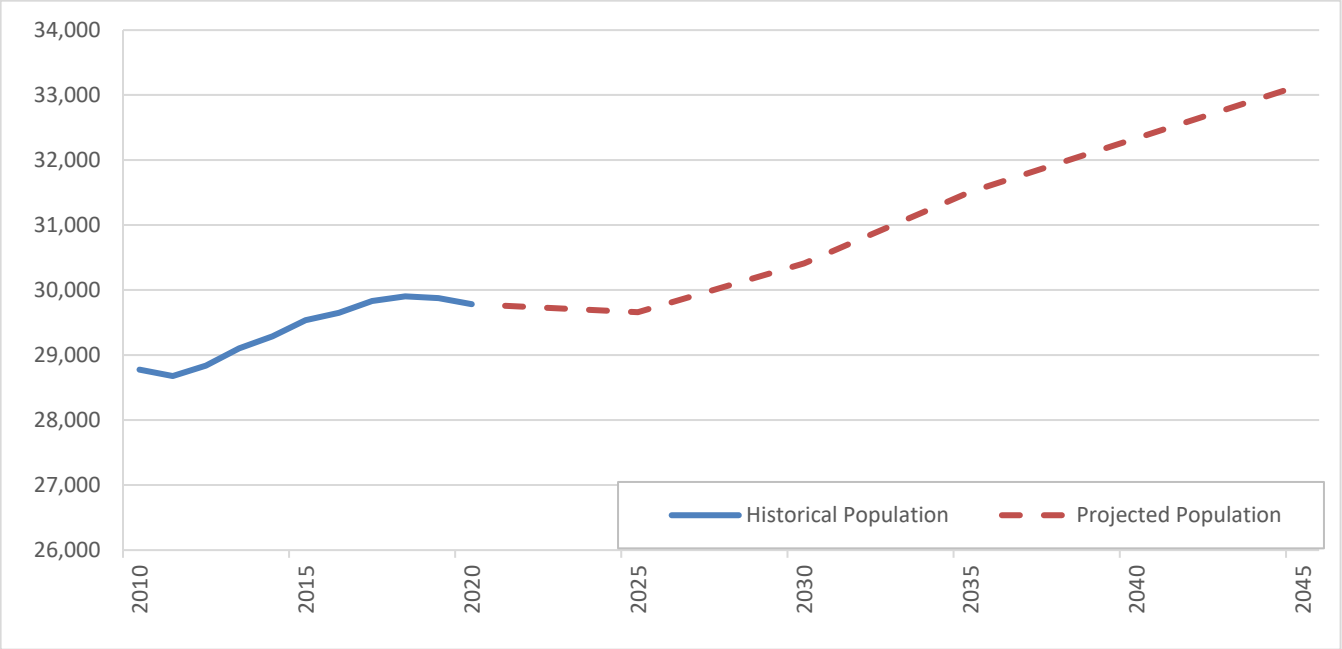
As provided by ABAG in the 2019 population estimation, the City's population is projected to increase approximately 11% from 29,783 in 2020 to 33,200 in 2045. The SSWA serves the City and an additional 72 people in the community of Mankas Corner and 592 in the community of Tolenas. Please note that geographical constraints may limit actual population growth from reaching these projections.

Table 3-1 and Figure 3-4 display SSWA's 2020 and projected population data.

Table 3.1. Retail Population – 2020 and Projected

Submittal Table 3-1 Retail: Population - 2020 and Projected						
Population Served	2020	2025	2030	2035	2040	2045 (opt)
	29,783	29,700	30,400	31,500	32,300	33,200
NOTES: 2020 actual population value is from the Department of Finance Table E-5 for City of Suisun City plus a derived population of 72 people for Mankas Corner and 592 people for Tolenas, based on number of residential parcels times average household size per ABAG 2019. The projected population is from ABAG for the City of Suisun City plus a derived population of 72 people for Mankas Corner and 592 people for Tolenas. Projected population is rounded to the nearest 100.						

Figure 3-4. City of Suisun City Population Projections

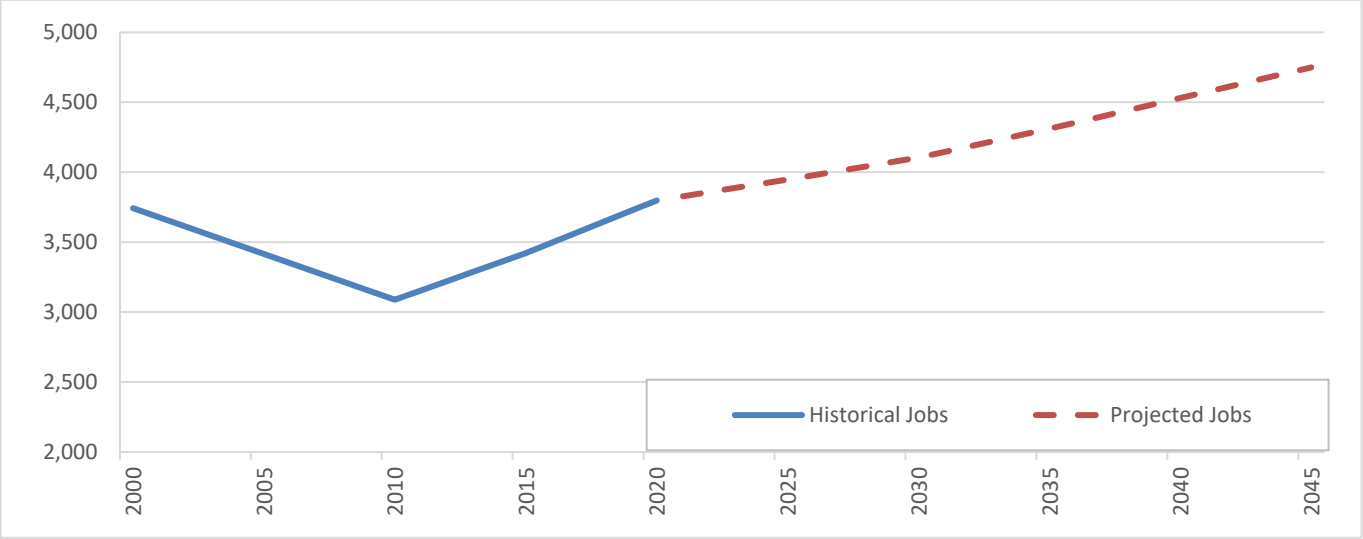


Notes:

1. Population includes City of Suisun City and the rural community population of 23 residential parcels and 72 people of Mankas Corner and the community of Tolenas of 191 residential accounts and 592 people, both of which are served by SSWA.
2. Source: *Association of Bay Area Governments (ABAG) 2040.* January 10, 2019.

Figure 3-5 displays SSWA's projected employment data.

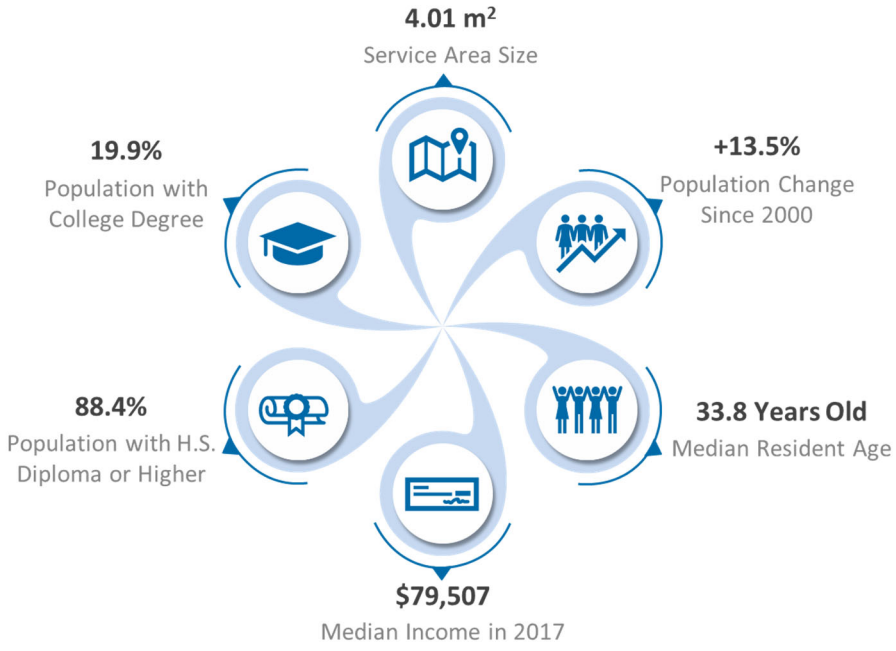
Figure 3-5. City of Suisun City Employment Projections



Source: ABAG Sustainable Communities Strategy Preferred Scenario, v2, May 24, 2013. Subregional Study Area 805 for Suisun City.

Figure 3-6 shows the demographic features for the City taken from the City-Data website.[9] According to the data provided below, the service area has experienced approximately 0.72% growth for the past 17 years (2000 to 2019). The future growth in the service area for the next 25 years, from 2020 to 2045, as shown in Table 3-1 above, is planned to have an annual growth rate of approximately 0.46% per year. This actual historical growth, as well as future planned growth, has been taken into account in the demand forecasts and future water management planning.

Figure 3-6. City of Suisun City Demographics



[9] City-Data website, accessed in August 2021. http://www.city-data.com/city/Suisun-City-California.html

3.4.2 Other Social, Economic, and Demographic Factors

It is recommended that suppliers describe social, economic, and demographic factors of their service areas since recent trends or shifts in these factors can affect water management and planning. Other demographic factors affecting water management in SSWA's service area include growth issues in the I-80 corridor between the Bay Area and Sacramento. Solano County, similar to other surrounding counties in the area, has experienced rapid urbanization in the last three decades. This growth is driven primarily by the rising cost of living in the San Francisco Bay Area, the availability of relatively affordable housing in Solano County, and the proximity of these counties to both the Bay Area and Sacramento.

Water Use Sectors of the Customer Base are addressed in Section 4.

3.5 Land Uses within Service Area

There are approximately four-square miles of land within the City boundaries. In Solano County, an initiative (Solano County Orderly Growth Initiative, 1994, as amended by Solano County General Plan Amendment, Measure T (November 2008)) requires that any urban development be annexed to a city.[10] There are no urban type populations in the unincorporated areas.

The primary land uses in the developed portions of the City are residential and commercial. The distribution of land uses provided by the City Planning Department consistent with the 2035 General Plan adopted May 5, 2015 (City of Suisun City, 2015) is as follows:

- 22 acres (less than 1%) agriculture
- 433 acres (17%) civic
- 70 acres (3%) commercial
- 22 acres (less than 1%) industrial
- 18 acres (less than 1%) natural resources
- 1,197 acres (45%) residential
- 675 acres (26%) roads/highways
- 135 acres (5%) vacant
- 47 acres (2%) water

[10] https://ballotpedia.org/Solano_County_General_Plan_Amendment,_Measure_T_(November_2008)

4 WATER USE CHARACTERIZATION

Lay Description

The Water Code requires a description and quantification of water uses in the service area, as well as recycled water if used or may potentially be used. This chapter describes and quantifies SSWA's past, 2020, and future water use projections through the year 2045, to the extent that records are available. Future water use is based upon the SSWA's past and existing water use (as of 2020), combined with considerations of anticipated growth, new regulations, changing climate conditions, and trends in customer water use behaviors. A thorough analysis examined each water use sector for a variety of factors then aggregated the information into a comprehensive projection of customer water use. Tables 4-1 through 4-4 present SSWA's actual total 2020 water consumption and projected water demands through 2045 by water use sector. Table 4-4 also shows SSWA's validated water audit results, showing 13.3% of non-revenue water as percent by volume of the total "Water Supplied" for calendar year 2019. Also presented in this chapter is a summary of drinking water pressurized distribution system water losses (i.e., leakage from pipes, under-registering meters, etc.). Information from this chapter and Chapter 6 was used to prepare the reliability assessments in Chapter 7.

4.1 Non-Potable vs. Potable Water Use

SSWA does not have an available, cost-effective supply of recycled water. Chapter 6, Section 6.2.5 discusses recycled water and its potential use in the SSWA service area. Table 4-3 summarizes total water use projections, including recycled water.

4.2 Past, 2020, and Projected Water Use by Sector

This section identifies water use, to the extent that records are available, for the 10 water use sectors identified in Water Code Section 10631(d). Additionally, a narrative description is included of how water use is calculated and projections are estimated.

The Least Cost Planning Decision Support System Model (DSS Model), created by MWM, was used to project long-term demand through 2045 based on expected service area growth for population and employment. Demand forecasts were developed to account for conservation from passive (i.e., from codes/standards) and active conservation programs. Based on this analysis, water demands were projected after accounting for the effects of the existing plumbing code and future active conservation savings. SSWA conservation measures are discussed in Chapter 9 – Demand Management Measures (DMMs).

For the demand analysis, SSWA provided metering data from 2001 through 2020 for its water rates, water use sectors, monthly water consumption and water conservation, and information for historical and projected use analyses. Based on the analyses in its DSS Model, SSWA describes its past, 2020, and projected water use for its six water use sectors, in five-year increments through 2045. As shown in Table 4-1, in calendar year 2020 the SSWA service area used a total of 1,174 million gallons (MG) including non-revenue water.

In 2020, 75% of SSWA's total water use was single family residential, while 5.4% was multi-family. In the Commercial, Institutional, and Industrial sector (CII), 5.7% of the total water use was Commercial, 0.3% was Institutional, 12.7% was Irrigation, and 0.8% was Other (hydrant and construction water use).

4.2.1 Water Use Sectors Listed in Water Code

The following water sectors are listed in the Water Code. Additional sectors or subdivisions are included as needed to reflect unique conditions that may apply to certain sectors or subsectors not listed in the Water Code.

Single Family Residential

This is defined as a single-family dwelling unit or a lot with a free-standing building containing one dwelling unit that may include a detached secondary dwelling. SSWA also includes duplexes and townhomes in the single-family category.

Multi-Family Residential

This is defined as multiple dwelling units contained within one building or several buildings within one complex. SSWA also includes mobile home parks in the multi-family category.

Commercial

This is defined as a water user that provides or distributes a product or service.

Industrial

This is defined as a water user that is primarily a manufacturer or processor of materials as defined by the North American Industry Classification System (NAICS) code sectors 31 to 33, inclusive, or an entity that is a water user primarily engaged in research and development. The following link is to the NAICS website: http://www.census.gov/cgi-bin/sssd/naics/naicsrch.

Institutional/Governmental

This is defined as a water user dedicated to public service. This type of user includes, among other users, higher-education institutions, schools, courts, churches, hospitals, government facilities, and nonprofit research institutions.

Landscape

This is defined as water connections supplying water solely for landscape irrigation. Such landscapes may be associated with multi-family, commercial, industrial, or institutional/governmental sites, but are considered a separate water use sector if the connection is solely for landscape irrigation.

Sales to Other Agencies

SSWA made no sales to other agencies; therefore, this section is not applicable.

Groundwater Recharge

This is defined as the managed and intentional replenishment of natural groundwater supplies using man-made conveyances such as infiltration basins or injection wells. Water used for groundwater banking or storage can be reported using this sector.

SSWA does not have groundwater recharge; therefore, this section is not applicable.

Saline Water Intrusion Barrier

This is defined as the injection of water into a freshwater aquifer to prevent the intrusion of saltwater.

SSWA does not have a saline water intrusion barrier; therefore, this section is not applicable.

Agricultural

This is defined as water used for commercial agricultural irrigation.

SSWA does not have agricultural irrigation; therefore, this section is not applicable.

Distribution System Water Loss

Distribution system water losses (also known as “real losses”) are the physical water losses from the water distribution system and storage facilities, up to the point of customer consumption.

See Section 4.2.4 for further details.

4.2.2 Water Use Sectors in Addition to Those Listed in Water Code

The water use sectors described below are not specifically listed in nor required by the Water Code.

Exchanges

Water exchanges are typically water delivered by one water user to another, with the receiving water user returning the water at a specified time, or when the conditions of the parties' agreement are met. Water exchanges can be strictly a return of water on a basis agreed upon by the participants or can include payment and the return of water. The water returned may or may not be an even exchange. Water can be returned on a one-for-one basis or by another arrangement (e.g., for each acre-foot of water received, two are returned).

Surface Water Augmentation

This is defined as the planned placement of recycled water into a surface water reservoir that is used as a source of domestic drinking water supply (refer to Chapter 6, Section 6.2.5 Wastewater and Recycled Water).

Transfers

The Water Code defines a water transfer as a temporary or long-term change in the point of diversion, place of use, or purpose of use due to a transfer, sale, lease, or exchange of water or water rights. Transfers can be between neighboring Suppliers or across the state, provided there is a means to convey or store the water. A water transfer can be a temporary or permanent sale of water or a water right by the water right holder, a lease of the right to use water from the water right holder, or a sale or lease of a contractual right to water supply. Water transfers can also take the form of long-term contracts to improve long-term supply reliability. Some Retail Suppliers transfer water to other suppliers. This is considered a wholesale use.

Wetlands or Wildlife Habitat

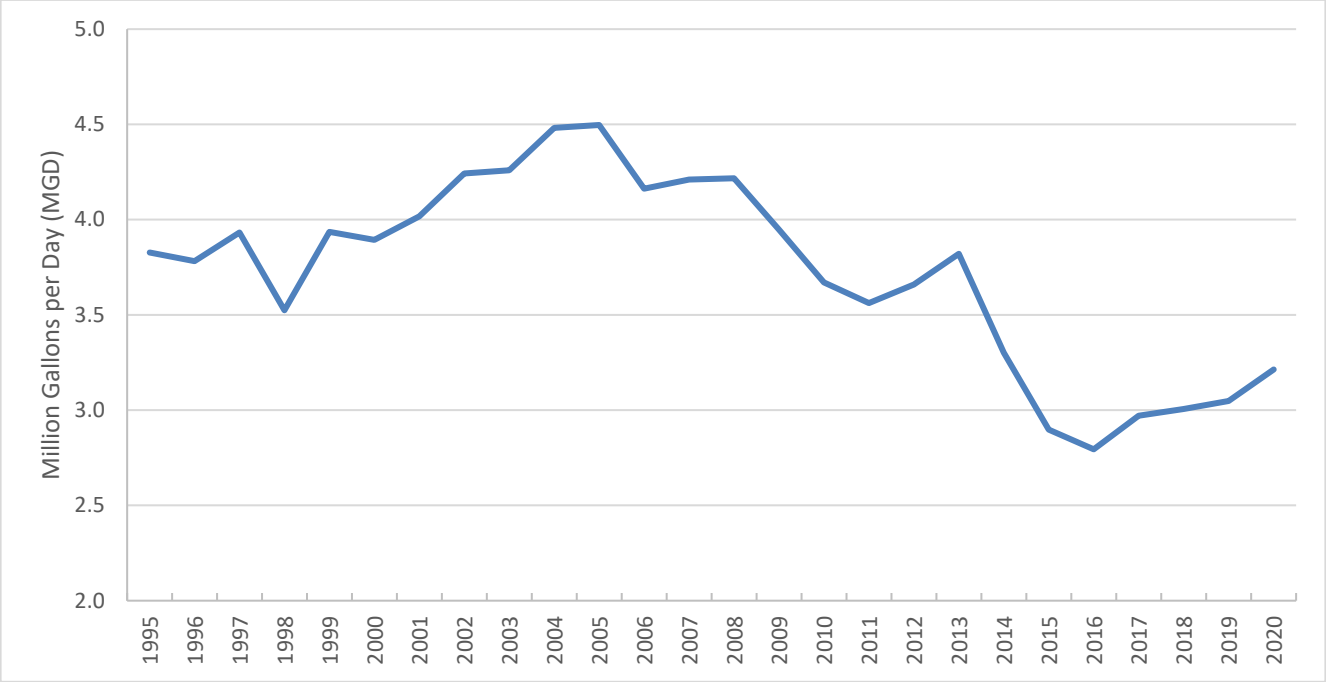
This is defined as water used for a managed environmental use to improve an environmental condition.

Other

4.2.3 Past Water Use

While not part of the DWR UWMP Reporting Tables, the Water Code requires Retail Suppliers to quantify past water use. Past water use is valuable during development of projected uses as it helps create an understanding of water use trends, effects of temporary use restrictions imposed during the most recent prolonged drought and recovery from such temporary restrictions, effects of long-term demand management measures, and other pertinent water use factors. The DSS Model analyzed SSWA's historical data from 1995–2020 to assess the impacts of certain factors (e.g., water rates, economic conditions, and weather) on water demand. The data identify demand and conservation projections through 2045 (Figure 4-1).

Figure 4-1. SSWA Historical Water Demand in Million Gallons per Day



4.2.4 Distribution System Water Loss

Distribution system water losses (also known as "real losses") are the physical potable water losses from the pressurized water distribution system and the storage facilities up to the point of delivery to the customer's system (e.g., up to the residential water meter) and are calculated using the American Water Works Association Method (Title 23 California Code of Regulations [CCR] Section 638.1 et seq.). This is the sum of American Water Works Association Method real losses and apparent losses.

In the 2020 UWMPs, distribution system water loss for each of the five years preceding the plan update must be reported (Water Code Section 10631(d)(3)) in accordance with the rules adopted pursuant to Water Code Section 10608.34. Table 4-4 is completed using the values calculated in the AWWA worksheet and submitted to DWR for each of the prior five years. Later in this section Table 4-5 (DWR Submittal Table 4-4) lists results of the Water Audit for the most recent five years of water loss data. Links to the results of Water Audit reports from 2016-2019 are included in Appendix H.

4.2.5 2020 Water Use

This section presents 2020 water use ascertained by analyzing information such as meter data, billing records, recently submitted EAR monthly reports, and more. Gross water use as of 2020 is provided in Table 4-1, not including recycled water use; recycled water use is detailed in Chapter 6 and summarized in Table 4-3 for total water use calculations.

Optional Planning Tool – 2020 Use

For the 2020 UWMP, DWR created an optional Planning Tool that suppliers could use to record and assess their data. The DWR Planning Tool can be used by water agencies but is not required.

As previously stated, SSWA used its updated 2020 DSS Model as the key reference for 2020 water use rather than the Optional Planning Tool. See Appendix C for an overview of the DSS Model.

Table 4.1. Demands for Potable and Non-Potable Water – Actual

Submittal Table 4-1 Retail: Demands for Potable and Non-Potable[1] Water – Actual			
Use Type	**2020 Actual**		
Drop down list May select each use multiple times These are the only Use Types that will be recognized by the WUE data online submittal tool	Additional Description (as needed)	Level of Treatment When Delivered Drop down list	Volume[2]
Add additional rows as needed			
Single Family		Drinking Water	800
Multi-Family		Drinking Water	58
Commercial		Drinking Water	61
Institutional/Governmental		Drinking Water	3
Landscape		Drinking Water	135
Losses		Drinking Water	107
Other	Construction Water	Drinking Water	9
		TOTAL	1,173
[1] Recycled water demands are NOT reported in this table. Recycled water demands are reported in Table 6-4. *[2] Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.*			
NOTES: Non-revenue water (losses) is calculated as the difference between total customer category use and production.			

4.2.6 Projected Water Use

This section presents projected water use for each sector in five-year increments through 2045, as reported in Table 4-2. Using the DSS Model, water use projections were developed using long-term population and employment growth projections and an average of 2018-2019 base water use which includes plumbing codes and standards. The initial step in the DSS Model was to establish the base-year water demand at the end-use level by breaking down total historical water use for each type of water service account (single family, multi-family, commercial, industrial and the like) to specific end uses, such as toilets, faucets, showers, and irrigation. Forecasting future demand involved determining the growth in the number of water service accounts. Once the rates of change were established, they were entered into the model and applied to those account types and end-use water consumption.

The next step in developing future demand was to evaluate the cost effectiveness and water savings of a variety of potential water conservation measures to determine how much of the projected demand could be reasonably met through demand management. The potential water conservation savings were deducted from the total demand. The model also incorporated the effects of plumbing and appliance codes, or so-called passive savings, on existing and future accounts, as well as anticipated land use changes, densification, and industrial development anticipated in the SSWA service area and supported by General Plan policies and strategies.

Development Factors Affecting Water Demand

There are no significant development factors affecting water demand. However, there are two new large hotels in the SSWA service area. Additionally, there are more planned developments in Suisun but many of those would require annexations and water transfers which are being worked on as of 2020. Furthermore, there are a couple of apartment complexes and residential developments going through planning stages in areas within the SSWA service boundary as of 2020.

Table 4.2. Demands for Potable and Non-Potable Water – Projected

Submittal Table 4-2 Retail: Use for Potable and Non-Potable[1] Water – Projected						
Use Type		Projected Water Use[2] *Report To the Extent that Records are Available*				
Drop down list May select each use multiple times. These are the only Use Types that will be recognized by the WUE data online submittal tool.	Additional Description (as needed)	2025	2030	2035	2040	2045 (opt)
Single Family		723	713	716	716	718
Multi-Family		64	62	63	63	63
Commercial		64	65	68	70	73
Institutional/Governmental		2	2	2	2	2
Landscape		120	123	127	131	134
Losses		139	125	112	97	83
Other	Construction Water	3	3	3	3	3
TOTAL		1,115	1,093	1,091	1,082	1,076
[1] Recycled water demands are NOT reported in this table. Recycled water demands are reported in Table 6-4. *[2] Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.*						
NOTES: Projected demands include passive savings (plumbing code) and active conservation.						

Table 4.3. Total Water Use

Submittal Table 4-3 Retail: Total Water Use (Potable and Non-Potable)						
	2020	2025	2030	2035	2040	2045 (opt)
Potable Water, Raw, Other Non-potable *From Tables 4-1R and 4-2 R*	1,173	1,115	1,093	1,091	1,082	1,076
Recycled Water Demand[1] *From Table 6-4*	0	0	0	0	0	0
Optional Deduction of Recycled Water Put Into Long-Term Storage[2]						
TOTAL WATER USE	1,173	1,115	1,093	1,091	1,082	1,076
[1]Recycled water demand fields will be blank until Table 6-4 is complete *[2] Long term storage means water placed into groundwater or surface storage that is not removed from storage in the same year. Supplier **may** deduct recycled water placed in long-term storage from their reported demand. This value is manually entered into Table 4-3.*						

20-Year Planning Horizon

In accordance with Water Code Section 10635(a), all Suppliers need to report their projected water use in five-year increments through 2040 and are encouraged to project through 2045. As shown in Table 4-2, SSWA projects its water use through 2045.

Water Year Types

For water supply reliability, SSWA is required to characterize the *normal* water use for estimating normal and single dry year water supply reliability. SSWA uses the average of two representative years (2018-2019) as its 'normal' year. The years were chosen since they were not affected by drought or other unusual environmental or economic circumstances. SSWA's *normal year* and *single dry year* data are reported in Tables 7-1, 7-2, and 7-3.

Codes and Other Considerations Used in Projections

Water savings from codes, standards, ordinances, and land use planning, also known as *passive savings*, generally decrease water use for new and future customers compared to existing customers. However, some ordinances and standards may also apply to existing customers, such as plumbing code changes that result in fixture and appliance replacements. Suppliers are required to state the extent to which passive savings are considered in these water use projections; this is noted in Table 4-5 and Appendix C.

The water demand projections in Table 4-2 are based on analysis of historic metering data and projected growth in population, jobs, and development that are presented in SSWA's 2020 DSS Model. The projections in Table 4-2 include reductions due to "plumbing code" upgrades and reflect on-going change-outs of existing plumbing fixtures for more water efficient devices and implementation of conservation measures selected by SSWA.

Optional Planning Tool – Projected Use

DWR developed optional "Planning Tool" worksheets for suppliers to facilitate their review of water use data. In this 2020 UWMP, SSWA has chosen instead to use data from its 2020 DSS Model because SSWA's past data and demand projections were analyzed in detail during the model's development process.

4.2.7 Characteristic Five-Year Water Use

A critical new component in Water Code Section 10635(b) is the requirement to prepare a five-year Drought Risk Assessment. This five-year DRA can also be used to provide the water service reliability assessment for a drought lasting five years. As a first step, DWR recommends that the expected gross water use for the next five years without drought conditions (also known as *unconstrained demand*) be estimated. These numbers can then be adjusted to estimate the five-years' cumulative drought effects. See Chapter 7 for more DRA details.

4.3 Worksheets and Reporting Tables

The Tables relevant to customer water use have been included in the appropriate subsections of this chapter rather than here. The included tables are similar to those completed by SSWA for its 2015 UWMP. The 2020 tables do contain some modifications to reflect Water Code changes, the 2020 timeframe, and to provide additional details. In addition to including the tables in this 2020 UWMP document, an electronic version of the tables was submitted to DWR.

4.3.1 Optional Planning Tool Use Analysis Worksheet

In this 2020 UWMP, SSWA is using data from its 2020 DSS Model because SSWA's past data and demand projections were analyzed in detail during the DSS Model development.

4.3.2 DWR 2020 UWMP Submittal Tables

Tables 4-1 through 4-5 are part of DWR's electronic reporting system and are used by DWR to evaluate regional and statewide water use information and summarize data for DWR-required Legislative reports. Earlier in

Chapter 4, Tables 4-1 through 4-3 present SSWA's actual total 2020 water consumption and projected water demands through 2045 by water use sector. Table 4-4 shows SSWA's validated water audit results, indicating that the 2019 water loss was 13.3% of the total water supplied.

Table 4.4. 12-Month Water Loss Audit Reporting

Submittal Table 4-4 Retail: Last Five Years of Water Loss Audit Reporting	
Reporting Period Start Date (mm/yyyy)	Volume of Water Loss [1,2]
01/2019	145
01/2018	158
01/2017	199
01/2016	178
01/2015	216
[1] Taken from the field "Water Losses" (a combination of apparent losses and real losses) from the AWWA worksheet. *[2] Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.*	

4.4 Water Use for Lower Income Households

As required, SSWA is including the projected water use for lower income households in this 2020 UWMP. A lower income household has an income below 80% of area median income, adjusted for family size. The most recent source of data for low-income housing units for the City is the March 2015 City of Suisun City 2015–2023 Housing Element prepared by PMC.[11] The 2010 area median income provided in the report was $79,200. Low-income households represent 32.9% of the City households. See Table 4-5b for low-income residential demand.

Table 4.5. Inclusion in Water Use Projections

Submittal Table 4-5 Retail Only: Inclusion in Water Use Projections	
Are Future Water Savings Included in Projections? (Refer to Appendix K of UWMP Guidebook)	Yes
If "Yes" to above, state the section or page number, in the cell to the right, where citations of the codes, ordinances, or otherwise are utilized in demand projections are found.	Appendix C
Are Lower Income Residential Demands Included In Projections?	Yes
NOTES: According to the March 2015 City of Suisun City 2015–2023 Housing Element prepared by PMC, low-income households represent 32.9% of City of Suisun City households. See Table 4-5b for low-income residential demand.	

The following table presents the estimated low-income household water use for SSWA's service area. Lower income demand is embedded in the previously presented demand projection estimates. According to the 2015–2023 Housing Element (PMC, 2015), low-income owner-occupied and renter-occupied households represent 2,850 of a total 8,660 or 32.9% of City households. Projected low-income demands represent 32.9% of projected single family and multi-family residential demands.

[11] https://www.suisun.com/Departments/Development-Services/Planning/General-Plan/Housing-Element

Table 4-5b. Projections of Future Low-Income Household Water Use, MG

Water Use	2025	2030	2035	2040	2045
Estimated Very Low and Low-Income Household Water Use	259	255	256	256	257
NOTES: Lower income demand is embedded in the presented demand projection estimates. According to the March 2015 City of Suisun City 2015–2023 Housing Element prepared by PMC, low-income owner-occupied and renter-occupied households represent 2,850 of a total 8,660 or 32.9% of City of Suisun City households. Projected low-income demands represent 32.9% of projected single family and multi-family residential demands. A lower income household has an income below 80% of area median income, adjusted for family size. The 2010 area median income provided in the report was $79,200.					

4.5 Climate Change Considerations

The types of climate change impacts that were considered in the water use projections include water demands, precipitation, and sea level rise. The Solano Project watershed is located in the coastal mountains – Lake County and Napa County. The source of water is from rainfall only. Since it does not rely on snowfall, at this time only a minor change in water availability is predicted due to climate change.

4.5.1 Water Demand Impacts and Analysis

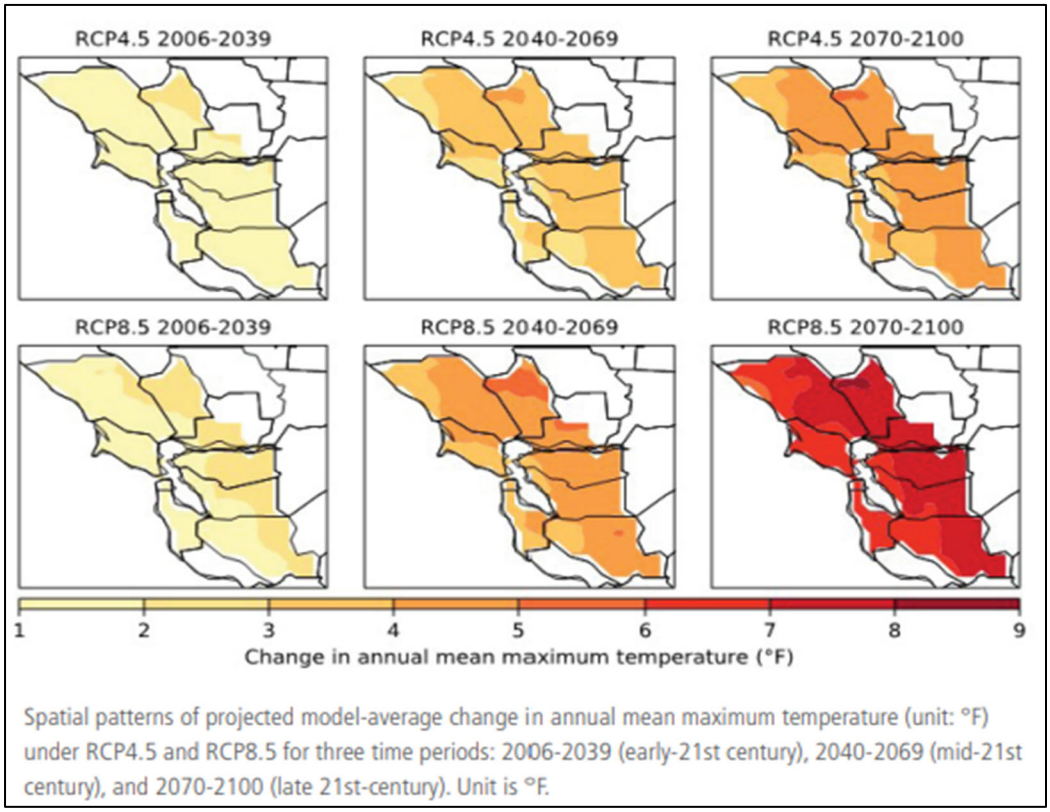
The Public Policy Institute of California has predicted that five climate pressures will impact the future of California's water management: warming temperatures, shrinking snowpack, shorter and more intense wet seasons, more variable precipitation, and rising seas.[12] As of 2019, some of these pressures are already apparent. The climate impact on water supply is predicted to significantly exceed the impact on water demand.

Precipitation in the Bay Area will continue to have high variability year to year, leading to very wet years at times and very dry years at other times. The largest winter storms in the Bay Area will likely become more powerful and potentially more damaging. Due to a predicted increase in future temperature, it is assumed that California and the Bay Area will experience longer and deeper droughts, which could impact the water supply.

The International Panel on Climate Change (IPCC) has several future climate change scenarios referred to as Representative Concentration Pathways (RCP). RCP 4.5 represents a mitigation scenario where global CO2 emissions peak by the year 2040. RCP 8.5 represents the business-as-usual scenario where CO2 emissions continue to rise throughout the 21st century. The following figure shows the spatial changes in annual mean of maximum daily temperatures across nine Bay Area counties under RCP 4.5 and RCP 8.5.

[12] Public Policy Institute of California. (2019). Priorities for California's Water, accessed online December 2019: https://www.ppic.org/publication/priorities-for-californias-water/

Figure 4-2. Bay Area Historical and Projected Mean Maximum Temperatures



Spatial patterns of projected model-average change in annual mean maximum temperature (unit: °F) under RCP4.5 and RCP8.5 for three time periods: 2006-2039 (early-21st century), 2040-2069 (mid-21st century), and 2070-2100 (late 21st-century). Unit is °F.

Source: Ackerly et al. (University of California, Berkeley), 2018.

According to the San Francisco Bay Area Climate Change Assessment (Ackerly et al., 2018), the Bay Area's historical temperature increased 1.7 degrees Fahrenheit from 1950 to 2005. It is predicted that annual mean maximum temperatures will increase by 1 to 2 degrees Fahrenheit in the early 21st century from the years 2006 to 2039, then will increase by an additional 3.3 degrees Fahrenheit in the mid-21st century from 2040 to 2069. This increment for the mid-21st century rises to 4.4 degrees Fahrenheit if the Bay Area remains under the high emissions scenario of "business-as-usual."

The above IPCC report temperature change is broken over two time periods (early-21st century and mid-21st century). Following are the considerations and methodology used to calculate the average annual temperature change for each of the IPCC report time periods:

- Early 21st century (2006-2039) had an estimated temperature increase of 1 to 2 degrees Fahrenheit that was averaged to 1.5 degrees Fahrenheit. For the 33-year time period, this equates to an average annual temperature increase of 0.045 degrees Fahrenheit.
- Mid-century (2040-2069) was estimated to have an increase of 3.3 degrees Fahrenheit. For the 29-year time period, this equates to an average annual temperature increase of 0.114 degrees Fahrenheit.

4.5.2 Precipitation

Climate change has the potential to impact SSWA's surface water supply directly and groundwater supplies indirectly, particularly through precipitation. However, SID is committed to adapting to climate change in ways that protect water resources for maximum benefit. For further discussion on the climate change impacts on precipitation for the SSWA service area, including SID involvement, see the full discussion in Section 3.3.1 of this UWMP.

4.5.3 Sea Level Rise

The Suisun City Marina is connected to the Bay Area Delta. Although the watershed and reservoirs are not on the Delta, the sea level rise might impact the service area land uses. Updated in 2018, the *State of California Sea-level Rise Guidance*[13] recommends using three risk projections until 2050 for projects in the San Francisco area with a lifespan to 2050, under a high-emissions scenario (RCP 8.5):

- Low risk aversion projection: 1.1 feet
- Medium-high risk aversion projection: 1.9 feet
- Extreme risk aversion projection: 2.7 feet

For highly vulnerable or critical assets that have a lifespan beyond 2050 and would result in significant consequences if damaged, it is recommended that the extreme risk aversion projection be included in planning analyses. The range of low, medium-high, and extreme risk aversion projections should be evaluated across the range of high and low emissions scenarios (RCP 8.5 and RCP 2.6, respectively). For example, for a project with a lifespan to 2100, the recommended range of projections is as follows:

- Low risk aversion projection: 2.4 – 3.4 feet
- Medium-high risk aversion projection: 5.7- 6.9 feet
- Extreme risk aversion projection: 10.2 feet

A discussion of the potential impacts of climate change on water supply is located in Section 6.2.10.

[13] California Natural Resources Agency and California Ocean Protection Council. (2018). *State of California Sea-Level Rise Guidance*, 2018 Update. http://www.opc.ca.gov/webmaster/ftp/pdf/agenda_items/20180314/Item3_Exhibit-A_OPC_SLR_Guidance-rd3.pdf

5 SB X7-7 BASELINES AND TARGETS

Lay Description

With the adoption of the Water Conservation Act of 2009, also known as SB X7-7, the Legislature required all state water suppliers to reduce urban per capita water use by 20% by the year 2020. California Water Code (Water Code) Section 10608.16(a) states: "The state shall achieve a 20-percent reduction in urban per capita water use in California on or before December 31, 2020." In order to meet this urban water use target requirement, each retail supplier completing a UWMP was required to determine its Baseline and Target water use for the year 2020 in gallons per capita per day (GPCD) using one of the four methods established by DWR. Suppliers also were given the option to comply individually or regionally. For further information on the technical components of these calculations, DWR's guidelines can be found in its *Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use* document (DWR, 2016).[14]

This chapter describes SSWA's calculation of its 2020 Target and Baseline water use and identifies which Target Method was used (see Section 5.2.1). In addition, this chapter demonstrates SSWA's compliance with this target through the SB X7-7 Verification Form in Appendix B and Tables 5-1 and 5-2 in this chapter.

GPCD Terminology

When determining water use in a UWMP, two terms are often used interchangeably:

- Daily Per Capita Water Use – This is the amount of water used per person per day. In UWMP calculations, this is total water use within a service area, divided by population, and it is measured in gallons.
- GPCD – This is the "daily per capita water use" measured in gallons. Therefore, the term commonly used when referring to "daily per capita water use" is "gallons per capita per day" or GPCD.

It is important to distinguish GPCD (as used in UWMPs) from the Residential GPCD (R-GPCD) that is used in some reporting to the State Water Board.

- GPCD is the total water use from all sectors within a service area (residential, commercial, institutional, and any others) minus allowable exclusions, then divided by the population. This is used in UWMPs.
- R-GPCD is only a part of the GPCD; it is the estimated residential water use in a service area divided by population.

5.1 Guidance for Wholesaler Suppliers

SSWA is a retailer and not a wholesaler; therefore, this section is not applicable.

5.2 Updating Calculations from 2015 UWMP to the 2020 UWMP

Section 5.2 only applies to suppliers that need to update their 2020 Target and/or Baseline because of changes to their distribution area per *Water Code Section 10608.20 (g)*.

SSWA does not need to update its Target or Baseline GPCD, as its distribution system and service area boundaries have not changed since the 2015 UWMP. Therefore, this section is not applicable.

5.2.1 Update of Target Method

There are four different methods a supplier can use to calculate its target. Suppliers must use the same target method in their 2020 UWMP that they used in their 2015 UWMP if they need to update values.

[14] DWR. (2016). *Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use*. https://cadwr.app.box.com/s/5rbv5gjm881dxonycnb7u2253a0l6e8l

SSWA used Target Method 3 in 2015 and is using the same method for this 2020 UWMP. Since SSWA is not updating its Target Method and is using the same Baseline and Target GPCD that was developed using Method 3 in its 2015 UWMP, this section does not apply.

5.2.2 Updating Baseline and Target GPCDs

For the 2020 UWMP, SSWA is not updating its Baseline or Target GPCD.

5.2.3 SB X7-7 Verification Form

All Retail Suppliers are required to submit the standardized tables in the SB X7-7 Verification Form with their 2020 UWMPs. These standardized tables were available in 2015 and are required again in 2020, to demonstrate compliance with the Water Conservation Act of 2009. SSWA is in compliance with SB X7-7 for the established water use target for the year 2020. Compliance is verified by DWR's review of the SB X7-7 Verification Form, which is summarized in Tables 5-1 and 5-2.

5.3 General Requirements for Baseline and Targets

The 2020 UWMP requirements are the same as the 2015 UWMP requirements for determining the baseline period, Baseline GPCD, Target confirmation, and 2020 Target. They are as follows:

- **Baseline Period:** Per *Water Code Section 10608.20*, Water use GPCD must be calculated and reported for two baseline periods, the 10- or 15-year baseline (Baseline GPCD) and the 5-year baseline (Target Confirmation).
    - The defined Baseline Period for SSWA for the 10-year baseline was 1999–2008. The 15-year period was not used given no recycled water is delivered by SSWA.
    - Suppliers must use their same water use from the 5-year baseline period as reported in 2015 UWMPs. This water use amount will be used to confirm that the selected 2020 target meets the minimum water use reduction requirements. The defined Baseline Period for SSWA for the 5-year period baseline was 2004–2008.
- **Baseline GPCD:** To correctly calculate annual GPCD, suppliers must determine the population that they served for each baseline year in both baseline periods. SSWA used ABAG 2019 data to determine the population served for each baseline period. For each baseline year, a GPCD is calculated by dividing gross water use by the service area population. Baseline GPCD or Target Confirmation GPCD is then an average of all GPCDs for each baseline year in the baseline period. The average baseline GPCD for SSWA is 153 for the 10-year period.
- **Target Confirmation:** The 5-year baseline, also called the Target Confirmation, is a shorter-term baseline for confirming the 2020 Target. Suppliers must use their same water use from the 5-year baseline period as reported in 2015 UWMPs. This water use amount will be used to confirm that the selected 2020 target meets the minimum water use reduction requirements. The defined 5-year baseline period for SSWA was 2004–2008. The 5-year baseline GPCD for SSWA was 155.
- **2020 Target:** Every suppler must calculate a water use target for 2020 in GPCD (2020 Target). The Target Method used in the 2015 UWMP may not be changed in any amendments to the 2015 UWMP or in the 2020 UWMP. SSWA used Target Method 3 for determining the 2020 Target in their 2015 UWMP.

5.4 Service Area Population

In order to correctly calculate the compliance year GPCD, Retail Suppliers must determine the population that they served in 2020. DWR recommends the U.S. Census 2020 decennial data as the most defensive population data, however it was not available at the time of the 2020 UWMP preparation. DWR permits California Department of Finance (DOF) data, American Community Survey 2018 or 2019 data (if available for the 2020

calculations), or other sources of population counts that the supplier considers the best available information for its service area.

In developing the 2020 UWMP, SSWA and MWM evaluated several data sources available for historical and projected population. They opted to use DOF population data plus ABAG 2019 population data for average household size to determine the 2020 population of Mankas Corner, a rural area served by SSWA, and the unincorporated area of Tolenas. SSWA and MWM further refined the DOF population data by comparing the DOF boundary to the SSWA service area boundary. This included accounting for the actual percentage of area and adding the community water use of Mankas Corner and Tolenas as additional population served. According to ABAG data, Mankas Corner has 23 residential parcels and Tolenas has 191 residential connections. Both have an approximate household size of 3.1. Population numbers were adjusted to ensure that the population data used were consistent with the actual area served. ABAG population data were further evaluated in comparison to other data sources (e.g., 2010 census) to identify any anomalies, all of which were addressed. Annual baseline population values and source information can be found in Section 5.4.5, Table 5-0a (SB X7-7 Table 2 – Method for Population Estimates), and Table 5-0b (SB X7-7 Table 3 – Service Area Population).

5.4.1 Department of Finance

Suppliers whose service area boundaries correspond by 95% or more with the boundaries of a city during the baseline period and the compliance year 2020 will be able to obtain population estimates from tables prepared by the DOF.

As previously mentioned, and further detailed in Section 5.4.5, SSWA used DOF data to quantify the 2020 population for the City. Mankas Corner and Tolenas were then added to the DOF population value using number of connections and ABAG 2019 data to determine the full-service area population for use in calculations for this 2020 UWMP.

5.4.2 U.S. Census Bureau American Community Survey

For the 2020 UWMP, SSWA did not use the U.S. Census Bureau Survey because they opted to use the ABAG 2019 and DOF data as further detailed in Section 5.4.5.

5.4.3 Persons-per-Connection

This method is used to determine population estimates for the non-census years, including 2020, until the 2020 U.S. Census data is released. Suppliers must already have population estimates for the census years in order to use this method. Number of service connections refer to the residential connections, except in the case where suppliers have classified any residential (including multi-family residential) as any other category, such as commercial or mixed use.

For the 2020 UWMP, SSWA used the Persons-per-Connection method to calculate the population for the communities of Tolenas and Mankas Corner. SSWA used the household size of 3.1 from the 2019 ABAG projections times the number of connections for each community.

5.4.4 DWR Population Tool

For the 2020 UWMP, SSWA did not use the DWR Population Tool because they opted to use the ABAG 2019 and DOF data as further detailed in Section 5.4.5.

5.4.5 Other Population Methods

Suppliers may estimate their population using other methods developed in-house, by a wholesaler, Association of Governments, consultant, university, or other entity. However, DWR must determine that the alternate method complies with the requirements of Methodology 9 of the *Methodologies* document (DWR, 2016) and is at least as accurate as the methods recommended by DWR. The supplier must provide a description of the method that provides enough detail for DWR to make this evaluation.

SSWA used ABAG 2013 for its population numbers in the 2015 UWMP. For the 2020 UWMP, SSWA elected to use DOF population combined with ABAG household size for the City to calculate the full-service area population for unincorporated areas of Mankas Corner and Tolenas. The use of this source is most appropriate because the boundary of SSWA's service area does not coincide with municipal boundaries. Furthermore, this source is consistent as ABAG data was used in SSWA's 2015 UWMP, as well as in the 2015 and 2020 DSS Model updates. In 2020, the SSWA service area population was 29,783. For the 2020 UWMP, it was unnecessary to recalculate the 10-year and 5-year baseline calculations.

As per DWR requirements, Table 5-0a (SB X7-7 Table 2: Method for Population Estimates) and Table 5-0b (SB X7-7 Table 3: Service Area Population) have been completed and are included below.

Table 5-0a. Method for Population Estimates

SB X7-7 Table 2: Method for 2020 Population Estimate	
Method Used to Determine 2020 Population (may check more than one)	
☑	**1. Department of Finance** (DOF) or **American Community Survey** (ACS)
☑	**2. Persons-per-Connection Method**
☐	**3. DWR Population Tool**
☐	**4. Other** DWR recommends pre-review
NOTES: 2020 population value is from the Department of Finance Table E-5 for City of Suisun City plus a derived population of 72 people for Mankas Corner and 592 people for Tolenas, based on number of residential parcels times average household size per size of 3.1 per Association of Bay Area Governments.	

Table 5-0b. Service Area Population

SB X7-7 Table 3: 2020 Service Area Population	
2020 Compliance Year Population	
2020	29,783

5.5 Gross Water Use

Gross water use must be reported for each year in the baseline periods as well as for 2020, the compliance year. SSWA's gross water use is the total volume of water, based on metering data, which enters its distribution system over a 12-month period from its supplier, SCWA, with certain allowable exclusions as follows:

- Recycled water delivered within the service area. Recycled water use has been excluded from all calculation of gross water, as reflected in the SB X7-7 tables. SSWA is not required to report recycled water use nor demonstrate any reduction in recycled water use for purposes of SB X7-7.
- Indirect recycled water (see Methodology 1 from the *Methodologies* document – DWR, 2016)
- Water placed into long-term storage (surface or groundwater)
- Water conveyed to another urban supplier
- Water delivered for agricultural use, except as otherwise provided in subdivision (f) of Section 10608.24

- Process water

In the 2020 UWMP, SSWA used million gallons as the units of measure based on metered deliveries from the Putah South Canal. Solano Project water stored in Lake Berryessa is released down Putah Creek from Monticello Dam and diverted to the Putah South Canal at the Putah Diversion Dam located approximately 13 miles downstream. The Putah South Canal is a 33-mile long USBR owned facility and delivers raw Solano Project Water to the Cement Hill Water Treatment Plant where the water is treated to potable water standards. The treated water is then conveyed to SSWA's distribution system in the City. SSWA's metering data includes all the water that enters its distribution system during a calendar year (month through month) as well as water delivered to individual customers. The SSWA does not use other sources of water, such as groundwater, recycled water, or desalinized water, and does not have other exclusions for industrial water.

Gross water use is reported in the SB X7-7 Verification Form tables in Appendix B for each year in the baseline periods as well as in the 2015 Interim Target compliance year and the 2020 Target. There are several tables from the SB X7-7 Verification Form that are related to gross water calculations. Suppliers who deduct indirect recycled water and/or process water from their gross water will complete additional tables, as found in the subsections below. Since, as stated above, SSWA does not use other sources of water, this is not applicable and as such not included in SSWA's calculations.

5.6 Baselines and Target Summary

SSWA used Method 3, Base Daily Per Capita Water Use, to develop its 2020 water use Target and 2015 water use Interim Target as the preferred method for determining compliance with SB X7-7. Method 3 is based on the *2020 Water Conservation Plan* (DWR, 2010). This method allows the water supplier to select the hydrologic regions target as the GPCD goal. The applicable hydrologic region for SSWA is Region 2 – San Francisco Bay. As provided by DWR, the 2020 target for this region is 124 GPCD as shown in Figure 5-1. The difference between the 10-year baseline water use of 153 GPCD and the hydrologic region target of 124 GPCD is 29 GPCD, which equates to an approximate **negative** 19% reduction necessary for compliance.

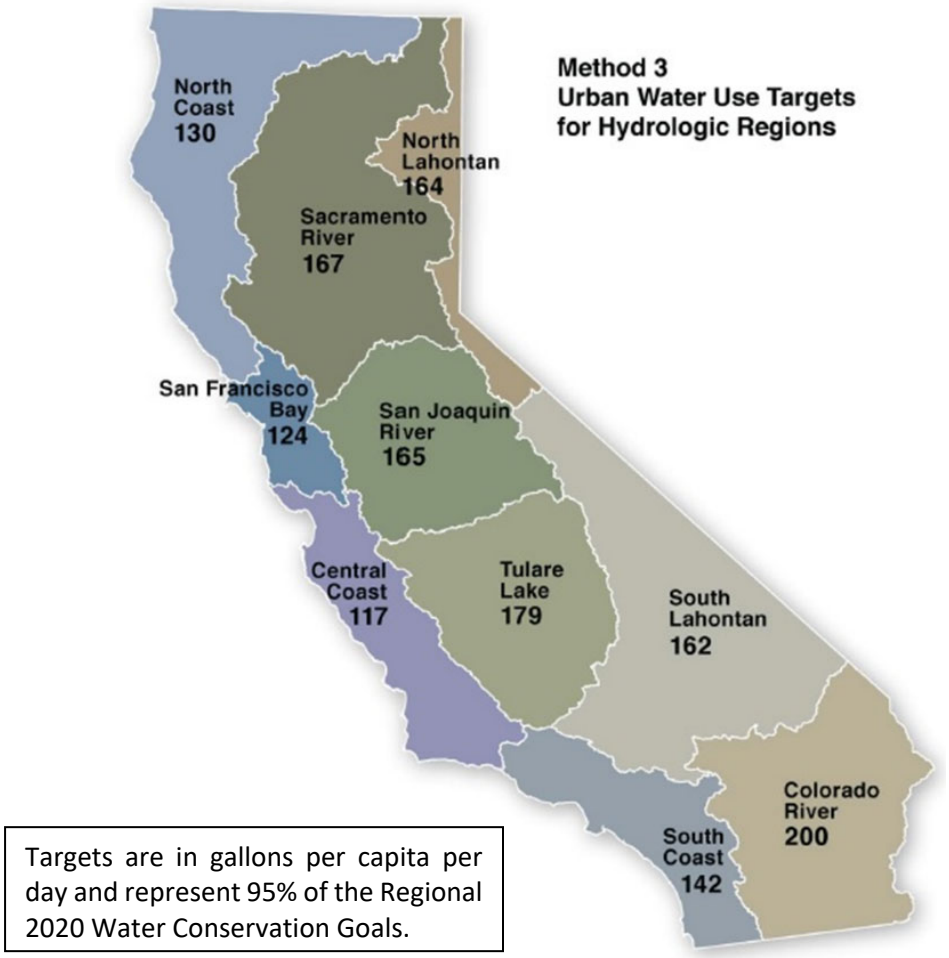
Method 3 requires SSWA's 2020 conservation goal to be no more than 95% of its 5-year baseline of 155 GPCD. SSWA's 2020 target was 124 GPCD.

As per DWR recommendation, the SB X7-7 Verification Form is included in Appendix B and summarized in Tables 5-1 and 5-2. SSWA's Average Baseline GPCD use (as shown in Table 5-1) is the total water used (in gallons) divided by the total service area population that has been averaged over 5 years or 10-15 years. The summary of the SB X7-7 calculations that were previously reported in the 2015 UWMP are unchanged for this 2020 UWMP.

Table 5.1. Baselines and Targets Summary

Submittal Table 5-1 Baselines and Targets Summary From SB X7-7 Verification Form *Retail Supplier or Regional Alliance Only*				
Baseline Period	Start Year *	End Year *	Average Baseline GPCD*	Confirmed 2020 Target*
10-15 year	1999	2008	153	124
5 Year	2004	2008	155	

Figure 5-1. Basis of the Method 3 Demand Target – San Francisco Bay Hydrologic Region



As part of the 2015 UWMP, all retail water suppliers were to develop an implementation plan for compliance with SB X7-7, requirements of which provided the overall goal for community-wide water demand reduction. The compliance with GPCD targets required by SB X7-7 was voluntary on behalf of each individual property owner. In development of its implementation plan (described below), SSWA was careful to avoid placing a disproportionate burden on any customer sector.

As part of its implementation plan, SSWA encouraged reductions in customer water demand mainly through the implementation of the Demand Management Measures, included in the 2015 UWMP and again in this 2020 UWMP, along with focused work on reducing water loss (a key area determined to be of specific importance for the SSWA service area). The SSWA Board also strengthened some existing policies and adopted new policies to help achieve their targets. Compliance with some of these Board policies was not necessarily voluntary, such as requirements to avoid wasteful practices (e.g., enforcement of the SSWA Board policy imposing fines for water waste violation). The highest priority with the largest potential water savings was determined to be water audit and leak reduction. Detailed descriptions of the water reduction plan elements were included in Section 8 of the 2015 UWMP.

5.7 2020 Compliance Daily Per Capita Water Use (GPCD)

Per *Water Code Section 10608.12(e),* "Compliance daily per capita water use" means the gross water use during the final year of the reporting period. Per *Water Code Section 10608.20 (e),* "*An urban retail water supplier shall*

include in its urban water management plan…compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data."

This section describes SSWA's compliance and adjustments to Gross Water Use.

5.7.1 Meeting the 2020 Target

As shown in Table 5-2, based on SSWA actual metered water consumption for 2020, the GPCD use was 108. This is significantly lower than SSWA's 2020 Target of 124 GPCD, illustrating compliance with its 2020 Target. SSWA used SB X7-7 Method 3 to determine compliance with its 2020 Target.

For the SSWA service area, 2020 was an extremely unusual year due to the COVID-19 pandemic. Therefore, SSWA is continuing to track changes in its water use sectors to determine if these water use patterns are short-term (i.e., from the pandemic) or ongoing.

5.7.2 2020 Adjustments to 2020 Gross Water Use

SSWA has not made any adjustments to its 2020 gross water use; therefore, this does not apply.

Extraordinary Events

If extraordinary events have affected institutional water use, suppliers may choose to adjust their compliance GPCD. An example recognized by DWR is the shelter-in-place requirement in California, due to COVID-19 precautions beginning in March 2020, which minorly affected urban water use (Cooley et al., 2020). In all cases of extraordinary events, it is important to adequately document the rationale and calculations leading to any adjustments. Table 5-2 includes a space to document this consideration, along with other adjustments.

Table 5.2. 2020 Compliance

Submittal Table 5-2: 2020 Compliance From SB X7-7 2020 Compliance Form *Retail Supplier or Regional Alliance Only*				
2020 GPCD			2020 Confirmed Target GPCD*	Did Supplier Achieve Targeted Reduction for 2020? Y/N
Actual 2020 GPCD*	2020 TOTAL Adjustments*	Adjusted 2020 GPCD* *(Adjusted if applicable)*		
108	0	108	124	Yes

5.8 Regional Alliance

Suppliers that are choosing to comply with SB X7-7 requirements through a Regional Alliance must report the information from this chapter in the Regional Alliance Report.

SSWA is complying with SB X7-7 as an individual retail agency, not as part of a Regional Alliance; therefore, this does not apply.

6 WATER SUPPLY CHARACTERIZATION

Lay Description

This section characterizes SSWA's system supplies, including purchased or imported water, groundwater, surface water, stormwater, wastewater, recycled water, desalinated water, exchanges or transfers, future water projects, and any climate change impacts.

The water supply analysis detailed herein focuses on characterizing each water asset to assess reliability and risk. The more accurate and detailed this characterization is, the better prepared SSWA will be to manage its water assets, assess supply reliability, perform its Drought Risk Assessment (DRA), and prepare and implement its WSCP.

6.1 Water Supply Analysis Overview

This section will identify and quantify, to the extent practicable, the existing and planned sources of water available to SSWA in 5-year increments for 25 years.

6.1.1 Specific Analysis Applicable to All Water Supply Sources

System Supplies

SSWA has two sources of water as of 2020, the USBR Federal Solano Project and the DWR State Water Project (SWP). The main water supply to SSWA is from Lake Berryessa (shown in Figure 6-3) which is owned and operated by the USBR and has a storage capacity of 1,602,000 acre-feet (AF).

The SWP is the largest state-built, multi-purpose water project in the country. It was authorized by the California State Legislature in 1959, with the construction of most initial facilities completed by 1973. Today, the SWP includes 34 storage facilities, reservoirs and lakes, 20 pumping plants, 4 pumping-generating plants, 5 hydro-electric plants, and approximately 700 miles of aqueducts and pipelines. The primary water source for the SWP is the Feather River, a tributary of the Sacramento River. Storage released from Oroville Dam on the Feather River flows down natural river channels to the Sacramento-San Joaquin River Delta (Delta). While some SWP supplies are pumped from the northern Delta into the North Bay Aqueduct, the vast majority of SWP supplies are pumped from the southern Delta into the 444-mile-long California Aqueduct. The California Aqueduct conveys water along the west side of the San Joaquin Valley to Edmonston Pumping Plant, where water is pumped over the Tehachapi Mountains, then divides into the East and West Branches.

Figure 6-1. Suisun-Solano Water Authority Water Sources

6.1.2 Other Characterization Considerations

6.1.3 Optional Planning Tool

As previously mentioned, SSWA has opted to use the DSS Model rather than the Optional Planning Tool for its 2020 UWMP.

6.2 UWMP Water Supply Characterization

SSWA's water supply portfolio is described and quantified in the following subsections, including imported supplies and recycled water.

6.2.1 Purchased or Imported Water

The City has water rights for both the Solano Project and the SWP. The City's SWP entitlement is from the North Bay Aqueduct (NBA). The SWP entitlement started in the year 1990 and increased by 50 acre-feet per year (AFY) until the maximum of 1,300 AFY was reached in 2015. As of 2020 SSWA does not have the facilities to convey or treat the SWP water but may develop such capability in the future. If a point of transfer is created for SWP water, the City may request an exchange on a one-for-one basis of any water entitlement from NBA for water from SID's Solano Project Allocation, and per terms of the 1990 Suisun-Solano Water Authority Implementation and Lease Agreement, SID shall exchange the requested amount. The diversity of available water resources provides for very good supply reliability for SSWA. This Implementation Agreement can be found in Appendix J.

According to the most recent Water Supply Assessment done by SSWA: "Both Suisun City and Solano Irrigation District have contracts with Solano County Water Agency for water supplies from the Federal Solano Project. The Solano County Water Agency is the contracting agency with the United States Bureau of Reclamation (USBR) for the water supplies from the Solano Project. SSWA has a water treatment facility that receives surface water from the Solano Project and, following treatment, delivers it to the service area. At present, due to a lack of connection to the SSWA water treatment plant, the City is unable to directly utilize their SWP entitlement, but they do have the opportunity to transfer to others or exchange this entitlement with other Solano County water users with access to the North Bay Aqueduct during periods of water shortage. This would include the cities of Benicia, Fairfield, Vacaville, and Vallejo. SID, under their Implementation Agreement with SSWA, delivers from its Solano Project entitlement the additional water needed to provide treated water service to the SSWA service area."

The amount of water that the SWP agreed to deliver to an agency is listed in Table A of Article 6 of typical SWP long-term water supply contracts. Hence this quantity is referred to as "Table A water." The contracts were structured to reflect increasing population and water demand, so Table A amounts gradually increased over time until a maximum Table A amount was reached. According to SCWA's 2010 UWMP, SCWA has contracted for an ultimate allocation of 15,556 MG of water per year from the SWP. This amount includes 1,875 MG of additional SWP water per year that SCWA purchased on behalf of the cities of Fairfield and Vacaville from Kern County Water Agency (another SWP contractor) in 2001. The SWP contract amount is 15,556 MG as of 2015 and will not increase, as it has reached the maximum Table A amount. SSWA's SWP allocation is included in SCWA's Table A amount, as are the allocations to the rest of the agencies contracting with SCWA for SWP water (agencies are known as "member units").

SWP contractors can also "carry over" (retain) part of their allocated Table A water from one year to the next, subject to reservoir operations (levels, filling cycles, and flood operations). This allows contractors to conserve their supplies by not losing them at the end of the year and saving it for future dry years.

DWR policy is that the SWP also makes available "Article 21 water" that is available to SWP contractors under specified conditions when the Delta is in excess (out of balance) conditions and there is pumping capacity available. SCWA receives its water from the NBA and Article 21 water is available to NBA users more frequently than SWP contractors relying upon the Banks Pumping Plant (South Delta SWP export facility) capacity. For the purposes of this UWMP, Article 21 deliveries are not included, although they can be a significant additional supply most years.

As shown in Table 6-1, there is no historical groundwater supply data for SSWA since it does not pump groundwater. The 2020 breakdown of Solano Project deliveries from SID and the City is in Table 6-8. Future water supplies include the aforementioned sources. Projected water supplies are provided in Table 6-9.

6.2.2 Groundwater

Agencies that pump, or expect to pump, groundwater are required to include in their UWMPs an overview of the groundwater resources and groundwater management strategies. SSWA has not pumped groundwater since 2001 and does not plan to do so in the foreseeable future. Therefore, this section does not apply to SSWA.

Table 6.1. Groundwater Volume Pumped

Submittal Table 6-1 Retail: Groundwater Volume Pumped						
☑	Supplier does not pump groundwater. The supplier will not complete the table below.					
☐	All or part of the groundwater described below is desalinated.					
Groundwater Type ***Drop Down List*** *May use each category multiple times*	Location or Basin Name	2016*	2017*	2018*	2019*	2020*
	TOTAL	0	0	0	0	0
NOTES: There are currently no plans for groundwater in the service area.						

6.2.3 Surface Water

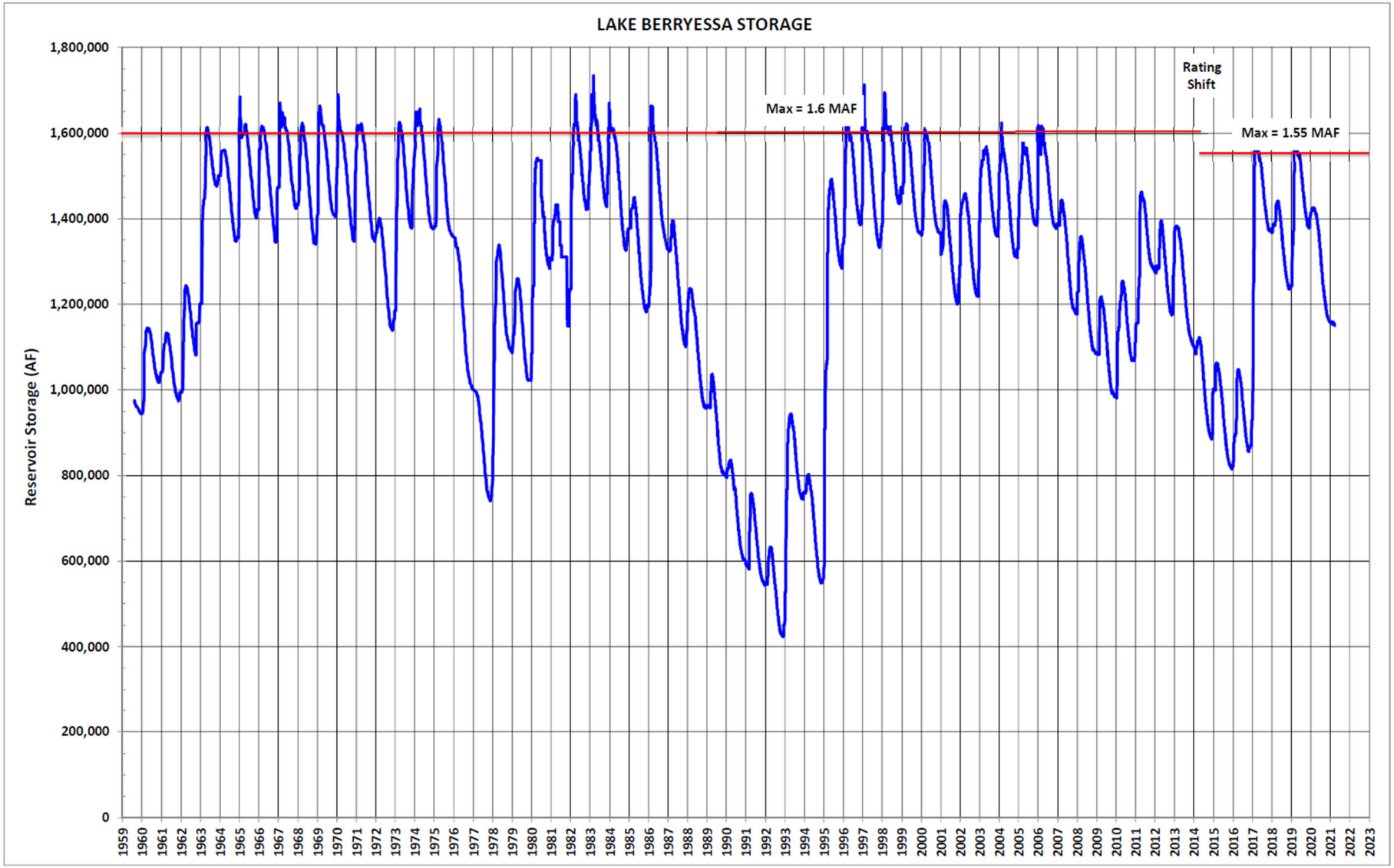
Water from streams, lakes, and reservoirs is considered a surface water supply for the purposes of the UWMP.

Solano Project water stored in Lake Berryessa is released down Putah Creek from Monticello Dam and re-captured by Putah Diversion Dam approximately 13 miles downstream. The water is diverted through the Putah South Canal to the Cement Hill Water Treatment Plant where the water is treated and piped to the City through Fairfield.

Figure 6-2 shows Lake Berryessa's historical lake levels. The graphic displays the cyclical nature of the lake levels and clearly shows the droughts that occurred in 1976-78 and 1990-1993 as well as the recent drought from 2012-2016. In 2007 Solano County Water Agency completed a bathymetric study of Lake Berryessa. The conclusion was an updated rating curve for depth to volume. The total volume of the lake was established and approved by the USBR to be 1.6 million nominal acre-feet.

Surface water supplies are reported in Tables 6-8, 6-9, and 7-1. Surface water that is not self-supplied will be reported as Purchased or Imported Water in Tables 6-8 and 6-9.

Figure 6-2. Historical Lake Berryessa Storage Levels



6.2.4 Stormwater

Communities are increasingly implementing opportunities to beneficially use stormwater to meet local water supply demands. These actions are motivated by constrained local water resources, new regulations, and relieving strain on overburdened stormwater infrastructure. Beneficial uses can include blending with other waters supplies for groundwater recharge, redirecting it into constructed wetlands or landscaping, and diverting it to a treatment facility for subsequent reuse.

SSWA is not using its stormwater as of 2020 but could consider this in the future.

6.2.5 Wastewater and Recycled Water

Municipal recycled water is municipal wastewater that has been treated to a specified quality to enable it to be used again for a beneficial purpose. The term "recycled water" is defined in the Water Code more broadly than "municipal recycled water." For purposes of the UWMPs, "recycled water" means only municipal recycled water, that is, water that has been treated and discharged from a municipal wastewater facility.

The two requirements that treated municipal wastewater must meet to be classified as recycled water are as follows:

1. It must be reused beneficially, in a manner consistent with Title 22.
2. It must be reused in accordance with a Regional Water Quality Control Board permit such as National Pollutant Discharge Elimination System, waste discharge requirement, or water recycling requirement.

The Fairfield-Suisun Sewer District (FSSD) (http://www.fssd.com/), an independent special district created by an act of the California Legislature in 1951, oversees wastewater collection and treatment. This section was prepared with information from and the assistance of FSSD staff and compiled from the City's General Plan Policy Document Chapter 7 and a FSSD brochure.

[15],[16] The FSSD service area encompasses the cities of Fairfield and the City as well as Travis Air Force Base (see Figure 6-4).

At the time FSSD was established, the service area had fewer than 6,000 residents (estimated to be less than 2,000 accounts). Today, the FSSD brochure states that it serves "135,000 residential, commercial and industrial customers and government agencies." The Fairfield and City storm water drainage systems serve an area of 48 square miles. The FSSD also operates a drainage maintenance utility that performs specified storm water management services in conjunction with the cities. The FSSD-operated drainage system encompasses seven pump stations to maintain flow of storm water to the natural creek system and the Suisun Marsh.

The sanitary sewerage collection system consists of 13 pump stations and a 70-mile network of sewers. The sewer conduits range from 12 inches to 48 inches in diameter. Wastewater flows by gravity or is pumped by smaller stations to four major pump stations which pump wastewater to the wastewater treatment plant (WWTP). The WWTP occupies about 150 acres. The average dry weather capacity is 23.7 mgd and peak-flow capacity is 52.3 mgd. FSSD treats a typical flow of 10-15 million gallons per day.

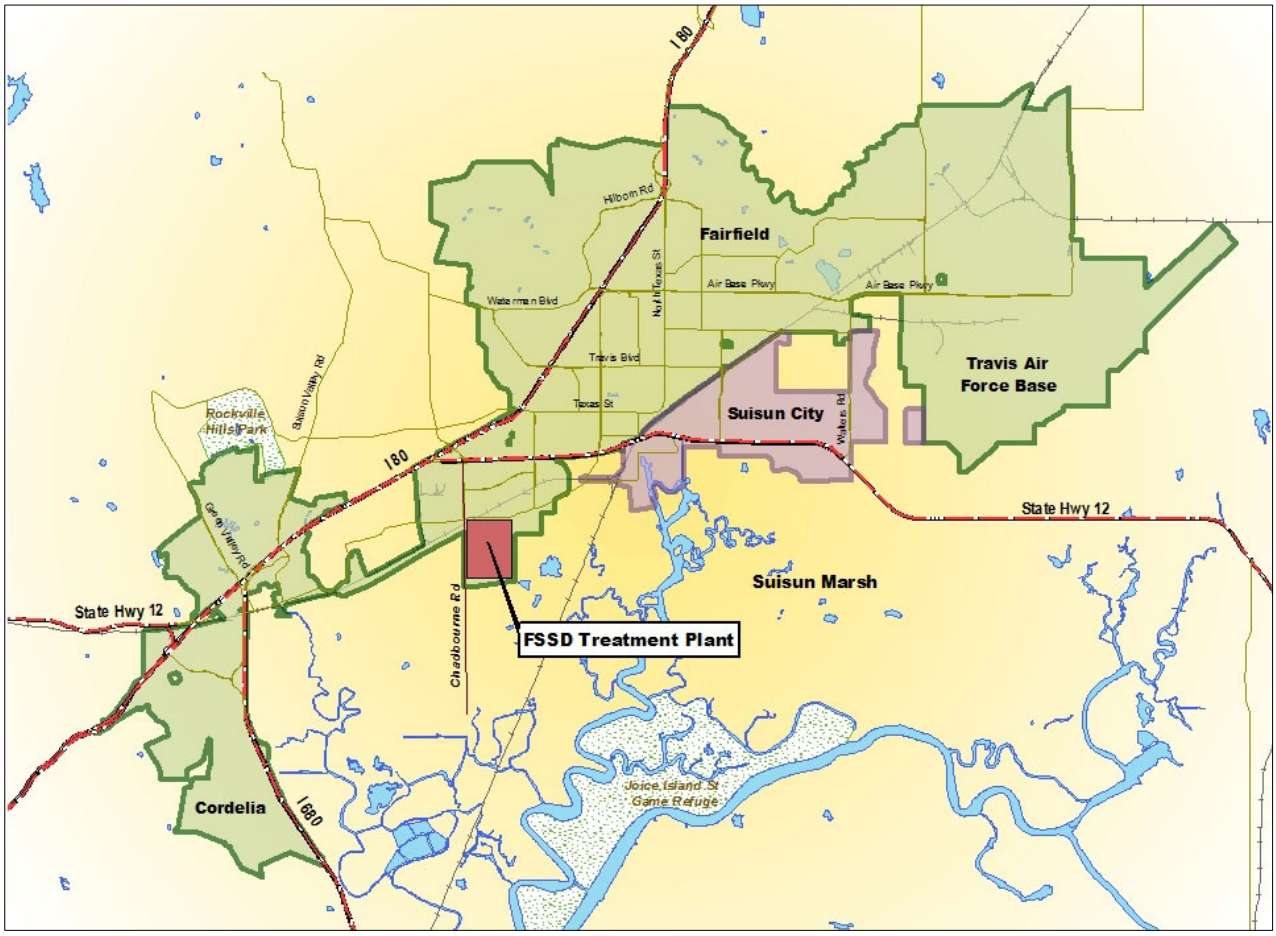
The City's General Plan Policy explains, "The wastewater treatment processes include screening, primary treatment, intermediate treatment by oxidation towers and intermediate clarifiers, secondary treatment with aeration basins, and secondary clarifiers and tertiary treatment via filtration and disinfection." The wastewater collected from the City is treated to an advanced secondary level (the secondary 23 standard), which is feasible for recycled water use. However, most of the water is discharged into Boynton Slough, southeast of the

[15] https://www.suisun.com/files/sharedassets/suisuncity/departments/development-services/documents/gp-vol_1_ch7-10.pdf

[16] https://www.fssd.com/wp-content/uploads/2021/06/District-Brochure-_Publisher_ed.5-8.5x11.pdf

treatment plant. Please refer to Tables 6-2 and 6-3 for wastewater collected and treated to recycled water standards per Title 22, and Table 6-6 for the discharge methods.

Figure 6-3. Fairfield-Suisun Sewer District Service Area



As of 2020, there is no reclaimed water use, nor are there imminent plans to do so, within the SSWA service area because there are no pipelines to deliver recycled water from the FSSD wastewater treatment plant to the SSWA service area due to economic infeasibility. Using recycled water in the City has been studied in the past and was extensively documented in the Central Solano Dual Water Systems Master Plan (Master Plan) prepared by James M. Montgomery, Consulting Engineers, for the City of Fairfield in 1992.[17]

The Master Plan defined a City Service Area (called Service Area 5), wherein reclaimed water could be used to irrigate parks (the largest of which is the Sports Complex) and median strips, and the Tolenas service area of the SID, where raw water is used for agricultural irrigation and stock watering. Service Area 5 would be served by a system consisting of existing and new transmission mains, pump stations and storage tanks to serve the City and the Tolenas area of the Solano Irrigation District (see the Master Plan, Figure 7.6 and Table 7-2.) The system is described in Section 6 of the 1992 Dual Water Systems Master Plan on pages 6-9 to 6-11 and Table 6-7 presents reconnaissance-level project cost estimates for three alternative distribution systems. The least-expensive system overall was Alternate 1 per Table 6-7, with a total capital cost of $5.66 million and total (O&M plus amortized capital) annual cost of $506,000, for a unit cost of $487 per acre-foot (AF) delivered (all figures in 1992 dollars). Adjusting these fees to 2016 dollars, the capital cost is $8.82 million, and the total annual cost is $787,000 for a unit cost of $756 per AF. Potable water in 2016 costs an average of $650 per AF from SSWA. The

[17] https://www.sidwater.org/DocumentCenter/View/120/Appendix-E--Central_Solano_Dual_Water_Systems_Mas?bidId=

increased cost is considered infeasible to take on, therefore there are no plans to implement the Master Plan projects.

Minor uses of recycled water such as dust control are also dependent upon installation of a secondary water system in the SSWA service area and are therefore considered to be infeasible for the foreseeable future.

These are the only two conceivably feasible projects for reclaimed water use as of 2020. Because of the limited accounts that could be served recycled water, it is not economically viable to transport and serve recycled water as the cost would far outweigh the benefits as of 2020 and into the foreseeable future.

SSWA's capital improvement plans will in the future review the potential for future recycling and options for financial incentives to achieve water conservation and decreased costs for water service. Cooperation with the City of Fairfield and the Fairfield Suisun Sewer District will be essential in any such future actions, and neither of these agencies has immanent projects planned. Because the financial restraints are at this time so compelling, financial incentives, such as grants and private investments, are considered either inadequate or infeasible. Depending on the timing of funding and system installation.

Recycled Water Coordination

As explained elsewhere, recycled water from FSSD and reclaimed water from the Solano Project or the City of Vallejo are not used due to the economic infeasibility of constructing the long distribution systems to serve small annual amounts of water.

Wastewater Collection, Treatment, and Disposal

Per Water Code Section 10633(a), a suppler must provide a general description of wastewater collection, treatment, and disposal within the service area. This information is reported in Tables 6-2 and 6-3.

Wastewater Collected Within the Service Area

No volume of treated wastewater was recycled or disposed of within the SSWA service area. The treatment plants are served by the Putah South Canal and treat only Solano Project water. Table 6-2 includes the volume of wastewater collected in the service area.

Wastewater Treatment and Discharge Within the Service Area

No volume of treated wastewater was recycled or disposed of within the SSWA service area. Table 6-3 identifies the volume of treated wastewater recycled or disposed of within the service area.

Recycled Water System Description

No recycled water use was predicted in the 2015 UWMP and none has occurred up to this point. There is no reclaimed water use as of 2020, nor are there imminent plans to do so, within the SSWA service area because there are no pipelines to deliver recycled water from the FSSD WWTP to the SSWA service area due to economic infeasibility. This information is reported in Table 6-4, Table 6-8, and Table 6-9 as applicable. For further information, please see the 2012 Non-Potable Water Feasibility Report.

Table 6.2. Wastewater Collected Within Service Area in 2020

Submittal Table 6-2 Retail: Wastewater Collected Within Service Area in 2020						
☐	There is no wastewater collection system. The supplier will not complete the table below.					
	Percentage of 2020 service area covered by wastewater collection system *(optional)*					
98%	Percentage of 2020 service area population covered by wastewater collection system *(optional)*					
Wastewater Collection			**Recipient of Collected Wastewater**			
Name of Wastewater Collection Agency	Wastewater Volume Metered or Estimated? *Drop Down List*	Volume of Wastewater Collected from UWMP Service Area 2020 *	Name of Wastewater Treatment Agency Receiving Collected Wastewater	Treatment Plant Name	Is WWTP Located Within UWMP Area? *Drop Down List*	Is WWTP Operation Contracted to a Third Party? *(optional) Drop Down List*
Fairfield-Suisun Sewer District (FSSD)	Metered	858	Fairfield-Suisun Sewer District (FSSD)	FSSD Wastewater Treatment Plant	No	Yes
Total Wastewater Collected from Service Area in 2020:		858				
NOTES: The communities of Mankas Corner and Tolenas is not served by Fairfield-Suisun Sewer District.						

Table 6.3. Wastewater Treatment and Discharge Within Service Area in 2020

Submittal Table 6-3 Retail: Wastewater Treatment and Discharge Within Service Area in 2020											
☑	No wastewater is treated or disposed of within the UWMP service area. The supplier will not complete the table below.										
Wastewater Treatment Plant Name	Discharge Location Name or Identifier	Discharge Location Description	Wastewater Discharge ID Number (*optional*)[2]	Method of Disposal ***Drop down list***	Does This Plant Treat Wastewater Generated Outside the Service Area? ***Drop down list***	Treatment Level ***Drop down list***	2020 volumes [1]				
							Wastewater Treated	Discharged Treated Wastewater	Recycled Within Service Area	Recycled Outside of Service Area	Instream Flow Permit Requirement
						Total	0	0	0	0	0

Potential and Projected Recycled Water Use

As noted previously, there is no reclaimed water use within the SSWA service area, nor are there imminent plans for it, because there are no pipelines to deliver recycled water from the FSSD WWTP to the SSWA service area due to economic infeasibility.

Table 6-4 contains information on the 2020, projected, and potential beneficial use of recycled water in the SSWA service area. The total projected recycled water use for each of the five-year planning increments reported in Table 6-4 is included in Table 4-5.

Table 6.4. 2020 and Projected Recycled Water Direct Beneficial Uses Within Service Area

Submittal Table 6-4 Retail: Recycled Water Direct Beneficial Uses Within Service Area											
☑	Recycled water is not used and is not planned for use within the service area of the supplier. The supplier will not complete the table below.										
Name of Supplier Producing (Treating) the Recycled Water:											
Name of Supplier Operating the Recycled Water Distribution System:											
Supplemental Water Added in 2020 (volume) *Include units*											
Source of 2020 Supplemental Water											
Beneficial Use Type *Insert additional rows if needed.*	**Potential** Beneficial Uses of Recycled Water (Describe)	Amount of **Potential** Uses of Recycled Water (Quantity) *Include volume units*[1]	General Description of 2020 Uses	Level of Treatment *Drop down list*	2020 [1]	2025 [1]	2030[1]	2035[1]	2040[1]	2045[1] (opt)	
Other (Description Required)											
				Total:	0	0	0	0	0	0	
				2020 Internal Reuse							

Table 6.5. 2015 UWMP Recycled Water Use Projection Compared to 2020 Actual

Submittal Table 6-5 Retail: 2015 UWMP Recycled Water Use Projection Compared to 2020 Actual	
☑	Recycled water was not used in 2015 nor projected for use in 2020. The supplier will not complete the table below. If recycled water was not used in 2020, and was not predicted to be in 2015, then check the box and do not complete the table.

Beneficial Use Type	2015 Projection for 2020 [1]	2020 Actual Use[1]
Agricultural irrigation		
Landscape irrigation (exc. golf courses)		
Golf course irrigation		
Commercial use		
Industrial use		
Geothermal and other energy production		
Seawater intrusion barrier		
Recreational impoundment		
Wetlands or wildlife habitat		
Groundwater recharge (IPR)		
Reservoir water augmentation (IPR)		
Direct potable reuse		
Other (Description Required)		
Total	0	0

Actions to Encourage and Optimize Future Recycled Water Use

Per Water Code Section 10633, the UWMP shall provide information on recycled water and its potential for use as a water source in the service area of the urban water supplier. It also shall include a plan for optimizing the use of recycled water in the supplier service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.

Table 6-6 provides a description of the methods planned to expand future recycled water use in the SSWA service area. At this time, it is predicted that 2045 will be the first year in which recycled water will be available.

Table 6.6. Methods to Expand Future Recycled Water Use

Submittal Table 6-6 Retail: Methods to Expand Future Recycled Water Use			
☐	Supplier does not plan to expand recycled water use in the future. Supplier will not complete the table below but will provide narrative explanation.		
60	Provide page location of narrative in UWMP		
Name of Action	Description	Planned Implementation Year	Expected Increase in Recycled Water Use *
Financial incentives	Grant or other funding source needed to make improvements to infrastructure	2045	163
		Total	163

6.2.6 Desalinated Water Opportunities

SSWA has determined that it will not consider the use of desalinated water as a source of supply due to economic infeasibility and potential environmental damage. The cost to treat desalinated water would be prohibitive and result in unsustainable rate increases to customers. Critical ecological habitat exists in the nearby Bay-Delta and environmental damage from desalination may not be recoverable.

6.2.7 Water Exchanges and Transfers

Per Water Code section 10631(c), this section describes the opportunities for exchanges or transfers of water on a short-term or long-term basis. The information contained in this section will inform the quantification of water supplies incorporated into Tables 6-8 and 6-9.

SSWA uses the water supplies of its two partner agencies, the City and SID. Exchanges and transfers of water would be arranged by these partner agencies rather than through SSWA. Existing agreements between other agencies and the City and SID do not affect SSWA.

According to the Water Supply Assessment Report for the Suisun Commerce & Logistics Center Project: "At present, due to a lack of connection to the SSWA water treatment plant, City of Suisun City is unable to directly utilize their State Water Project (SWP) entitlement, but they do have the opportunity to transfer or exchange this entitlement with other Solano County water users with access to the North Bay Aqueduct during periods of water shortage. This would include the cities of Benicia, Fairfield, Vacaville and Vallejo."[18] The City could also transfer the water to other SWP contractors outside of Solano County. Such transfers would cease once the means to utilize the SWP entitlement for the benefit of SSWA became available.

There are three system interties between SSWA and the City of Fairfield water systems that SSWA can utilize in an emergency situation. These are the subject of an existing agreement between SSWA and Fairfield. Fairfield could treat and deliver SSWA supplies from the Solano Project and the SWP. Water transferred from other agencies that can be delivered to Fairfield for treatment could be arranged by SSWA, but these would be extraordinary arrangements in response to emergencies. At this time there are no planned or identified potential future water exchanges.

Exchanges

As indicated above, there are no planned or identified potential future water exchanges for SSWA.

Transfers

SSWA is not doing water transfers as of 2020.

Emergency Interties

Emergency water interties are connections between water systems that allow for the exchange or delivery of water between those systems on a short-term emergency basis. Emergency interties are addressed in Section 7 Water Service Reliability and Drought Risk Assessment.

6.2.8 Future Water Projects

Per Water Code section 10631(f) this section describes all water supply projects and water supply programs that may be undertaken to meet the total projected water use.

SSWA has from 2016-2020 accomplished an aggressive Capital Improvement Program (CIP) that has made the following major improvements:

[18]https://www.sidwater.org/DocumentCenter/View/1341/-Water-Supply-Assessment-for-Suisun-Commerce-and-Logistics-Center-Project?bidId=

- Replaced all customer meters up to 2" in size with Badger ultrasonic meters read by an AMI system.
- Rebuilt the clarifiers at the Cement Hill WTP.
- Constructed a second 2 MG storage tank on Cement Hill. This tank also has a trihalomethane (THM) removal system that improves water quality. The additional storage has permitted more uniform operation of the plant, further improving water quality and operational efficiency.
- Added a second pipeline between the WTP and the two storage tanks on Cement Hill. This has permitted the tanks to be used in series which improves water quality.
- The Cement Hill WTP chemical system upgrades, design has been completed to change from gaseous chlorine to a sodium hypochlorite system. The construction of the chemical system upgrades is to be completed in 2022.

Coupled with the water system improvements are the outside effects of drought, mandatory water conservation with a persistent reduction in water demand, and economic downturn resulting in increased home vacancies and reduced water use. Therefore, the predicted need for additional water treatment capacity to meet increased demand has been deferred if not eliminated. Cement Hill WTP is now adequate to meet the water demand of SSWA. To better identify necessary future projects, a new condition assessment and rehabilitation plan for the WTP is planned for 2023.

Also in 2023, a condition assessment and rehabilitation plan for the distribution system is planned. This will address the storage tanks, pump stations, pipelines and appurtenances taking the water from the WTP to the customers. Future projects will be identified.

SSWA does not have any facilities to convey and treat Suisun City's SWP allocation of 1,300 AFY deliverable through the North Bay Aqueduct (NBA) as of 2020. However, SCWA has agreed to conduct a feasibility study for a future transfer facility to exchange SWP for Solano Project Water with SID.

Table 6.7. Expected Future Water Supply Projects or Programs

Submittal Table 6-7 Retail: Expected Future Water Supply Projects or Programs						
☐	No expected future water supply projects or programs that provide a quantifiable increase to the agency's water supply. Supplier will not complete the table below.					
☑	Some or all of the supplier's future water supply projects or programs are not compatible with this table and are described in a narrative format.					
61-63	Provide page location of narrative in the UWMP					
Name of Future Projects or Programs	Joint Project with other suppliers?		Description (if needed)	Planned Implementation Year	Planned for Use in Year Type *Drop Down List*	Expected Increase in Water Supply to Supplier* *This may be a range*
	Drop Down List (y/n)	*If Yes, Supplier Name*				

6.2.9 Summary of Existing and Planned Sources of Water

Per Water Code Section 10631, this section will identify and quantify the existing and planned sources of water available over five-year increments and provide supporting and related information.

Description of Supplies

Demand projections are shown in Table 6-9. According to the Water Supply Assessment for the Gentry Project, "Both City of Suisun City and Solano Irrigation District have contracts with Solano County Water Agency for water

supplies from the federal Solano Project. The Solano County Water Agency is the contracting agency with the United States Bureau of Reclamation (USBR) for the water supplies from the Solano Project." SCWA also is the contracting agency for water supply from the SWP's NBA from which the City has an allocation.

Quantification of Supplies

Table 6-8 lists the actual volume of purchased or imported water for the SSWA service area. Each supply source is listed and quantified separately, to the extent practicable. SSWA is a joint powers authority between the City and the SID under an Implementation Agreement entered into in 1990. Both Suisun City and SID have contracts with the SCWA for water supplies from the federal Solano Project. The SCWA is the contracting agency with the USBR for water supplies from the Solano Project. SSWA has a water treatment facility that, as of 2020, receives surface water from the Solano Project, and following treatment, delivers it to the service area. The City also has an annual entitlement from the SWP's North Bay Aqueduct. Their SWP entitlement increased to 1,300 acre-feet per year in 2015. Following the recent revised Implementation Agreement for SSWA water supplied to SSWA, will first come from the City's 1,600 AF entitlement. Then, any transfers of the City's SWP with SID on a 1 for 1 basis for Solano Project Water, with the remaining balance to come from SID's entitlement. As of 2021, due to a lack of a connection to the SSWA water treatment plant, The City is unable to directly utilize their SWP entitlement, in meeting their future water supplies, but opportunities are available for Suisun to negotiate water transfers of their SWP North Bay Aqueduct water supplies to other agencies or exchange this entitlement with other Solano County water users with access to the North Bay Aqueduct. This includes the SID and the cities of Benicia, Fairfield, Vacaville, and Vallejo. SID, under their Implementation Agreement with SSWA, delivers from its Solano Project entitlement additional water needed to provide treated water service to the SSWA service area.

Table 6.8. Water Supplies – Actual

Submittal Table 6-8 Retail: Water Supplies — Actual				
Water Supply	Additional Detail on Water Supply	2020		
Drop down list May use each category multiple times. These are the only water supply categories that will be recognized by the WUE data online submittal tool.		Actual Volume*	Water Quality Drop Down List	Total Right or Safe Yield* (optional)
Purchased or Imported Water	Solano County Water Agency under contract to City of Suisun City for Solano Project water	521	Drinking Water	
Purchased or Imported Water	Solano County Water Agency under contract to City of Suisun City for State Water Project water	0	Drinking Water	
Purchased or Imported Water	Solano County Water Agency under contract to Solano Irrigation District for Solano Project water	652	Drinking Water	(See note below)
	Total	1,173		
NOTES: SID is under contract with SSWA to provide Solano Project water to SSWA to meet water demands of new development after full utilization of City of Suisun City's allocated supplies.				

Table 6-9 lists the projected volume of water supplies, including volume by source, for the SSWA service area.

Table 6.9. Water Supplies – Projected

Submittal Table 6-9 Retail: Water Supplies — Projected											
Water Supply		Projected Water Supply * Report to the Extent Practicable									
Drop down list May use each category multiple times. These are the only water supply categories that will be recognized by the WUE data online submittal tool	Additional Detail on Water Supply	**2025**		**2030**		**2035**		**2040**		**2045** (opt)	
		Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)
Purchased or Imported Water	Solano County Water Agency under contract to City of Suisun City for Solano Project water	521		521		521		521		521	
Purchased or Imported Water	Solano County Water Agency under contract to City of Suisun City for State Water Project water	424		424		424		424		424	
Purchased or Imported Water	Solano County Water Agency under contract to Solano Irrigation District for Solano Project water	170	(see note below)	148	(see note below)	146	(see note below)	137	(see note below)	131	(see note below)
	Total	1,115		1,093		1,091		1,082		1,076	
NOTES: SID is under contract with SSWA to provide Solano Project water to SSWA to meet water demands of new development after full utilization of City of Suisun City's allocated supplies.											

6.2.10 Special Conditions

Numerous special conditions may affect each supplier's water supplies. This section documents the special conditions applicable to the SSWA service area. All conditions are dependent on Lake Berryessa's storage levels (Solano Project storage levels) and what is reported in the water shortage contingency plan.

Climate Change Effects

The issue of climate change has become an important factor in water resources planning in the state and is frequently considered for urban water management planning purposes, though the extent and precise effects of climate change remain uncertain.

Precipitation in Solano County may continue to have high variability year to year, leading to very wet years sometimes and very dry years at other times. Temperature and precipitation variability could have an impact on water supplies. However, climate change does not currently impact SSWA's water supplies because their water storage is not dependent on local snowpack. The Solano Irrigation District 1991-2014 Water Balance Description and Results document discusses and analyzes this.[19]

Regulatory Conditions and Project Development

Emerging regulatory conditions and planned future projects may also affect characterization of future water supply availability and analysis. This does not apply to SSWA.

Other Locally Applicable Criteria

Recent fire activity in the Lake Berryessa watershed has the potential to impact the water quality supplies for SSWA, however there was extensive testing by multiple agencies in the Solano Project watershed for volatile organics and inorganics after the LNU Lightning Complex Fire of August- October 2020 and there have been no negative impacts to water quality for public water systems from the fire. SSWA will continue testing and monitoring for particulate substances that may impact water quality.

6.3 Submittal Tables

Submittal tables are included in the appropriate subsections of this chapter rather than here.

6.4 Energy Intensity

Water energy intensity is the total amount of energy, calculated on a whole-system basis, required for the use of a given amount of water in a specific location. For the purposes of the required water energy reporting for urban water management plans, urban water suppliers are only expected to report the energy intensity associated with water management processes occurring within their operational control. Any energy embedded in water supplies by an upstream water supplier (such as a water wholesaler) is not intended to be included in the energy intensity reported. The energy intensity of water supplies within SSWA's operational control[20] for extraction, diversion, conveyance, placement into storage, treatment, and distribution for a one-year time period is reported in the following tables.

The "Total Utility Approach" as defined by DWR in the 2020 UWMP Guidebook is used to report water-related energy consumption data for SSWA. Calendar year 2020 is selected as the one-year reporting period, and utility bills for the associated reporting period are used as the source for energy consumption data. Total energy consumed by SSWA during calendar year 2020 based on reported utility bills was 1,925,580.77 kilowatt hours (kWh).

[19] https://www.sidwater.org/DocumentCenter/View/999/2015-Water-Balance?bidId=

[20] Operational control in this context is defined as authority over normal business operations at the operational level.

Table O-1B shows the energy consumed for each million gallons of water entering the distribution system. SSWA's water system energy use includes treating, pumping, and distributing drinking water. Based on the Total Utility Approach, SSWA's energy intensity is estimated to be 1,640.87 kWh/MG. SSWA does not have collection and treatment of wastewater; therefore, Table O-2 lists no energy intensity.

Table O-1B. Recommended Energy Intensity – Total Utility Approach

Urban Water Supplier: *Suisun-Solano Water Authority*

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

Retail Potable Deliveries

Table O-1B: Recommended Energy Reporting - Total Utility Approach				
Enter Start Date for Reporting Period	1/1/2020	**Urban Water Supplier Operational Control**		
End Date	12/31/2020			
☐ Is upstream embedded in the values reported?		**Sum of All Water Management Processes**	**Non-Consequential Hydropower**	
Water Volume Units Used	*MG*	Total Utility	Hydropower	Net Utility
Volume of Water Entering Process (volume unit)		*1,173.51*	*0*	*1,173.51*
Energy Consumed (kWh)		*1,925,580.77*		*1,925,580.77*
Energy Intensity (kWh/MG)		*1,640.87*	*0.0*	*1,640.87*

Quantity of Self-Generated Renewable Energy

0 kWh

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

Metered Data

Data Quality Narrative:

Utility bills for the associated time period are used as the source for energy consumption data.

Narrative:

Total energy consumption represents the energy consumed for plumbing and distribution of drinking water.

Table O-2. Recommended Energy Reporting – Wastewater & Recycled Water

Urban Water Supplier: *Suisun-Solano Water Authority*

Table O-2: Recommended Energy Reporting - Wastewater & Recycled Water						
Enter Start Date for Reporting Period	10/1/2019		Urban Water Supplier Operational Control			
End Date	9/29/2020		Water Management Process			
☐ Is upstream embedded in the values reported?			Collection/ Conveyance	Treatment	Discharge/ Distribution	Total
Volume of Water Units Used	MG					
Volume of Wastewater Entering Process (volume units selected above)			*0*	*0*	*0*	*0*
Wastewater Energy Consumed (kWh)			*0*	*0*	*0*	*0*
Wastewater Energy Intensity (kWh/volume)			*0.0*	*0.0*	*0.0*	*0.0*
Volume of Recycled Water Entering Process (volume units selected above)			*0*	*0*	*0*	*0*
Recycled Water Energy Consumed (kWh)			*0*	*0*	*0*	*0*
Recycled Water Energy Intensity (kWh/volume)			*0.0*	*0.0*	*0.0*	*0.0*

Quantity of Self-Generated Renewable Energy related to recycled water and wastewater operations

kWh

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

dropdown menu

Data Quality Narrative:

Narrative:

Suisun-Solano Water Authority does not have collection and treatment of wastewater or recycled; therefore, Table O-2 lists no energy intensity.

7 WATER SERVICE RELIABILITY AND DROUGHT RISK ASSESSMENT

Lay Description

This chapter assesses the reliability of SSWA water supplies, with a specific focus on potential constraints, including purchased water supply availability, water quality, and climate change. The intent of this chapter is to identify any potential constraints that could affect the reliability of SSWA's supply during normal year, single dry year, and multiple dry year hydrologic conditions.

SSWA has contracts with the USBR Federal Solano Project and the DWR SWP for all its potable water supply. The reliability of the SWP is anticipated to vary greatly in different year types. The Solano Project was sized to provide storage to span the known dry years and store water in wet years. If the reservoir is full, there are approximately six (6) years of supply available even with zero inflow from rainfall. In addition to the long-term reliability assessment, this chapter also presents a Drought Risk Assessment to evaluate SSWA's supply risks under a severe drought period lasting for the next five consecutive years (through 2025).

7.1 Water Service Reliability Assessment

"Reliability" of a water source is defined as the percentage of a full contractual annual amount that was historically delivered or is modeled to be delivered in the future. Assessment of water supply reliability is complex and dependent upon a number of factors, such as the number of water sources, regulatory and legal constraints, climate change, and expected growth. SSWA has two sources of water: the Solano Project and the SWP; the reliability of each is assessed below.

7.1.1 Constraints on Water Sources

State Water Project

There are numerous factors that affect the reliability of SWP supplies. The main factor is hydrologic conditions that result in extremely variable runoff conditions. The SWP has storage from Oroville Reservoir. However, most of the SWP water supply comes from Sacramento Valley runoff. There is a myriad of environmental, water quality, and legal constraints on the SWP that affect water supply reliability. The water rights for the SWP are conditioned upon meeting various water quality and environmental conditions including the Federal Endangered Species Act. The models used to develop the SWP reliability data incorporate these constraints.

Solano Project

The main factor affecting Solano Project reliability is the frequency of long droughts which could result in major drawdown of Lake Berryessa. Participating agencies in the Solano Project have entered into a Drought Measures Agreement which provides contingency plans and mandatory restrictions depending on the volume of storage remaining in Lake Berryessa.[21] Environmental issues have been addressed in a legal settlement regarding downstream flows from the Solano Project, and the settlement has been ratified by the State Water Resources Control Board. Limits on upstream depletions have been established through a settlement agreement administered by a court appointed water master.

As noted in Section 6.2.1, SSWA receives Solano Project supplies from its two parties, The City and SID. The reliability of both these supplies is analyzed in Section 7.1.3. While the entire City allocation is delivered to SSWA, only a small portion of SID's allocation is delivered to SSWA. At this time SID is able to provide sufficient supply to SSWA to meet its full demand (i.e., guarantee 100% reliability of supply).

A basis for the water year data for SSWA's two water sources is presented in Tables 7-1a, 7-1b and 7-1c. Base years were selected by identifying the year of each Water Year Type within the Historical Sequence with

[21] https://www.solanocounty.com/civicax/filebank/blobdload.aspx?blobid=18575

reliability most closely matching the average reliability of the Water Year Type over the Historical Sequence. Referring to the description of the reliability analysis above, however, the basis of the water year data cannot be said to be the reliability data of any single water year. Instead, the basis is the average of the reliability of types of water years within the Historical Sequence as per the 2020 Reliability Technical Memorandum (Kennedy Jenks).

State Water Project Supply

Table 7-1a shows the average SWP supply reliability for the defined water year scenarios.

Table 7.1. Basis of State Water Project Water Year Data (Reliability Assessment)

Submittal Table 7-1a Retail: Basis of Water Year Data (Reliability Assessment) **Solano County Water Agency under contract to City of Suisun City for State Water Project water**			
Year Type	**Base Year** If not using a calendar year, type in the last year of the fiscal, water year, or range of years, for example, water year 2019-2020, use 2020	**Available Supplies if Year Type Repeats**	
		☐	Quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP. Location _____
		☑	Quantification of available supplies is provided in this table as either volume only, percent only, or both.
		Volume Available *	**% of Average Supply**
Average Year	Average 1992-2003	352	100%
Single-Dry Year	2015 and 2021	21	6%
Consecutive Dry Years 1st Year	Average 2010 - 2020	191	54%
Consecutive Dry Years 2nd Year	Average 2010 - 2020	127	36%
Consecutive Dry Years 3rd Year	Average 2010 - 2020	21	6%
Consecutive Dry Years 4th Year	Average 2010 - 2020	64	18%
Consecutive Dry Years 5th Year	Average 2010 - 2020	127	36%
Supplier may use multiple versions of Table 7-1 if different water sources have different base years and the supplier chooses to report the base years for each water source separately. If a Supplier uses multiple versions of Table 7-1, in the "Note" section of each table, state that multiple versions of Table 7-1 are being used and identify the particular water source that is being reported in each table.			
***Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*			
NOTES: 1. Due to multiple sources of water for SSWA, there are multiple 7-1 Tables. This table is for the water source Solano County Water Agency under contract to City of Suisun City for State Water Project water. 2. Supplies to SCWA are based on DWR analyses presented in its "2019 State Water Project Delivery Capability Report" (2019 DCR), assuming existing SWP facilities and current regulatory and operational constraints in 2021.			

3. Average water year is based on average SWP deliveries over a repeat of the study's historic hydrologic period of 1922 through 2003. The 2014 North of Delta Settlement allocation of 10% is included in this percentage. Actual Solano County Water Agency contract to City of Suisun City for State Water Project water volume is greater at 424 MGY.
4. Singe dry year is based on a repeat of single dry years 2015 and 2021.
5. Multiple dry year supplies shown are annual average percentage of deliveries that have occurred in the last ten years. The 2014 North of Delta Settlement allocation of 10% is included in this percentage.
6. Percent of average supply is based on the average water year supply volume and not the contract volume.

Suisun City Solano Project Supply

Table 7-1b shows the average Suisun City Solano Project supply reliabilities for the defined water year scenarios.

Table 7-1b. Basis of Suisun City Solano Project Water Year Data (Reliability Assessment)

Submittal Table 7-1b Retail: Basis of Water Year Data (Reliability Assessment)
Solano County Water Agency under contract to City of Suisun City for Solano Project water

Year Type	Base Year If not using a calendar year, type in the last year of the fiscal, water year, or range of years, for example, water year 2019-2020, use 2020	Available Supplies if Year Type Repeats	
		☐ Quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP. Location _____	
		☑ Quantification of available supplies is provided in this table as either volume only, percent only, or both.	
		Volume Available *	% of Average Supply
Average Year	Average 1906 -2020	518	100%
Single-Dry Year	Average 1906 -2020	514	99%
Consecutive Dry Years 1st Year	Average 1990 - 1994	484	93%
Consecutive Dry Years 2nd Year	Average 1990 - 1994	484	93%
Consecutive Dry Years 3rd Year	Average 1990 - 1994	484	93%
Consecutive Dry Years 4th Year	Average 1990 - 1994	484	93%
Consecutive Dry Years 5th Year	Average 1990 - 1994	484	93%

Supplier may use multiple versions of Table 7-1 if different water sources have different base years, and the supplier chooses to report the base years for each water source separately. If a Supplier uses multiple versions of Table 7-1, in the "Note" section of each table, state that multiple versions of Table 7-1 are being used and identify the particular water source that is being reported in each table.

***Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES:

1. Due to multiple sources of water for SSWA, there are multiple 7-1 Tables. This table is for the water source Solano County Water Agency under contract to City of Suisun City for Solano Project water.
2. Suisun City's Solano Project Contract Amount is 1,600 AF (521 MG).
3. Average year based on average percent allocation during average years over the study's historic hydrologic period of 1906 through 2020, rounded to the nearest whole percent. Actual Solano County Water Agency contract to City of Suisun City for Solano Water Project water volume is greater at 521 MGY.
4. Single dry year is based on the average percent allocation during Single Dry Years over the study's historic hydrologic period of 1906 through 2020, rounded to the nearest whole percent.
5. Multiple dry year supplies shown are average percent allocation over four consecutive dry years, based on a repeat of the historic five-year dry period with low inflow to Lake Berryessa of 1990-1994, rounded to the nearest whole percent.
6. Percent of average supply is based on the average water year supply volume and not the contract volume.

SID Solano Project Supply

Table 7-1c shows the average SID Solano Project supply reliabilities for the defined water year scenarios. As noted in Section 7.1 above, the Volume Available cannot be listed in Table 7.1 because the volume available from SID's Solano Project supply is not fixed.

Table 7-1c. Basis of SID Solano Project Water Year Data (Reliability Assessment)

Submittal Table 7-1c Retail: Basis of Water Year Data (Reliability Assessment) **Solano County Water Agency under contract to Solano Irrigation District for Solano Project water**			
Year Type	**Base Year** If not using a calendar year, type in the last year of the fiscal, water year, or range of years, for example, water year 2019-2020, use 2020	**Available Supplies if Year Type Repeats**	
		☐	Quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP. Location _____
		☑	Quantification of available supplies is provided in this table as either volume only, percent only, or both.
		Volume Available *	**% of Average Supply**
Average Year	Average 1906 - 2020	45,650	100%
Single-Dry Year	Average 1906 -2020	45,275	99%
Consecutive Dry Years 1st Year	Average 1990 - 1994	42,627	93%
Consecutive Dry Years 2nd Year	Average 1990 - 1994	42,627	93%
Consecutive Dry Years 3rd Year	Average 1990 - 1994	42,627	93%
Consecutive Dry Years 4th Year	Average 1990 - 1994	42,627	93%
Consecutive Dry Years 5th Year	Average 1990 - 1994	42,627	93%
Supplier may use multiple versions of Table 7-1 if different water sources have different base years, and the supplier chooses to report the base years for each water source separately. If a Supplier uses multiple versions of Table 7-1, in the "Note" section of each table, state that multiple versions of Table 7-1 are being used and identify the particular water source that is being reported in each table.			
***Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*			

NOTES:

1. Due to multiple sources of water for SSWA, there are multiple 7-1 Tables. This table is for the water source Solano County Water Agency under contract to City of Suisun City for Solano Project water.
2. Solano Irrigation District's Solano Project Contract Amount is 141,000 AF (45,945 MG).
3. Average water year is based on average percent allocation during Average Years over the study's historic hydrologic period of 1906 through 2020, rounded to the nearest whole percent.
4. Single dry year is based on the average percent allocation during Single Dry Years over the study's historic hydrologic period of 1906 through 2020, rounded to the nearest whole percent.
5. Multiple dry year supplies shown are average percent allocation over four consecutive dry years, based on a repeat of the historic five-year dry period with low inflow to Lake Berryessa of 1990-1994, rounded to the nearest whole percent.
6. Solano Irrigation District may have additional water supply agreements in place with other agencies, which are not shown in this table.
7. Percent of average supply is based on the average water year supply volume and not the contract volume.

7.1.2 Types of Years

In order to categorize water years into Dry and Normal water year types, DWR uses the Sacramento Valley Index, also known as the 40/30/30 index. The Sacramento Valley Index uses 40% of April-through-July runoff, 30% of October-through-March runoff and 30% of the previous year's index. The Index is used to determine water year types in State Water Resources Control Board Decision 1641.

For the 2005 analysis of Solano Project supply delivery data, SCWA developed a year type index based upon procedures similar to those used to develop the Sacramento Valley Index. A model now exists for the Solano Project that uses hydrologic records of Lake Berryessa inflow data. Using similar assumptions as the Sacramento Valley Index, year types were assigned to each of the years in the Solano Project model resulting in a Lake Berryessa Index that identified wet, normal, and dry years.

Per the UWMP Guidebook 2020, the water service reliability assessment includes three unique year types:

- A normal hydrologic year represents the water supplies available under normal conditions; this could be an averaged range of years or a single representative year.
- A single dry year represents the lowest available water supply.
- A five-consecutive year drought represents the driest five-year period in the historical record.

Normal Year

This condition represents the water supplies a supplier considers available during normal conditions. This could be a single year or an average range of years that most closely represents the average water supply available to the supplier. In the 2020 Guidebook and this UWMP, the terms average and normal are used interchangeably when addressing the water year type.

State Water Project

The estimated deliveries in an average water year are based on the average SWP deliveries over a repeat of the DWR State Water Project Delivery Capability Report (DCR) historic hydrologic period of 1922 through 2003. The 2014 North of Delta Settlement allocation of 10% is included in this amount. Per Table 3c of the 2020 Reliability TM, Suisun City (and therefore SSWA) may in an Average Water Year receive 1,079 AF, or 83% of its contractual Table A Supply of 1,300 AF. In other words, The City's SWP supply is 83% reliable in a normal water year. This percentage is used throughout the period of the 2020 UWMP of 2020 to 2045.

Solano Project

The estimated deliveries in an average water year are based on the average total percent allocation during Average Years Solano Project deliveries over the hydrologic period of historic hydrologic period of 1906 through 2020.

Per Table 6b of the 2020 Reliability TM, the City (and therefore SSWA) may in an Average Water Year receive 1,590 AF, or 99.4% of its Participating Agency contractual amount of 1,600 AF. In other words, the City's Solano Project supply is 99.4% reliable in a normal water year. This figure is used throughout the period of the 2020 UWMP of 2020 to 2045.

Per Table 6g of the 2020 Reliability TM, SID may deliver to SSWA in an Average Water Year 99.4% of its planned supply amount. In other words, SID's Solano Project delivery to SSWA is 99.4% reliable in a normal water year. This figure is used throughout the period of the 2020 UWMP of 2020 to 2045.

Single Dry Year

The single dry year is the year that represents the lowest water supply available to the agency.

State Water Project

The estimated deliveries in a single dry water year are based on a repeat of single dry years 2015 and 2021. Per Table 3c of the 2020 Reliability TM, the City (and therefore SSWA) may in a Single Dry Water Year receive 65 AF, or 5% of its contractual Table A Supply of 1,300 AF. In other words, the City's SWP supply is 5% reliable in a single dry water year. This figure is used throughout the period of the 2020 UWMP of 2025 to 2045.

Solano Project

The estimated deliveries in a single dry water year are based on the average percent of total Solano Project allocation during single dry years over the historic hydrologic period of 1906 through 2020.

Per Table 6b of the 2020 Reliability TM, the City (and therefore SSWA) may in a Single Dry Water Year receive 1,577 AF, or 98.5% of its Participating Agency contractual amount of 1,600 AF. In other words, the City's Solano Project supply is 98.5% reliable in a single dry water year. This figure is used throughout the period of the 2020 UWMP of 2020 to 2045.

Per Table 6g of the 2020 Reliability TM, SID may deliver to SSWA in a Single Dry Water Year 98.5% of its planned supply amount. In other words, SID's Solano Project delivery to SSWA is 98.5% reliable in a single dry water year. This figure is used throughout the period of the 2020 UWMP of 2020 to 2045.

Five Consecutive Dry Years

The five-consecutive-year drought for the DRA would be the driest five-year historical sequence for the Supplier (Water Code Section 10612). For the water service reliability assessment, suppliers are encouraged to use the same five-year sequence for their water service reliability assessment. However, they may choose to use a different five-consecutive-year dry period, such as the lowest average water supply available to the supplier for five years in a row. Suppliers are encouraged to characterize the five-consecutive year drought in a manner that is best suited for understanding and managing their water service reliability.

Assessing the reliability to meet demand for five consecutive dry years is a new requirement for the 2020 UWMP, as compared to the previous requirement of assessing three or more consecutive dry years. Multiple dry years are defined as five or more consecutive dry years with minimal rainfall within a period of average precipitation.

Multiple Dry Year

The multiple dry year period is the period that represents the lowest average water supply availability to the agency, generally considered to be the lowest average runoff for a consecutive multiple year period (five years or more) for a watershed since 1903. DWR has interpreted "multiple dry years" to mean five dry years for the 2020 UWMP.

State Water Project

The estimated deliveries in a multiple dry water year period are annual averages over five consecutive dry years, have occurred in the last ten years. The 2014 North of Delta Settlement allocation of 10% is included in this percentage.

Per Table 3c of the 2020 Reliability TM, the City (and therefore SSWA) may in a Multiple Dry Water Year period receive in dry year one 585 AF, or 45%, dry year two 390 AF, or 30%, dry year three 65 AF, or 5%, dry year four 195 AF, or 15%, and dry year five 390 AF or 30%, of its contractual Table A Supply of 1,300 AF. In other words, the City's SWP supply ranges from 45% to 5% reliable in multiple dry water years, depending on the year. This figure is used throughout the period of the 2020 UWMP of 2020 to 2045.

Solano Project

The estimated deliveries in a multiple dry water year period are annual averages over five consecutive dry years, based on a repeat of the historic five-year dry period with low inflow to Lake Berryessa of 1990-1994.

Per Table 6b of the 2020 Reliability TM, the City (and therefore SSWA) may in a Multiple Dry Water Year period receive 1,484 AF, or 92.8% of its Participating Agency contractual amount of 1,600 AF. In other words, the City's Solano Project supply is 92.8% reliable in multiple dry water years. This figure is used throughout the period of the 2020 UWMP of 2020 to 2045.

Per Table 6g of the 2020 Reliability TM, SID may deliver to SSWA in a Multiple Dry Water Year period 92.8% of its planned supply amount. In other words, SID's Solano Project delivery to SSWA is 92.8% reliable in multiple dry water years. This figure is used throughout the period of the 2020 UWMP of 2020 to 2045.

7.1.3 Water Service Reliability

Scenarios for analysis of supply reliability are based on deliveries in historic water years characterized as "normal" or "average" water years, and "single dry" water years and combinations of these into "multiple dry water years." See Section 7.1.2 above for descriptions and reliability of these types of years. Sources of delivery data for SSWA's two supplies – the SWP and the Solano Project – are described below. The main source of information for this analysis is the 2020 Reliability Technical Memorandum (Kennedy Jenks), which is described below. Combined reliability of the SSWA supplies is presented in Section 7.1.

State Water Project

Specific information on the reliability of SCWA's SWP supply comes from the 2019 DWR State Water Project DCR, finalized in August 2020.[22] In this 2019 update, DWR provides SWP supply estimates for SWP contractors to use in their planning efforts, including for use in their 2020 UWMPs. The 2019 DCR includes DWR's estimates of SWP water supply availability under both 2020 and future conditions using the CalSim II model; a CalSim III model is currently under development. Further details on modeling assumptions can be found in the DCR and its appendices.

The 2019 DCR was reviewed for SCWA by Kennedy Jenks as technical support for SCWA Partner Agencies (of which SSWA is one) to address water supply reliability for their 2020 UWMPs. The results of the work by Kennedy Jenks are presented in the SCWA Water Supply Reliability Technical Memorandum (Appendix K) dated April 26, 2021 (2020 Reliability TM). The following factors are of significance.

2014, 2020 and 2021 SWP Water Supply Allocation

The extremely dry sequence from the beginning of January 2013 through the end of 2014 was one of the driest two-year periods in the historical record. Water year 2013 was a year with two hydrologic extremes. October through December 2012 was one of the wettest fall periods on record but was followed by the driest consecutive 12 months on record. Accordingly, the 2013 SWP supply allocation was a low 35% of Table A Amounts. The 2013

[22] https://data.ca.gov/dataset/state-water-project-delivery-capability-report-dcr-2019

hydrology ended up being even drier than DWR's conservative hydrologic forecast, so the SWP began 2014 with reservoir storage lower than targeted levels and less stored water available for 2014 supplies. Compounding this low storage situation, 2014 also was an extremely dry year, with runoff for water year 2014 the fourth driest on record. Due to extraordinarily dry conditions in 2013 and 2014, the 2014 SWP water supply allocation was a historically low 5% of Table A Amounts. The 2020 SWP allocation was initially 10% and increased to 20% while the 2021 SWP allocation was reduced from 10% to 5%.

The dry hydrologic conditions that led to the low 2014 SWP water supply allocation were unusual, and to date hydrology through 2014 has not been included in the CalSim II modeling that estimates future SWP delivery presented in DWR's 2019 Delivery Capability Report. It is anticipated that the hydrologic record used in the DWR model will be extended to include the period through 2021 during one of the next updates of the model. For the reasons stated above, the SCWA UWMP uses a conservative assumption that a 5% allocation of SWP Table A Amounts represents the "worst case" scenario.

SCWA SWP Reliability

"All scenarios modeled by DWR include North of Delta considerations, including contract specific allocations and the North of Delta Allocation Settlement terms. For long term planning purposes, the Early Long Term (ELT) scenario found in Appendix C of the DCR (excerpted and attached) was agreed upon by the SWP Contractors as the most appropriate scenario to use to estimate future supply availability. Therefore, future [SCWA Table A] SWP supply availability … is based on the ELT study included in the 2015 DCR."

SSWA's Table A Supply Reliability is based on SCWA's as shown in Table 2 of the 2020 Reliability TM on page 6 therein. The 2020 Reliability TM shows the Table A Supply Reliability for Suisun-Solano Water Authority in Table 3c on page 9 thereof. It shows both percentages and acre-feet and includes carryover amounts.

Solano Project

As part of their scope of services for SCWA, Kennedy Jenks also provided a review and summary of Solano Project Reliability. Page 12 of the 2020 Reliability TM states, "Reliability estimates for the Solano Project are developed based on historic hydrology from 1906-2019, Lake Berryessa inflows, and the Sacramento Valley Index (SVI) for hydrologic year types (wet, above normal, below normal, dry, critically dry). The SVI was further categorized into Average Year (above normal, below normal), Single Dry Year, and Multi-Dry Year. The update of the Solano Project reliability analysis from 2015-2020 resulted in a slight change to the reliability since 2016, therefore, it is recommended that the updated reliability estimates be utilized for the 2020 SCWA UWMP." Reliability of the Solano Project supply is presented in the 2020 Reliability TM, Table 6b on page 15 thereof for the City's allocation, and Table 6g on page 20 thereof for SID's allocation. Note that the hydrologic period of the study is 1906-2019, while Lake Berryessa inflow data are available only from 1956 to date. Prior years' inflows are projected from historical data.

Normal/Average Year

Comparison of the projected normal water supply to the projected normal water use over the next 25 years in 5-year increments is shown in Table 7-2 below. Note that the only water supply available to SSWA within the table's timeframe is the Solano Project supply.

Table 7.2. Normal Year Supply and Demand Comparison

Submittal Table 7-2 Retail: Normal Year Supply and Demand Comparison					
	2025	2030	2035	2040	2045 *(Optional)*
Supply totals (*autofill from Table 6-9)*	1,115	1,093	1,091	1,082	1,076
Demand totals *(autofill from Table 4-3)*	1,115	1,093	1,091	1,082	1,076
Difference	0	0	0	0	0

Single Dry Year

Comparison of the projected single dry year water supply to the projected single dry year water use over the next 25 years in 5-year increments is shown in Table 7-3 below. The supply totals are based upon the Combined Regional Supply Reliability of 100% as described in Section 7.3.1.

Table 7.3. Single Dry Year Supply and Demand Comparison

Submittal Table 7-3 Retail: Single Dry Year Supply and Demand Comparison					
	2025	2030	2035	2040	2045 (Optional)
Supply totals*	1,115	1,093	1,091	1,082	1,076
Demand totals*	1,115	1,093	1,091	1,082	1,076
Difference	0	0	0	0	0
***Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*					
NOTES: Supply totals consist of three sources: SCWA's contract with Suisun City for Solano Project water, SCWA's contract with Suisun City for State Water Project water, and SCWA's contract with SID for Solano Project water. The amount of water from SID equals the demand minus the SCWA/Solano Project water and SCWA/State Water Project water.					

Five Consecutive Dry Years

Comparison of the projected multiple dry year water supplies to the projected multiple dry year water use over the next 20 years in 5-year increments is shown in Table 7-4 below. The supply totals are based upon the Combined Regional Supply Reliability of 100% as described in Section 7.3.1.

Table 7.4. Multiple Dry Years Supply and Demand Comparison

Submittal Table 7-4 Retail: Multiple Dry Years Supply and Demand Comparison						
		2025	2030	2035	2040	2045 (Optional)
First year	Supply totals	1,115	1,093	1,091	1,082	1,076
	Demand totals	1,115	1,093	1,091	1,082	1,076
	Difference	0	0	0	0	0
Second year	Supply totals	1,115	1,093	1,091	1,082	1,076
	Demand totals	1,115	1,093	1,091	1,082	1,076
	Difference	0	0	0	0	0
Third year	Supply totals	1,115	1,093	1,091	1,082	1,076
	Demand totals	1,115	1,093	1,091	1,082	1,076
	Difference	0	0	0	0	0
Fourth year	Supply totals	1,115	1,093	1,091	1,082	1,076
	Demand totals	1,115	1,093	1,091	1,082	1,076
	Difference	0	0	0	0	0
Fifth year	Supply totals	1,115	1,093	1,091	1,082	1,076
	Demand totals	1,115	1,093	1,091	1,082	1,076
	Difference	0	0	0	0	0
Sixth year *(optional)*	Supply totals	1,115	1,093	1,091	1,082	1,076
	Demand totals	1,115	1,093	1,091	1,082	1,076
	Difference	0	0	0	0	0
NOTES: Supply totals consist of three sources: SCWA's contract with Suisun City for Solano Project water, SCWA's contract with Suisun City for State Water Project water, and SCWA's contract with SID for Solano Project water. The amount of water from SID equals the demand minus the SCWA/Solano Project water and SCWA/State Water Project water.						

7.1.4 Management Tools and Options

Existing and planned water management tools and options for SSWA's service area that seek to maximize local resources and result in minimizing the need to import water are described below:

- **Water Loss Program:** The water loss audit program reduces SSWA's dependency on imported water from the SWP and Solano Water Project by implementing water loss control technologies after assessing audit data and leak detection.
- **Implementation of Demand Management Measures During Dry Periods:** During dry periods, water reduction methods to be applied to the public will in turn reduce SSWA's overall demands on SWP and Solano Water Project water. SSWA's specific demand management measures are further discussed in Section 9.1.

7.2 Drought Risk Assessment

In addition to the long-term water service reliability assessment presented above, the DRA evaluates SSWA's supply risks under a severe drought period lasting for the next five consecutive years after the assessment is completed (i.e., from 2021 through 2025). The DRA is intended to inform the demand management measures and water supply projects and programs to be included in the UWMP (see Chapters 8 and 9). The DRA is a specific

planning action that assumes SSWA is experiencing a drought over the next five years and addresses SSWA's water supply reliability in the context of presumed drought conditions.

Water Code Section 10612 requires the DRA to be based on the driest five-year historic sequence of SSWA's water supply. However, Water Code Section 10635 also requires that the analysis consider plausible changes on projected supplies and demands due to climate change, anticipated regulatory changes, and other locally applicable criteria.

The following sections describe SSWA's methodology and results of its DRA.

7.2.1 Data, Methods, and Basis for Water Shortage Condition

As a first step to the DRA, SSWA has estimated unconstrained water demand for the five-year period 2021-2025. Unconstrained water demand is the expected water use in the absence of drought water use restrictions. The characteristic five-year water demand is described in Section 4.2.7 and is based upon the DSS Model results discussed in Section 4.2.6. The available potable water supplies assumed in the DRA are based upon the same methodology and assumptions used for the long-term water service reliability assessment (Section 7.1).

The DRA demonstrates that there is no expected decrease in supplies from any of the three sources of water in any 5-year multi-dry scenario. Under any five-year dry conditions, the WSCP would not be not triggered such that supplies would be cutback and therefore demands required to be reduced. However, as reported in the WSCP, should Lake Berryessa levels be sufficiently reduced, the WSCP would be triggered to enact demand cutbacks. Historically, lake levels have not been reduced sufficiently in the first 5 years of a drought to trigger supply and demand reductions.

7.2.2 DRA Water Source Reliability

As described in Chapter 6 and consistent with Table 7-5, SSWA's water sources are: SCWA's contract with the City for Solano Project water, SCWA's contract with the City for State Water Project water, and SCWA's contract with SID for Solano Project water. SSWA's available potable water supplies during the five-consecutive-year drought are based upon information provided in the Water Shortage Contingency Plan and the 1999 Solano Project Members' Agreement as to Drought Measures and Water Allocation project supplies.

7.2.3 Total Water Supply and Use Comparison

SSWA's DRA reveals that its supply capabilities are expected to balance anticipated total water use and supply, assuming a five-year consecutive drought from 2021 through 2025 (Table 7-5).

Table 7.5. Five-Year Drought Risk Assessment Tables to Address Water Code Section 10635(b)

Submittal Table 7-5: Five-Year Drought Risk Assessment Tables to address Water Code Section 10635(b)	
2021	**Total**
Total Water Use	1,168
Total Supplies	1,168
Surplus/Shortfall w/o WSCP Action	0
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	
Revised Surplus/(shortfall)	0
Resulting % Use Reduction from WSCP action	0%

2022	**Total**
Total Water Use	1,154
Total Supplies	1,154
Surplus/Shortfall w/o WSCP Action	0
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	
Revised Surplus/(shortfall)	
Resulting % Use Reduction from WSCP action	0%

2023	**Total**
Total Water Use	1,141
Total Supplies	1,141
Surplus/Shortfall w/o WSCP Action	0
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	
Revised Surplus/(shortfall)	
Resulting % Use Reduction from WSCP action	0%

2024	**Total**
Total Water Use	1,128
Total Supplies	1,128
Surplus/Shortfall w/o WSCP Action	0
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	
Revised Surplus/(shortfall)	
Resulting % Use Reduction from WSCP action	0%

2025	Total
Total Water Use	1,116
Total Supplies	1,116
Surplus/Shortfall w/o WSCP Action	0
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	
Revised Surplus/(shortfall)	
Resulting % Use Reduction from WSCP action	0%

NOTES: Supply totals consist of three sources: SCWA's contract with Suisun City for Solano Project water, SCWA's contract with Suisun City for State Water Project water, and SCWA's contract with SID for Solano Project water. The amount of water from SID equals the demand minus the SCWA/Solano Project water and SCWA/State Water Project water. Under these five-year demand and supply conditions, the WSCP is not triggered such that supplies would be cutback and therefore demands required to be reduced. However, as reported in the WSCP, should Lake Berryessa levels be sufficiently reduced, the WSCP would be triggered to enact demand cutbacks. Historically, lake levels have not been reduced sufficiently in the first 5 years of a drought to trigger supply and demand reductions.

7.3 Regional Supply Reliability

This section describes measures to improve supply reliability, combined regional supply reliability, and water quality impacts on supply reliability.

7.3.1 Combined Regional Supply Reliability

Full allocations from each SSWA supply are presented in Table 6-9. To combine the reliability of the sources, reliabilities are converted into expected deliveries, combined and compared to the expected Normal Year delivery amount from the supplies as presented in Tables 7-1a, 7-1b, and 7-1c. SCWA concluded that if projected SCWA and member agency supplies are developed as planned, no shortages are anticipated within SCWA's service area under normal year, single dry year or multiple dry water years through 2045 (i.e., the combined reliability of SSWA's water sources is 100%). However, and as a safeguard, SCWA is pursuing development of other potential supplies.

7.3.2 Measures to Improve Supply Reliability

SCWA prepared a *Drought Contingency Plan for 1993*. This plan addressed deliveries from both the Solano Project and the North Bay Aqueduct and proposed two potential drought mitigation measures that might temporarily offset or reduce use of surface water supplies, thus preserving urban supplies for agencies like SSWA. There has not been a need for a Solano Project Drought Contingency Plan since 1993.

Conjunctive Use

First, increased use of groundwater would mitigate decreased surface supplies due to a drought. Groundwater is extensively used in the north-central portion of Solano County near Vacaville and Dixon and supplements the surface supply of the State Water and Solano Projects. Since these are both supplies to SSWA, drought effects on groundwater supplies may indirectly affect deliveries to SSWA. However, if the aquifer is overdrawn, this

might cause long-term permanent damage to the aquifer due to compaction or subsidence and water quality problems. To date there is no evidence that the aquifer is overdrawn, as noted below.

The City of Suisun City historically used groundwater underlying the Suisun Valley as a supply for the City itself, and SSWA has, in the past, used one of the City wells to supply its customers in that area. At the present time, no groundwater is used to serve any SSWA service area, and it is unlikely that groundwater will be used in the future. Suisun Valley groundwater is not now nor has ever been used in Fairfield or Vallejo service areas. Therefore, drought effects on groundwater supplies in the Suisun Valley, if there should be any, should not significantly affect the supply of groundwater available to SSWA.

Fallowing of Agricultural Land

The second such drought mitigation measure proposed in the SCWA *Drought Contingency Plan for 1993* was the potential sale of agricultural water from farmland taken out of production to cities in need of additional water due to drought conditions.

A plan to implement such a system was later formalized in the Solano Project Members' Agreement as to Drought Measures and Water Allocation in 1999.[23] Indeed, fallowing of agricultural land might occur anyway since, per pages 5 and 6 of the SCWA Drought Contingency Plan for 1993: "For agriculture, a 25% or greater cut in Solano Project supplies would require taking land out of production. Local groundwater resources are not adequate to make up the difference from such a Solano Project supply deficiency." This would decrease the surface recharge of shallow aquifers, slow the recharge of the deeper aquifers that are hydraulically connected to the surface aquifers, and result in increased pumping costs from lower groundwater levels. Based on observed behavior of groundwater levels during and after the 1987-1992 drought, however, recovery from reduced summer recharge is rapid and long-term effects are not expected at this time. Therefore, the actions specified in these drought contingency plans should not significantly affect the supply of surface water available to SSWA.

7.3.3 Water Quality Impacts on Supply Reliability

The water quality in the SSWA service area is very good, with the main source coming from Lake Berryessa. Very little treatment is required to ensure a safe, palatable water supply. Annual water quality reports required by the state reflect compliance with all quality standards. However, chlorine is added to the domestic water supply to provide residual disinfection in system pipelines.

Other potential impacts could arise from the introduction and uncontrolled spread of invasive species such as Quagga or Zebra mussels as observed in the Colorado River System at Lake Mead and the SWP at San Justo Reservoir. Invasive mussel species and/or aquatic plant growth with little or no natural controls could rapidly grow in number and biomass causing reliability issues by clogging intake pipes. Should SSWA start using SWP water, then invasive species may become more of an operational issue and possibly a water quality issue. Examples of invasive species could include algae species which create toxic by-products, Geosmin, or other taste and odor issues. If this change is ever planned, potential impacts will be dealt with at that time.

[23] https://www.solanocounty.com/civicax/filebank/blobdload.aspx?blobid=18575

8 WATER SHORTAGE CONTINGENCY PLAN

Lay Description

The California Water Code Section 10632 requires every urban water supplier that serves more than 3,000 acre-feet per year or has more than 3,000 connections to prepare and adopt a standalone WSCP as part of its UWMP. The WSCP is required to allow suppliers to plan for a greater than 50% supply shortage and is due to be updated every five years. Water shortage contingency planning is a strategic planning process in which SSWA engages to prepare for and respond to water shortages, which occur when available water supply is insufficient to meet normally expected customer water use. A shortage may occur due to a number of reasons, such as water supply quality changes, climate change, drought, and catastrophic events (e.g., earthquake). The SSWA WSCP provides real-time water supply availability assessment and structured steps designed to respond to actual conditions. This level of detailed planning and preparation will help maintain reliable supplies and reduce the impacts of supply interruptions.

8.1 Overview of the WSCP

The WSCP serves as the operating manual that SSWA will use to prevent catastrophic service disruptions through proactive mitigation of water shortages. The WSCP contains documented processes and procedures, which are given legal authority through the Water Shortage Contingency Response Ordinance. This way, when shortage conditions arise, the SSWA governing body, its staff, and the public can easily identify and efficiently implement pre-determined steps to mitigate a water shortage to the level appropriate for the degree of water shortfall anticipated. Figure 8.1 illustrates the interdependent relationship between the three procedural documents related to planning for and responding to water shortages.

Figure 8-1. Water Shortage Contingency Plan Flow of Information

SSWA's WSCP is provided in Appendix G. It includes the steps to assess if a water shortage is occurring and the level of shortage drought actions to achieve the best response as appropriate to the water shortage conditions.

The WSCP contains the following prescriptive elements:

- An analysis of water supply reliability
- The drought shortage actions for each of the six standard water shortage levels that correspond to water shortage percentages ranging from 10% to greater than 50%
- An estimate of the potential to close the supply gap for each measure

- Protocols and procedures to communicate identified actions for any current or predicted water shortage conditions
- Procedures for an annual water supply and demand assessment
- Monitoring and reporting requirements to determine customer compliance
- Reevaluation and improvement procedures for evaluating the WSCP

8.2 Summary of Water Shortage Response Strategy and Required DWR Tables

This WSCP is organized into three main sections with Section 3 aligned with the California Water Code Section 16032 requirements.

Section 1 Introduction and WSCP Overview gives an overview of the WSCP fundamentals.

Section 2 Background Information provides information on SSWA's water service area.

Section 3 Water Shortage Contingency Preparedness and Response Planning

Section 3.1 Water Supply Reliability Analysis provides a summary of the water supply analysis and water reliability findings from the 2020 UWMP.

Section 3.2 Annual Water Supply and Demand Assessment Procedures provides a description of procedures to conduct and approve the Annual Assessment.

Section 3.3 Six Standard Water Shortage Levels explains the WSCP's six standard water shortage levels corresponding to progressive ranges of up to 10%, 20%, 30%, 40%, 50%, and more than 50% shortages.

Section 3.4 Shortage Response Actions describes the WSCP's shortage response actions that align with the defined shortage levels.

Section 3.5 Communication Protocols addresses communication protocols and procedures to inform customers, the public, interested parties, and local, regional, and state governments regarding any current or predicted shortages and any resulting shortage response actions.

Section 3.6 Compliance and Enforcement describes customer compliance, enforcement, appeal, and exemption procedures for triggered shortage response actions.

Section 3.7 Legal Authorities describes the legal authorities that enable the SSWA to implement and enforce its shortage response actions.

Section 3.8 Financial Consequences of the WSCP provides a description of the financial consequences of and responses to drought conditions.

Section 3.9 Monitoring and Reporting describes monitoring and reporting requirements and procedures that ensure appropriate data is collected, tracked, and analyzed for purposes of monitoring customer compliance and to meet state reporting requirements**.**

Section 3.10 WSCP Refinement Procedures addresses reevaluation and improvement procedures for monitoring and evaluating the functionality of the WSCP.

Section 3.11 Special Water Feature Distinction defines water features that are artificially supplied with water.

Section 3.12 Plan Adoption, Submittal, and Availability provides a record of the process SSWA followed to adopt and submit its WSCP.

Section 3.13 Seismic Risk Assessment and Mitigation Plan addresses the vulnerability of the systems to earthquakes and the FEMA Approved Solano County Multi-Jurisdiction Hazard Mitigation Plan.

The WSCP is based on adequate details of demand reduction and supply augmentation measures that are structured to match varying degrees of shortage so relevant stakeholders may know what to expect during a

water shortage situation. The SSWA has adopted water shortage levels consistent with the requirements identified in Water Code Section 10632 (a)(3)(A) (Table 8-1 of the Water Shortage Contingency Plan).

The demand reduction measures that align with each shortage level are described in Table 8-2 of the Water Shortage Contingency Plan. This table also estimates the extent to which that action will reduce the gap between supplies and demands to demonstrate that the chosen suite of shortage response actions can be expected to deliver the outcomes necessary to meet the requirements of a given shortage level.

The supply augmentation actions that align with each shortage level are described in Table 8-3. These augmentations represent short-term management objectives triggered by the WSCP and do not overlap with the long-term new water supply development or supply reliability enhancement projects.

9 DEMAND MANAGEMENT MEASURES

Lay Description

The SSWA's conservation program is guided by a mix of agency and City policy directives and state and local water efficiency requirements that have evolved over time. On the state level, these shifted from meeting Best Management Practices (BMPs) to the state per capita water reduction targets set by the Water Conservation Action of 2009 (SB x7-7), to the more recent water efficiency target mandates by AB 1668 and SB 606. Urban suppliers will need to meet these new mandates starting in. SSWA has been implementing conservation measures for decades. Through continued efforts to promote conservation and educate SSWA residents and retail customers on efficient and appropriate uses of water, SSWA was able to exceed their SB X7-7 target. As discussed in Chapter 5, SSWA's 2020 confirmed GPCD target was 124, however their actual 2020 GPCD was 108.

Although not a member of the California Water Efficiency Partnership (CalWEP), SSWA submitted annual reports from 1991-2016 to CalWEP's predecessor, the California Urban Water Conservation Council (CUWCC) in accordance with the "Memorandum of Understanding Regarding Urban Water Conservation in California" (MOU). During that time, the SSWA implemented conservation measures in accordance with CUWCC BMP compliance goals and met requirements for biannual BMP reporting. In 2016, the CUWCC underwent an organizational transformation and decided to sunset in response to social, economic, environmental, regulatory, and political conditions that changed substantially over its 25 years of existence. In 2017 it relaunched as a new organization, the California Water Efficiency Partnership (CalWEP). Although SSWA is not a member of CalWEP, SSWA continues to implement numerous Demand Management Measures (DMM) in the form of conservation programs, most of which builds from and meet the goals of the last iteration of the CUWCC's foundational and programmatic BMPs.

9.1 Demand Management Measures for Retail Suppliers

This section describes the planned efforts of SSWA in implementing various conservation measures to meet their water use targets, as well as SSWA's future plans for achieving its water use objectives.

9.1.1 Water Waste Prevention Ordinances

A water waste ordinance explicitly states that the waste of water is to be prohibited. The ordinance may prohibit specific actions that waste water, such as excessive runoff from landscape irrigation, or use of a hose outdoors without a shut off nozzle. A water waste prevention ordinance is in place at all times and is not dependent upon a water shortage for implementation. However, a water waste ordinance may include increasingly restrictive prohibitions that may be implemented in response to shortages.

SSWA has complied with this Best Management Practice since 1992. SSWA's Water Conservation Requirements were adopted by Resolution No. 09-11 on June 16, 2009, which placed restrictions on water use during Stage 1 through Stage 4 Water Conservation Conditions. Stage 1 Minimum Water Conservation Conditions are in place regardless of the volume of water storage, even during non-drought years. Stage 1 restrictions include wasting water, landscape irrigation during the hours between noon and 6 pm, new plumbing fixtures must meet compliance requirements, and multiple shower and lavatory installations within non-residential facilities must be equipped with metering valves.

Stage 2, 3, & 4 Conditions correlate with increasing severity of water shortage, based on Lake Berryessa storage levels. Residential and commercial watering restrictions also become increasingly strict. See Table 8-3. On August 14, 2014, Resolution 14-06 was adopted, declaring a Stage 2 Drought Condition and implementation of Stage 2 water conservation measures. On June 8, 2015, Resolution 15-05 was adopted to declare a continued Stage 2 drought condition and implement updated Stage 2 water conservation measures in compliance with the State Water Resources Control Board's Emergency Regulation for Statewide Urban Water Conservation.

Method for Evaluation of Effectiveness: SSWA's Water Waste Prohibition ordinance is based on available water supplies, correlated to Stage I – IV water levels at Lake Berryessa. SSWA considers its customer water use prohibitions to be highly effective and a solid safeguard towards protecting SSWA's water supplies in the event of drought or catastrophe. The effectiveness of the ordinance is measured by analyzing the amount of production and water usage during a Stage 1 Minimum Condition compared to a Stage 2 Drought Condition. For example, during 2013, a Stage 1 condition was in place, compared to the Stage 2 condition in 2015. Water production and usage was significantly lower in 2015, attributed to the Stage 2 watering prohibitions in place.

Estimated Water Savings: While it may be possible to quantify the water savings related to the prohibitions listed above, assumptions must be made as to the performance of the equipment and the amount of equipment and fixtures that are affected.

9.1.2 Metering

All of SSWA's service area accounts are metered. Metering and monitoring of municipal uses is critical to fully assessing water use within the City. Quantifying distribution system water loss, leaks, revenue, and future water use projections are examples of metering benefits. The service area is in the process of installing AMI meters. There were 8,423-meter changes and 3-meter retrofits between May 2019 to February 2020.

Method for Evaluation of Effectiveness: SSWA evaluates metering effectiveness by analyzing water usage from its different customer categories and comparing usage with previous timeframes.

9.1.3 Conservation Pricing

This section describes the conservation pricing structure that is always in place for SSWA's service area as well as the drought rate structures.

The SSWA Board adopted single-tier water rates by Resolution No. 15-02 at their April 13, 2015 meeting. The rates are presented in Figure 9-1 below. The rates were based on the *Water Rate Study for the Suisun-Solano Water Authority* dated January 30, 2015 (SSWA, 2015). This study addressed the billing tier issue raised by Proposition 218 and recent court decisions, particularly the San Juan Capistrano court decision, which require a specific demonstration of increased costs to an agency to justify delivery of additional water at a higher tier. Since SSWA could not make such a demonstration, the tiered Commodity Charges of the water rates were eliminated, and a single-tier water rate structure was adopted to comply with the court decisions. Rates were updated In October 2021, outside the scope of this document.

Table 9.1. Single-Tier Water Rates

Fiscal Year	2015/16	2016/17	2017/18	2018/19	2019/20
Fixed Charges by Meter Size					
5/8 x 3/4 inch	$44.11	$47.64	$50.03	$52.53	$55.15
3/4 inch	$44.11	$47.64	$50.03	$52.53	$55.15
1 inch	$70.03	$75.63	$79.41	$83.38	$87.55
1 1/2 inch	$87.30	$94.29	$99.00	$103.95	$109.15
2 inch	$173.68	$187.57	$196.95	$206.80	$217.14
3 inch	$260.05	$280.86	$294.90	$309.65	$325.13
4 inch	$346.43	$374.15	$392.85	$412.50	$433.12
6 inch	$864.69	$933.86	$980.56	$1,029.58	$1,081.06
Commodity Charges in ccf					
Single Family Residential	$1.99	$2.15	$2.26	$2.37	$2.49
Multi-family Residential & Non-Residential	$1.99	$2.15	$2.26	$2.37	$2.49

Notes:

1. Fixed charges are bi-monthly; commodity charges are per 100 cubic feet (ccf).
2. Source: Suisun-Solano Water Authority. *Water Rate Study for the Suisun-Solano Water Authority*, Resolution no. 15-02, Exhibit A, January 30, 2015.

Method for Evaluation of Effectiveness: Rates can be studied to see if they change customer water use patterns.

Estimated Water Savings: None at this time.

9.1.4 Public Education and Outreach

Public Information

As a member of the Solano UWCC, SSWA is involved in numerous public information activities. The lead agency for the UWCC is the Solano County Water Agency (SCWA) which has promoted regional collaboration for public information outreach and other water conservation efforts.

SSWA participates in various local media avenues to dispense water conservation information. Press releases, newspaper articles, radio announcements, and the "Solano Saves Water" website are all components of the public information program. Events include booths at Earth Day and Fourth of July events, where home water conservation items are distributed. Water conservation pamphlets and flyers are posted at City Hall counters and water conservation booths. In addition, a Water-Wise Gardening CD is promoted, and a well-received demonstration garden is in nearby Vallejo at the Six Flags Discovery Kingdom amusement park.

During the COVID-19 pandemic, SCWA revised their website to include more online resources.

Marketing Strategy: The UWCC meets monthly to evaluate public information programs and to plan future water conservation activities. Announcements, flyers, newspaper ads, or website links have all been methods for marketing the program. Members of the UWCC often attend public events as exhibitors or participants and are able to assess the effectiveness of programs.

Tracking of Participation: The numbers of attendees at public events are a gauge for tracking participation. Radio listenership, newspaper circulation, and website hits are all reviewed to assess the program's success. Furthermore, the numbers of cards, brochures, and free conservation devices distributed are tabulated to determine public interest.

Planned Implementation Schedule and Budget: SSWA will maintain the public information program through 2020 with continual evaluation of the program's viability. SCWA will apply for grants on behalf of SSWA and other member agencies grants if possible.

Method for Evaluation of Effectiveness: The popularity of public programs is a measurement of the effectiveness of the program.

Estimated Water Savings: Estimating water savings is difficult to quantify. The reduction in overall water use by SSWA in 2020 can be partly attributed to public information efforts.

School Education

SSWA participates in a regional program, the School Water Education Program (SWEP), which retains an education consultant to administer water conservation education. The consultant coordinates K-12 programs regionally for the City, Fairfield, Benicia, Vallejo, Dixon, Vacaville, and Travis Air Force Base. The consultant visits classrooms, provides in-class education, and trains educators. State-wide curriculum teaching standards are adhered to. Activities include school assemblies, field trips, video contests, and public programs, such as Youth Ag Day. More information on the school educational program can be found on the Solano Resource Conservation District website at https://www.solanorcd.org/projects-and-programs/education/swep.html.

The program is very successful. The education consultant has worked with the following schools located in the City, or with local students that attend nearby schools:

- Crescent Elementary
- Dan O. Root Elementary
- Suisun Valley Elementary
- Green Valley Middle School
- Green Valley Elementary
- Tolenas Elementary
- Rodriquez High School

In 2020-2021 so far, there were a total of 650 students reached from live stream classroom instruction water conservation, (330) students attended a school assembly presentation in water science and conservation, and (100) students participated in a youth educational event.

Marketing Strategy: SWEP will continue to market the program by maintaining the solid relationships that the program has fostered with schools and educators and by reaching out to other educators.

Tracking of Participation: The number of students, educators, and schools are tracked to evaluate the success of programs.

Planned Implementation Schedule and Budget: SSWA will continue its partnership with SWEP program and collaborate with other regional efforts that focus on water conservation. SSWA's share of the SWEP budget is $4,639.41 per year, and no changes in the budget are anticipated though 2021.

Method for Evaluation of Effectiveness: School response from educators is the greatest way to evaluate effectiveness. Comments from schools have been positive, with numerous invitations for the Education Consultant to return in subsequent school years and expand the program.

Estimated Water Savings: Considering the difficulty of placing a numerical value for water savings, the effectiveness of the program can be the gauge for the program's success.

9.1.5 Programs to Assess and Manage Distribution System Real Loss

SSWA water losses are quantified in Appendix H of this 2020 UWMP. This section presents a description of routine and planned system maintenance to prevent losses.

SSWA has a surface leak detection and repair program that is done on a passive basis where leaks are repaired when identified by staff. Historically, SSWA did not have an active leak detection and repair program. Historic water losses have been on the order of 20% of system input volume (production), although some data inconsistencies may overstate the actual losses. A system-wide audit for leak detection and repair was prioritized and funded to adequately assess the extent of leaks and other contributing factors to the system non-revenue water as described in detail below.

Prior Work: Pursuant to the requirements of SB555 and following the American Water Works Association Manual of Practice M36, Water Audits and Loss Control Programs, SSWA conducted validated water loss audit in 2016 and 2017, with annual audits thereafter. This helps identify the highest priorities for addressing water losses. The highest priority will focus on first addressing the non-revenue water in order to recover revenue issues that will in turn assist with paying for some of the repairs and upgrades anticipated. SSWA looked into the potential sources for real (leaks, tank overflows, etc.) or apparent losses (billing errors, inaccurate meter readings, etc.), in order to determine the best course of action to address the chronic water losses. (Apparent losses can be treated as an operational expense and water loss reductions as a capital expense.)

Table 9-2 below presents information on the progress and funding of water loss program information since the 2015 UWMP.

- Leaks have been repaired and the repair history does not yet indicate the need for a program to replace the mains, which are still within their useful lifetimes. However, in 2020, a section of 565 feet of 6” pipe was replaced with 12” pipe along Civic Center Blvd. This line was formally isolated due to leaks.
- In 2023, an approximate 1,200 ft section of pipe in old town that has leaks and inoperable valves is planned to be replaced in concert with a new residential subdivision.

Table 9.2. Actual Water Loss

	2015	2016	2017	2018	2019	2020
% of water loss as system input volume	21%	17.7%	18.6%	14.6%	13.3%	8.2%
Projected expenditures (pipeline replacements)	$0	$0	$128,000	$399,000	$86,000	$125,000
Advanced Metering Infrastructure (AMI) System	$0	$30,000	$74,000	$2,563,000	$1,737,000	$0
District Metered Area Project	$0	$6,700	$0	$78,000	$7,300	$0

Planned Projects and Implementation Schedule:

1. To address non-revenue water loss, SSWA planned conversion to an Advanced Metering Infrastructure (AMI) system in 2017. From May 2019 to February 2020, SSWA had 8,423-meter changes to AMI and 3-meter retrofits. Besides reducing apparent losses, the system will contribute to improving customer service, revenue recovery and operational efficiency.

2. To address real water loss, SSWA undertook a full-system leak detection and repair (LD&R) project in 2017. Estimated schedule and budget will be determined as part of a work plan developed each year as the highest priorities are identified and methodically addressed. The SSWA staff and contractor plan to undertake a methodical approach over the next ten years to address both the real and apparent losses in an effort to curb the historic water losses. Grant opportunities to enhance the program will be explored. Apparently, many water system capital projects are eligible for State Revolving Fund funding.

Planned Budget and Funding: SSWA has prepared a long-term capital improvement program (CIP) that includes the proposed AMI, LD&R and DMA projects. In the upcoming years 2020-2025 SSWA is planning to:

- Cement Hill WTP chemical system upgrade (2022) – replace gaseous chlorine system with sodium hypochlorite and reconstruct the coagulant and filter aid systems. ($4.5 million)
- Tank 2A Rehabilitation (2023)– recoat the 2-million-gallon tank and add THM removal equipment ($3.5 million)
- Master Plan update (2023) – update SSWA's Master Plan for its water supply and distribution facilities ($300,000)
- Condition Assessment and Asset Management Plan (2024) – this project, along with the Master Plan, will identify future Capital Improvement Projects. ($550,000)

Table 9.3. Planned Water Loss With Water Loss Management Implementation*

	2021	2022	2023	2024	2025
% of water loss as system input volume	15%**	13.1%	12.9%	12.7%	12.5%

*An analysis of the effects of the AMI, leak detection and repair, and metered area projects on NRW was not performed but notable improvements from the implementation of these three projects is anticipated.

** Based on actual AWWA Certified Validation Report submitted for year 2021 for SSWA as found here: https://wuedata.water.ca.gov/public/awwa_uploads/7114270865/SSWA%20V5%20CY21_v2.xls . The following years 2022-2025 estimate values are based on the SSWA's demand and conservation modeling tool output.

Method for Evaluation of Effectiveness: According to the American Water Works Association's *Manual of Water Supply Practice, M36,* in order to achieve best practices in water loss control each year, SSWA and the contractor will conduct a Water System Audit based on the production, metered demand, and other appropriate data to determine the water losses (AWWA, 2009). It is expected that the non-revenue water will decline as more water is accounted for and real and apparent water losses are addressed. Based on the results of the previous year's audit and available funding, SSWA will set the priorities for the coming year.

Estimated Water Savings: Actual water savings from individual leaks are difficult to measure or estimate given the leak has been running for an indeterminate amount of time. The measurement of water savings for this measure will be estimated based on the results of the annual water system audit. It is anticipated that the audit will show a declining non-revenue water component that indicates real or apparent water losses have been reduced or alternatively measurements of reductions in real losses due to actions taken (e.g., leak repairs, main replacement). It is envisioned that implementation of this water loss control program could provide the greatest water savings of all SSWA's water conserving measures.

9.1.6 Water Conservation Program Coordination and Staffing Support

This section includes the contact information of SSWA's water conservation representative as well as a description of the support staff and program funding. The current water conservation representative is:

Uriel Romero
Suisun-Solano Water Authority
810 Vaca Valley Parkway, Suite 201
Vacaville, CA 95688
Phone: (707) 455-4045
E-mail: uromero@sidwater.org

Mr. Romero is a SID employee and serves on the Solano UWCC, which manages and coordinates water conservation programs. Mr. Romero is a Registered Civil Engineer and is assisted in BMP implementation by Matthew Hobbs, SID's Manager of Water and Power Operations, and Paul Fuchslin, SID's District Engineer. Additional internal staff and outside consultants are added as necessary to assist SSWA in meeting our commitment to reaching our water conservation targets, goals and objectives.

9.1.7 Other Demand Management Measures

SSWA recognizes the need to explore additional opportunities to increase water conservation savings. The following efforts listed below are managed on a trial basis, enabling staff time to assess the effectiveness of the programs.

Water Efficiency Landscape Program (Turf Replacement Rebate Program)

The turf replacement program provides rebates to residential and commercial customers who replace turf with drought tolerant plants. In FY 20/21, 1 rebate was distributed at $1 per square foot replaced. College-age interns

perform inspections to ensure that applicants meet pre-project and post-project criteria. The renovated area must not include artificial turf products or non-permeable surfaces. Plantings must cover at least 50% of the project area when mature. Rebates are offered once per customer, on a first come-first served basis, and subject to funding availability. The program is projected to continue through 2025 at the same level of participation as in 2020. This measure is very popular; additional details are available on the Turf Replacement Rebate program website.[24]

Water Survey Programs for Single Family and Multi-family Residential Customers

SSWA offers a comprehensive water survey program, in place from spring through fall of each year, which is free to its customers. The program includes both Single Family and Multi-family Account holders. A Water Conservation Representative provides on-site checks for leaks and indoor plumbing flow rates, evaluates irrigation system efficiency, and advises on irrigation scheduling and irrigation timer adjustments. In addition, water conservation information and water efficient plumbing devices are distributed to homeowners.

SSWA cost shares the program expenses with SCWA. SSWA provided $686 in funding toward the program in 2020.

Marketing Strategy: The program is marketed by identifying the top 10-20% of water users, and sending direct mail letters, promoting the program, and informing customers of the scope of the surveys. Flyers are also distributed at City Hall, public events, and on the Solano County Water Agency's water conservation website at www.solanosaveswater.com. Interested customers are reached by phone to schedule appointments or answer questions. Follow-up is made by mail or phone. Staff review the response rate and may re-send letters or consider expanding the mailing list to the top 20% of water users.

A baseline has been developed to analyze annual participation, determine potential water savings, and evaluate the effectiveness of the program. In 2020, 14 surveys were performed. The past five-year average number of surveys is 25 surveys per year. Projected expenditures through 2025 are planned at $3,000 per year. SSWA will continue to offer surveys and target the top 10-20% water users. SSWA plans to continue the program and projects 29 surveys conducted per year through 2025.

Method for Evaluation of Effectiveness: The purpose of the program is to introduce homeowners to modest water conserving practices. SSWA evaluates the program by assessing the participation and the acceptance of the program by residents.

Estimated Water Savings: Water savings for this category are difficult to quantify. SSWA could estimate conservation values by comparing pre-survey metering data with post-survey metering data, but variables affect the savings calculations such as changes in weather patterns, behavioral changes due to the drought, and, and the homeowner's willingness to implement the survey recommendations.

Residential Plumbing Retrofit to Pre-1992 Single Family and Multi-family Residences

The distribution of water-saving devices to single family and multi-family homes occurs on a year-round basis. The program includes the distribution of indoor plumbing kits, each containing a low-flow shower head, kitchen and bathroom faucet aerators, and a toilet leak detection dye tablet, all free of charge.

This measure is very popular among residents. Based on replacement rates since 2002, both single family and multi-family residences have reached the 75% target figure for retrofit. In 2020, 298 devices were distributed. The 5-year average number of devices distributed since 2015 is 91 per year.

Marketing Strategy: The indoor kits are available at the City Hall's front counter, public events, and distributed as part of the residential water survey program. The kits and other devices such as hose shut-off nozzles, shower

[24] https://www.scwa2.com/water-efficiency/rebates-programs/residential-rebates/water-efficient-landscape-rebate-program/

timers, and garden hose timers are also promoted as part of the Solano Saves Water website and listed on flyers and cards.

Tracking of Participation: The numbers of devices are tracked, and a baseline has been developed to analyze participation. In addition, the number of requests for kits are noted.

Planned Implementation Schedule and Budget: Due to the popularity of the program since 1992, this measure is completed. SSWA's target for future distribution is (415) devices per year through 2025 at a budget of about $2,300 per year.

Method for Evaluation of Effectiveness:

SSWA evaluates the effectiveness by assessing the level of popularity of the devices. The distribution of water conservation kits over a period of many years demonstrates a strong willingness by residents to install the devices and conserve water.

Estimated Water Savings: Water savings can be estimated if the total number of units distributed is multiplied by the projected water savings for the device being replaced, although consideration must be given for unknown factors such as the performance of the older devices being replaced, the willingness of the homeowner to install the devices, and behavioral changes in water use due to the drought.

Large Landscape Conservation Programs and Incentives

Large Landscape Surveys

SSWA offers free large landscape site surveys for commercial and institutional accounts with dedicated irrigation meters. The surveys are conducted by a certified irrigation consultant and includes an evaluation of water use and irrigation system performance, with recommendations given to improve irrigation efficiency. Landscaped areas are measured by aerial photo or by hand measurement. Water budgets are then developed by comparing actual water use with local evapotranspiration (ETo)[25] rates. As part of the program, a Smart Irrigation Controller rebate is also offered (see web site: http://solanosaveswater.org/). In 2020, no large landscape surveys were conducted due to the 2020 COVID-19 Pandemic.

Marketing Strategy: The program is marketed to large landscape accounts. Commercial and institutional customers are the major participants. Examples of recent municipal survey sites include city parks such Independence Park and McCoy Creek Park. Promotion is by phone calls, site visits, direct mail, website, and flyers distributed at public events.

Tracking of Participation: The number of large landscape surveys conducted is utilized to track participation, assess outcomes, and form a component of a water savings formula. The surveys performed demonstrated that significant water savings were possible; SSWA reviews pre-survey and post-survey customer account metered water use.

Planned Implementation Schedule and Budget: SSWA will continue implementing its large landscape conservation programs and incentives. SSWA continues to increase outreach efforts to gain greater participation among its customer base. Grant opportunities to enhance the program will be explored. SSWA plans to provide one large landscape survey per year at a cost of $3,500 per year.

Method for Evaluation of Effectiveness: SSWA evaluates the effectiveness of large landscape audits and incentives by making site visits and comparing metering data between pre-survey customer usage and post-survey usage. Follow-up visits to surveyed sites are conducted.

[25] ETo is defined to be the amount of water needed by well-watered cool season turf grass, normally expressed as inches/week or per month or per year.

Estimated Water Savings: Pre-audit metering data are compared with post-audit data to estimate water savings. The final audit large landscape audit reports, prepared by consultants, also estimate potential water savings.

Large Landscape Water Budget Program

SSWA implements a monthly water budget program for (20) large landscape accounts, primarily city parks and schools. Water budgets are developed for each account whereby water use is compared to evapotranspiration rates from the nearest CIMIS station in Concord, CA.

Staff reads water meters on a monthly basis, and a Water Conservation Specialist prepares a monthly report for each account. The report provides account holders with valuable information for reducing water use and meeting water conservation targets. SSWA will continue to gauge the effectiveness of the program by comparing pre- budget and post-budget water usage.

The program is marketed to all large landscape account holders through phone calls and the SCWA website. SCWA provides the primary funding for the program, and SSWA's cost-share was $3,000/year in 2020. Projected budgets are set at $3,000 per year through 2020.

Effectiveness is determined by tracking pre-budget and post-budget water use for each account holder. SSWA plans to continue the program through 2025.

HighEfficiency Washing Machine Rebate Programs

A clothes washer rebate program is ongoing and has been a popular program. Goals for the program include providing incentives for homeowners to replace older inefficient washers with models that use up to 70% less water and energy than conventional models. SCWA administers the program on behalf of SSWA and other member agencies. In 2020, there were 13 rebates and the average number of participants for the past 5 years dating back to 2016 is 31 per year. In 2020, the rebate amount was $100.00.

Marketing Strategy: Information for the program is posted on the Solano Saves Water website at http://solanosaveswater.org/. Flyers are posted at City Hall, public events, and articles have been published in local newspapers.

Tracking of Participation: SSWA compiles participation and rebate data annually and develops baseline levels of participation.

Planned Implementation Schedule and Budget: SSWA will continue the existing program, and SCWA will apply for additional grant funding on SSWA's behalf.

Method for Evaluation of Effectiveness: The program's participation is an intangible measurement of the public's interest in conserving water and energy, and a way to assess effectiveness.

Estimated Water Savings: Water savings are difficult to quantify due to the lack of data for the older replaced washers. Tracking the ratings of the old washers could provide an estimated water savings per household, but many variables exist, including behavioral changes in water usage due to the drought.

Commercial, Industrial and Institutional Conservation Programs

SSWA, in conjunction with SCWA and the UWCC, implements a water conservation program for its CII customers. The program is regionally based, and a Water Conservation Specialist is retained to manage the effort. The CII program–consists of complimentary indoor water use surveys, outdoor irrigation system audits, and direct installation of efficiency fixtures, such as showerheads and high efficiency toilets (HETs).

Financial incentives to upgrade irrigation systems, plumbing fixtures, and/or water using appliances are offered through the Water Savings Incentives Program (WSIP). Up to $10,000 in rebates may be available to public service agencies, and a maximum of $5,000 is available to commercial and customers. Customers must agree to a water survey as part of eligibility. In 2020, there were not participants in the WSIP.

Marketing Strategy: SSWA conducts outreach and researches grants to strengthen its programs. As of 2021 marketing components include:

- Making telephone calls and site visits to CII customers
- Marketing the program on the Solano Saves Water website (http://solanosaveswater.org/)
- Generating and distributing flyers that advertise the program
- Conducting audits as requested

Tracking of Participation: SSWA tracks the number of customers participating in its CII programs, and CII projects are thoroughly monitored. SSWA sets a participation target of two account holders per year and plans to continue its CII and WSIP programs through 2025.

Planned Implementation Schedule and Budget: SSWA plans to continue the implementation of the CII program. Staff plans to administer two CII or WSIP projects per year through 2025, at a cost of $5,000 per year.

Method for Evaluation of Effectiveness: The effectiveness of the program is determined by reviewing the numbers of participants, analyzing costs versus benefits, and estimating water savings.

Estimated Water Savings: SSWA can estimate water savings from CII programs by calculating pre-installation water demand compared to post-installation demand. However, CII customers have reduced water use due to the drought, especially outdoor irrigation, and therefore water savings estimates are challenging.

CII and Multi-family Direct Install HET Program

In 2020, SSWA offered a direct install toilet program for CII and multi-family residents. Replacements through the WSIP are completed by a professional plumbing contractor at no cost to the owner.

In 2020, there were 160 HET replacements. The five-year average of the number of HET's replaced from 2016-2020 was 95 replacements per year. The program was discontinued in mid-2019 due to the closing of the partnership business. SSWA plans to restart this program in the future.

9.2 Implementation Over the Past Five Years

The nature and extent of each measure that has been implemented by SSWA over the past five years, from 2015 through 2020, is presented by measure in the previous section.

9.3 Planned Implementation to Achieve Water Use Targets

SSWA's plans for achieving its water use targets are presented by measure in the previous section as well as in Chapter 5.

Actual Fiscal Year 2020 Budget

The following table has the SSWA Fiscal Year budget for expenditures and staff effort to implement the DMMs.

Table 9.4. SSWA Fiscal Year 2016/17–2019/20 Budget for DMM Implementation

Name	FY 2016/2017	FY 2017/2018	FY 2018/2019	FY 2019/2020
Residential Water Audits	$1,430	$2,240	$3,890	$690
Residential Retrofit	$70	$0	$360	$950
Pipeline Replacements	$128,000	$399,000	$86,000	$125,000
AMI	$104,000	$2,563,000	$1,737,000	--
Landscape Water Audits and Landscape Budgets	$1,590	$1,100	$1,030	$2,380
Washing Machine Rebates	$1,960	$1,010	$440	$410
Public Information	$1,000	$1,270	$3,300	$1,440
School Education Program	$2,580	$1,830	$3,280	$2,890
CII Conservation Programs	$2,480	$2,390	$2,700	$3,950
District Meter Area Project	$6,700	$0	$7,300	$0
Conservation Coordinator	(included in other items)	(included in other items)	(included in other items)	(included in other items)
HET Direct Install Program	$3,150	$12,920	$1,550	$14,220
Turf Replacement including Landscape Assistance for Residents with Disabilities	$4,140	$1,640	$4,480	$3,540
Smart Controller Rebate Program	$240	$50	$150	$160
Low Income Water Conservation Upgrades	N/A	$120	$1,040	$4,600
Ag Water Conservation	$33,360	$28,650	$31,810	$4,410

Note: Values have been rounded to the nearest $10.

Projected Next Year Budget

The SSWA Fiscal Year 2020/2021 projected budget for expenditures and staff effort to implement future DMMs is estimated to be $25,000 in total allotted to each future DMM in a manner consistent with the last 5-years of participation and budget as shown in the previous table.

Table 9.5 summarizes the implementation schedule of the DMMs for SSWA.

Table 9.5. DMM Implementation Schedule

BMP	How Implemented	How Staffed	How Funded	5-year goal 2021-2025
Residential Water Audits	Regional with City of Fairfield	Interns coordinated by City of Fairfield	SSWA Budget & SCWA Budget	On-going implementation
Residential Retrofit	SSWA/SCWA Project	SSWA Staff	SSWA Budget & SCWA Budget	Multi-family & single family completed at 75%, on-going implementation
System Water Audit and Leak Detection	SSWA Project	SSWA Staff + Consultant	SSWA Budget	Paused as of 2023
Metering w/Commodity Rates	Completed		SSWA Budget	
Landscape Water Audits	SSWA/SCWA Project	SSWA Staff + Consultant	SSWA Budget and SCWA Budget	On-going implementation, apply for grant funding
Washing Machine Rebates	SSWA/SCWA Project	SSWA Staff + SCWA Staff	SSWA Budget & SCWA Budget	On-going implementation, apply for grant funding
Public Information	SSWA/SCWA Project	SSWA Staff SCWA Staff	SSWA Budget & SCWA Budget	On-going implementation.
School Education Program	SSWA + SCWA Regional Project	SSWA + SCWA Consultant	Regional Budget School Water Education Program	Continue existing program, investigate regional cost sharing options with interested agencies
CII Conservation Programs	SSWA/SCWA Regional Project	SSWA + SCWA Staff/Consultant	SSWA Budget & SCWA Budget	On-going implementation, investigate grant funding and local cost sharing options
Wholesale Agency Programs	Completed			
Conservation Pricing	Completed		SSWA Budget	
Conservation Coordinator	Completed		SSWA Budget	
Water Waste Prohibition, also includes letters to customers, water cop, reporting?	Completed		SSWA Budget	
ULFT Program	SSWA/SCWA project	SSWA Staff + SCWA Staff	SSWA Budget & SCWA Budget	On-going implementation, apply for grants

BMP	How Implemented	How Staffed	How Funded	5-year goal 2021-2025
Turf Replacement	SSWA/SCWA project	SSWA Staff + SCWA Staff	SSWA Budget & SCWA Budget	On-going implementation, apply for grants

9.4 Members of the California Water Efficiency Partnership

SSWA is not a member of the California Urban Water Conservation Council (Council). However, SSWA has submitted annual reports to the Council in accordance with the "Memorandum of Understanding Regarding Urban Water Conservation in California," dated September 1991, as amended.

9.5 Water Use Objectives (Future Requirements)

Beginning in 2023, Urban Water Suppliers are required to calculate and report their annual urban water use objective (WUO), submit validated water audits annually, and to implement and report best management practice (BMP) CII performance measures.

Urban Water Use Objective

An Urban Water Supplier's urban WUO is based on efficient water use of the following:

- Aggregate estimated efficient indoor residential water use
- Aggregate estimated efficient outdoor residential water use
- Aggregate estimated efficient outdoor irrigation landscape areas with dedicated irrigation meters or equivalent technology in connection with CII water use
- Aggregate estimated efficient water losses
- Aggregate estimated water use for variances approved by the State Water Board
- Allowable potable reuse water bonus incentive adjustments

SCWA and SSWA offer a suite of programs, described in detail throughout this chapter, that will help SSWA meeting and calculating their WUO.

The following table describes SSWA's programs that will assist agencies in meeting their WUO through both direct measures: programs/activities that result in directly quantifiable water savings; and indirectly: programs that provide resources promoting water efficiencies to the public that are impactful but not directly measurable.

Table 9.6 Programs to Assist in Meeting Water Use Objectives

WUO Component	Calculation	Program	Impact
Indoor Residential	Population and GPCD standard	Direct Impact • HE Clothes Washers • Plumbing Devices Giveaways Indirect Impact • Water efficiency surveys	Direct Impact: Increase of indoor residential efficiencies and reductions through GPCD Indirect Impact: Provide information, resources, and education to promote efficiencies in the home

WUO Component	Calculation	Program	Impact
Outdoor Residential	Irrigated/irrigable area measurement and a percent factor of local ETo	Direct Impact • Turf Removal • Landscape devices giveaways (hose timers, etc.) • Low Income Water Conservation Upgrades • Weather-Based Irrigation Controller Indirect Impact • Landscape Assistance for Residents with Disabilities • County-wide SCWA outdoor education classes that includes a K-12 school component.	Direct Impact: Increase outdoor residential efficiencies and reductions of gallons per ft2 of irrigated/ irrigable area use Indirect Impact: Provide information, resources, and education to promote efficiencies in the landscape
Outdoor Dedicated Irrigation Meters	Irrigated/irrigable area measurement and a percent factor of local ETo	Direct Impact • Turf Removal • Landscape devices giveaways (hose timers, etc.) • Landscape incentives • Water budgets	Direct Impact: Increase outdoor residential efficiencies and reductions of gallons per ft2 of irrigated/ irrigable area used Indirect Impact: Provide information, resources, and education to promote efficiencies in the landscape
Water Loss	Following the AWWA M36 Water Audits and Water Loss Control Program, Fourth Edition and AWWA Water Audit Software V	Direct Impact • Water Balance Validation • Customer Meter Accuracy Testing • Distribution System Pressure Surveys • Distribution System Leak Detection • No-Discharge Distribution System Flushing • Water Audit Compilation • Component Analysis	Direct Impact: Identify areas of the distribution system that need repair, replacement, or other action

DWR will provide residential outdoor landscape measurements; however, Urban Water Suppliers are responsible for measuring landscape that is irrigated/irrigable by dedicated irrigation meters. SCWA is contracting for consultant services to assist agencies in obtaining these measurements. Services may include but are not limited to:

- Accounting/database clean up (e.g., data mining billing software to determine dedicated irrigation customers).
- Geolocation of dedicated irrigation meters.
- In-field measurements.
- GIS/Aerial imagery measurements.
- Transformation of static/paper maps to digital/GIS maps.

These services will SSWA organize and/or update their databases to determine which accounts are dedicated irrigation meters and provide landscape area measurements for those accounts. These data points are integral when calculating the WUO.

10 PLAN ADOPTION, SUBMITTAL, AND IMPLEMENTATION

Lay Description

Procedures for adopting and implementing the UWMP in a transparent and stakeholder-accessible manner are important for good governance of water resources. The procedures are designed to provide customers with the opportunity to understand water supply management, planning, and reliability, as well as to provide input into the process through public commenting and revision suggestions. Adequate notifications and public hearings allow for the interested public to affect reliability and future investments in local water management. An adopted UWMP is often important for justifying investment decisions and potential rate restructuring. This chapter details the processes the SSWA followed for review and adoption of the 2020 UWMP, including noticing, public availability and review, public hearing, adoption, submission, and implementation, as well as the processes for a potential amendment of an adopted UWMP.

This 2020 UWMP was presented to the SSWA's Board of Directors for review and adoption and supersedes the 2015 UWMP. It was filed with the Water Efficiency Office in the Department of Water Resources and the California State Library as required by law, and will be used by the SSWA staff during the five-year planning cycle. As required by Section 10621 (a) of the Water Code, the SSWA will update the UWMP again for the 2025 UWMP process. This UWMP also includes a Water Shortage Contingency Plan as required under the provisions of AB 11X (1991) and addresses changes required by subsequent legislation including the Water Conservation Act of 2009 (SB X7-7). The WSCP also incorporates the water conservation initiatives that the SSWA has implemented. If any update is made to this 2020 UWMP or the WSCP, the SSWA will follow the amendment process outlined in Section 10.6 of this UWMP.

10.1 Notice of Public Hearing

See Section 10.1.2 below. A public hearing before the SSWA Board of Directors was held on May 8, 2023 to discuss and receive comments/input regarding the SSWA's 2020 UWMP and WSCP prior to its adoption. The public hearing was advertised in the Daily Republic newspaper at least 14 days prior to the meeting including April 24 and May 1, 2023. See Appendix E for a copy of the newspaper notice.

10.1.1 Notice to Cities and Counties

This section describes the notices to cities and counties that the SSWA distributed. The notices to the cities and counties included the location where the 2020 UWMP could be viewed, the UWMP revision schedule, and the SSWA's contact information. Table 10-1 lists the specific entities notified.

Table 10.1. Notification to Cities and Counties

Submittal Table 10-1 Retail: Notification to Cities and Counties		
City Name	60 Day Notice	Notice of Public Hearing
City of Vallejo	Yes	Yes
City of Vacaville	Yes	Yes
City of Suisun City	Yes	Yes
City of Rio Vista	Yes	Yes
City of Fairfield	Yes	Yes
City of Dixon	Yes	Yes
City of Benicia	Yes	Yes
County Name *Drop Down List*	60 Day Notice	Notice of Public Hearing
Solano County	Yes	Yes

A copy of the letter sent to the cities and county notifying them of SSWA's intent to update the UWMP is included in Appendix D.

10.1.2 Notice to the Public

The public was notified at least 14 days prior to the public hearing that the SSWA would be reviewing and considering amendments to the UWMP. The public hearing was placed in a local newspaper for two successive weeks (14 calendar days) or two separate one-week timeframes with at least five days between publication dates, as prescribed in Government Code Section 6066.[26] This notice included time and place of hearing as well as the location where the UWMP was available for public inspection. Notification came via the Daily Republic newspaper and by posting the 2020 UWMP on the following websites by April 24, 2023:

- City of Suisun: http://www.suisun.com/
- Solano Irrigation District: http://www.sidwater.org/

The notice from the Daily Republic is shown in Appendix E.

10.2 Public Hearing and Adoption

This section details the public hearing and adoption processes for the 2020 UWMP and WSCP.

10.2.1 Public Hearing

The public hearing allowed for community input, consideration of economic impacts, and adoption of a method for determining the SSWA's urban water use target. As part of the public hearing, the SSWA provided information

[26] California State Legislature. (1949). Government Code Section 6066. http://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=GOV&sectionNum=6066

on its baseline values, water use targets and compliance, and implementation plan as required per the Water Conservation Act of 2009.

10.2.2 Adoption

The plan was adopted on May 8, 2023 at the SSWA's regular Board meeting. A copy of the resolution adopting the 2020 UWMP is provided in Appendix F.

10.3 Plan Submittal

To satisfy California Water Code Sections 10635(c), 10644(a)(1) and (2), and 10645(a) and (b), within 30 days of adoption, the SSWA submitted a copy of the 2020 UWMP and WSCP to DWR, the California State Library Government Publications Section (Sacramento), and to any city or county to which the SSWA provides water.

10.3.1 Submitting a UWMP and WSCP to DWR

To satisfy DWR requirements, all UWMPs and WSCPs must be submitted to DWR within 30 days of adoption and prior to July 1, 2021. The SSWA submitted the documents within 30 days of the adoption date of May 8, 2023.

10.3.2 Electronic Data Submittal

The SSWA submitted its 2020 UWMP and WSCP to DWR electronically.

10.3.3 Submitting a UWMP to the California State Library

The SSWA submitted a CD or hard copy of its adopted 2020 UWMP to the California State Library within 30 days of adoption.

10.3.4 Submitting a UWMP to Cities and Counties

The SSWA submitted a copy of its adopted 2020 UWMP to any city or county served by the SSWA within 30 days of adoption.

10.4 Public Availability

Within 30 days after filing the 2020 UWMP and WSCP with DWR, the documents were made available for public review during normal business hours at the Solano Irrigation District office, Suisun City Hall, and on the Suisun-Solano Water Authority's website.

10.5 Notification to Public Utilities Commission

Per Water Code Section 10621(c), Suppliers that are regulated by the California Public Utilities Commission (CPUC) must submit their UWMP and WSCP to the CPUC as part of its general rate case filings. Since this was/was not applicable to the SSWA, the plans were not submitted to the CPUC.

10.6 Amending an Adopted UWMP or WSCP

Should any changes be made to the 2020 UWMP and/or the WSCP, per Water Code Sections 10621(d) and 10644(a)(1), within 30 days after adoption, the SSWA will submit copies of the amendments or changes to DWR, the California State Library, and any city or county to which the SSWA supplies water.

10.6.1 Amending a UWMP

If the SSWA amends the adopted 2020 UWMP, each of the steps for notification, public hearing, adoption, and submittal will be followed for the amended UWMP.

10.6.2 Amending a WSCP

Specific to Water Code Section 10644(b), if the SSWA revises its WSCP after DWR has approved the 2020 UWMP, the SSWA will submit to DWR an electronic copy of the revised WSCP within 30 days of adoption.

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APPENDICES

A. UWMP Checklist

B. SB X7-7 Verification Form

C. Demand & Passive Savings Methodology

D. Notice of Intent to Update UWMP

E. Notice of Public Hearing

F. Adoption Resolution

G. Water Shortage Contingency Plan

H. Water Audit Report

I. 2015 City of Suisun City 2015–2023 Housing Element

J. 1990 Suisun-Solano Water Authority Implementation And Lease Agreement

APPENDIX A – UWMP CHECKLIST

2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location
Chapter 1	10615	A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, reclamation, and demand management activities.	Introduction and Overview	Section 1.2
Chapter 1	10630.5	Each plan shall include a simple description of the supplier's plan including water availability, future requirements, a strategy for meeting needs, and other pertinent information. Additionally,a supplier may also choose to include a simple description at the beginning of each chapter.	Summary	Start of Each Chapter
Section 2.2	10620(b)	Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.	Plan Preparation	Chapter 1 and Section 2.2
Section 2.6	10620(d)(2)	Coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.	Plan Preparation	Sections 2.1, 2.3, and 10.1
Section 2.6.2	10642	Provide supporting documentation that the water supplier has encouraged active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan and contingency plan.	Plan Preparation	Section 2.6.2
Section 2.6, Section 6.1	10631(h)	Retail suppliers will include documentation that they have provided their wholesale supplier(s) - if any - with water use projections from that source.	System Supplies	Section 4.2.6, Table 10.1 and Appendix D

2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location
Section 2.6	10631(h)	Wholesale suppliers will include documentation that they have provided their urban water suppliers with identification and quantification of the existing and planned sources of water available from the wholesale to the urban supplier during various water year types.	System Supplies	N/A (Wholesale Only)
Section 3.1	10631(a)	Describe the water supplier service area.	System Description	Sections 3.1 and 3.2
Section 3.3	10631(a)	Describe the climate of the service area of the supplier.	System Description	Section 3.3
Section 3.4	10631(a)	Provide population projections for 2025, 2030, 2035, 2040 and optionally 2045.	System Description	Section 3.4.1
Section 3.4.2	10631(a)	Describe other social, economic, and demographic factors affecting the supplier's water management planning.	System Description	Section 3.4.2
Sections 3.4 and 5.4	10631(a)	Indicate the current population of the service area.	System Description and Baselines and Targets	Section 3.4.1
Section 3.5	10631(a)	Describe the land uses within the service area.	System Description	Section 3.5
Section 4.2	10631(d)(1)	Quantify past, current, and projected water use, identifying the uses among water use sectors.	System WaterUse	Sections 4.2.3, 4.2.5, and 4.2.6
Section 4.2.4	10631(d)(3)(C)	Retail suppliers shall provide data to show the distribution loss standards were met.	System WaterUse	Section 4.2.4
Section 4.2.6	10631(d)(4)(A)	In projected water use, include estimates of water savings from adopted codes, plans, and other policies or laws.	System WaterUse	Section 4.2.6 and Appendix C

2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location
Section 4.2.6	10631(d)(4)(B)	Provide citations of codes, standards, ordinances, or plans used to make water use projections.	System WaterUse	Section 4.2.6 and Appendix C
Section 4.3.2.4	10631(d)(3)(A)	Report the distribution system water loss for each of the 5 years preceding the plan update.	System WaterUse	Section 4.3.2
Section 4.4	10631.1(a)	Include projected water use needed for lower income housing projected in the service area of the supplier.	System WaterUse	Section 4.4
Section 4.5	10635(b)	Demands under climate change considerations must be included as part of the drought risk assessment.	System WaterUse	Sections 4.5, 7.2, and Appendix G
Chapter 5	10608.20(e)	Retail suppliers shall provide baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.	Baselines and Targets	Sections 5.3, 5.6, and 5.7
Chapter 5	10608.24(a)	Retail suppliers shall meet their water use target by December 31, 2020.	Baselines and Targets	Section 5.7.1
Section 5.1	10608.36	Wholesale suppliers shall include an assessment of present and proposed future measures, programs, and policies to help their retail water suppliers achieve targeted water use reductions.	Baselines and Targets	N/A (Wholesale Only)
Section 5.2	10608.24(d)(2)	If the retail supplier adjusts its compliance GPCD using weather normalization, economic adjustment, or extraordinary events, it shall provide the basis for, and data supporting the adjustment.	Baselines and Targets	Section 5.7.2

2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location
Section 5.5	10608.22	Retail suppliers' per capita daily water use reduction shall be no less than 5% of base daily per capita water use of the 5-yearbaseline. This does not apply if the suppliers base GPCD is at or below 100.	Baselines and Targets	Section 5.6
Section 5.5 andAppendix E	10608.4	Retail suppliers shall report on their compliance in meeting their water use targets. The data shallbe reported using a standardized form in the SB X7-7 2020 Compliance Form.	Baselines and Targets	Section 5.7.2
Sections 6.1 and 6.2	10631(b)(1)	Provide a discussion of anticipated supply availability under a normal, single dry year, and a drought lasting five years,as well as more frequent and severe periods of drought.	System Supplies	Sections 7.1.2 and 7.3
Sections 6.1	10631(b)(1)	Provide a discussion of anticipated supply availability under a normal, single dry year, and a drought lasting five years,as well as more frequent and severe periods of drought, *including changes in supply due to climate change.*	System Supplies	Sections 7.1, 7.1.1, 7.1.2, 7.2.3, and 7.3
Section 6.1	10631(b)(2)	When multiple sources of water supply are identified, describe the management of each supply in relationship to other identified supplies.	System Supplies	Sections 6.2.1 and 6.2.3
Section 6.1.1	10631(b)(3)	Describe measures taken to acquire and develop planned sources of water.	System Supplies	Sections 6.2.8, 6.2.9, and 7.1.4
Section 6.2.8	10631(b)	Identify and quantify the existing and planned sources of water available for 2020, 2025, 2030, 2035, 2040 and optionally 2045.	System Supplies	Sections 6.2.9
Section 6.2	10631(b)	Indicate whether groundwater is an existing or planned source of water available to the supplier.	System Supplies	Section 6.2.2

2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location
Section 6.2.2	10631(b)(4)(A)	Indicate whether a groundwater sustainability plan or groundwater management plan has been adopted by the water supplier or if there is any other specific authorization for groundwater management. Include a copy ofthe plan or authorization.	System Supplies	N/A
Section 6.2.2	10631(b)(4)(B)	Describe the groundwater basin.	System Supplies	N/A
Section 6.2.2	10631(b)(4)(B)	Indicate if the basin has been adjudicated and include a copy of the court order or decree and a description of the amount of water the supplier has the legal right to pump.	System Supplies	N/A
Section 6.2.2.1	10631(b)(4)(B)	For unadjudicated basins, indicate whether or not the department has identified the basin as a high or medium priority. Describe efforts by the supplier to coordinate with sustainability or groundwater agencies to achieve sustainable groundwater conditions.	System Supplies	N/A
Section 6.2.2.4	10631(b)(4)(C)	Provide a detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years.	System Supplies	N/A
Section 6.2.2	10631(b)(4)(D)	Provide a detailed description and analysis of the amount and location of groundwater that is projected to be pumped.	System Supplies	N/A
Section 6.2.7	10631(c)	Describe the opportunities for exchanges or transfers of water on a short-term or long- term basis.	System Supplies	Section 6.2.7
Section 6.2.5	10633(b)	Describe the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.	System Supplies (RecycledWater)	Section 6.2.5

2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location
Section 6.2.5	10633(c)	Describe the recycled water currently being used in the supplier's service area.	System Supplies (Recycled Water)	Section 6.2.5
Section 6.2.5	10633(d)	Describe and quantify the potential uses of recycled water and provide a determination of the technical and economic feasibility of those uses.	System Supplies (RecycledWater)	Section 6.2.5
Section 6.2.5	10633(e)	Describe the projected use of recycled water within the supplier's service area at the endof 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected.	System Supplies (RecycledWater)	Section 6.2.5
Section 6.2.5	10633(f)	Describe the actions which may be taken to encourage the use of recycled water and the projected results of these actions in terms of acre-feet of recycled water used per year.	System Supplies (RecycledWater)	Section 6.2.5
Section 6.2.5	10633(g)	Provide a plan for optimizing the use of recycled water in the supplier's service area.	System Supplies (Recycled Water)	Section 6.2.5
Section 6.2.6	10631(g)	Describe desalinated water project opportunities for long-term supply.	System Supplies	Section 6.2.6
Section 6.2.5	10633(a)	Describe the wastewater collection and treatment systemsin the supplier’s service area with quantified amount of collection and treatment and the disposal methods.	System Supplies (RecycledWater)	Section 6.2.5
Section 6.2.8, Section 6.3.7	10631(f)	Describe expected future water supply projects and programs that may be undertaken by the water supplier to address water supply reliability in average, single-dry, and for a period of drought lasting 5 consecutive water years.	System Supplies	Section 6.2.8
Section 6.4 and Appendix O	10631.2(a)	The UWMP must include energy information, as stated in the code, that a supplier can readily obtain.	System Suppliers, Energy Intensity	Section 6.4

2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location
Section 7.2	10634	Provide information on the quality of existing sources of water available to the supplier and the manner in which water quality affects water management strategies and supply reliability	Water Supply Reliability Assessment	Section 7.3.3
Section 7.2.4	10620(f)	Describe water management tools and options to maximize resources and minimize the need to import water from other regions.	Water Supply Reliability Assessment	Section 7.1.4
Section 7.3	10635(a)	Service Reliability Assessment: Assess the water supply reliability during normal, dry, and a drought lasting five consecutive water years by comparing the total water supply sources available tothe water supplier with the total projected water use over the next 20 years.	Water Supply Reliability Assessment	Section 7.2 and 4.2.6
Section 7.3	10635(b)	Provide a drought risk assessment as part of informationconsidered in developing the demand management measures and water supply projects.	Water Supply Reliability Assessment	Section 7.2
Section 7.3	10635(b)(1)	Include a description of the data, methodology, and basis for one or more supply shortage conditions that are necessary to conduct a drought risk assessment for a drought period that lasts 5 consecutive years.	Water Supply Reliability Assessment	Section 7.2.1
Section 7.3	10635(b)(2)	Include a determination of the reliability of each source of supply under a variety of water shortage conditions.	Water Supply Reliability Assessment	Sections 7.2.2, 7.3, and Appendix K
Section 7.3	10635(b)(3)	Include a comparison of the total water supply sources available to the water supplier with the total projected water use for the drought period.	Water Supply Reliability Assessment	Appendix K

2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location
Section 7.3	10635(b)(4)	Include considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change conditions, anticipated regulatory changes, and other locally applicable criteria.	Water Supply Reliability Assessment	Sections 6.2.10
Chapter 8	10632(a)	Provide a water shortage contingency plan (WSCP) with specified elements below.	Water Shortage Contingency Planning	2020 UWMP Appendix G 2020 WSCP
Chapter 8	10632(a)(1)	Provide the analysis of water supply reliability (from Chapter 7 of Guidebook) in the WSCP.	Water Shortage Contingency Planning	2020 WSCP Section 3.1
Section 8.10	10632(a)(10)	Describe reevaluation and improvement procedures for monitoring and evaluation the water shortage contingency plan to ensure risk tolerance is adequate and appropriate water shortage mitigation strategies are implemented.	Water Shortage Contingency Planning	2020 WSCP Section 3.10
Section 8.2	10632(a)(2)(A)	Provide the written decision-making process and other methods that the supplier will use each year to determine its water reliability.	Water Shortage Contingency Planning	2020 WSCP Section 3.2
Section 8.2	10632(a)(2)(B)	Provide data and methodology to evaluate the supplier's water reliability for the current year and one dry year pursuant to factors in the code.	Water Shortage Contingency Planning	2020 WSCP Section 3.2.2
Section 8.3	10632(a)(3)(A)	Define six standard water shortage levels of 10%, 20%, 30%, 40%, 50%, and greater than 50% shortage. These levels shall be based on supply conditions, including percent reductions in supply, changes in groundwater levels, changes in surface elevation, or other conditions. The shortage levels shall also apply to a catastrophicinterruption of supply.	Water Shortage Contingency Planning	2020 WSCP Section 3.3

2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location
Section 8.3	10632(a)(3)(B)	Suppliers with an existing water shortage contingency plan that uses different water shortage levels must cross reference their categories with the six standard categories.	Water Shortage Contingency Planning	N/A – using six standard categories
Section 8.4	10632(a)(4)(A)	Suppliers with water shortage contingency plans that align with the defined shortage levels must specify locally appropriate supply augmentation actions.	Water Shortage Contingency Planning	2020 WSCP Section 3.4.2
Section 8.4	10632(a)(4)(B)	Specify locally appropriate demand reduction actions to adequately respond to shortages.	Water Shortage Contingency Planning	2020 WSCP Section 3.4.1
Section 8.4	10632(a)(4)(C)	Specify locally appropriate operational changes.	Water Shortage Contingency Planning	2020 WSCP Section 3.4.3
Section 8.4	10632(a)(4)(D)	Specify additional mandatory prohibitions against specific water use practices that are in addition to state-mandated prohibitions are appropriate to local conditions.	Water Shortage Contingency Planning	2020 WSCP Section 3.4.4
Section 8.4	10632(a)(4)(E)	Estimate the extent to which the gap between supplies and demand will be reduced by implementation of the action.	Water Shortage Contingency Planning	2020 WSCP Section 3.4.1
Section 8.4.6	10632.5	The plan shall include a seismic risk assessment and mitigation plan.	Water Shortage Contingency Plan	2020 WSCP Sections 3.13 and 3.4 and Appendix F
Section 8.5	10632(a)(5)(A)	Suppliers must describe that they will inform customers, the public and others regarding any current or predicted water shortages.	Water Shortage Contingency Planning	2020 WSCP Section 3.5 and WSCP Appendix C
Section 8.5 and 8.6	10632(a)(5)(B) 10632(a)(5)(C)	Suppliers must describe that they will inform customers, the public and others regarding any shortage response actions triggered or anticipated to be triggered and other relevant communications.	Water Shortage Contingency Planning	2020 WSCP Section 3.5 and WSCP Appendix C

2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location
Section 8.6	10632(a)(6)	Retail supplier must describe how it will ensure compliance with and enforce provisions of the WSCP.	Water Shortage Contingency Planning	2020 WSCP Section 3.6 and WSCP Appendix B
Section 8.7	10632(a)(7)(A)	Describe the legal authority that empowers the supplier to enforce shortage response actions.	Water Shortage Contingency Planning	2020 WSCP Section 3.7
Section 8.7	10632(a)(7)(B)	Provide a statement that the supplier will declare a water shortage emergency per Water Code Chapter 3.	Water Shortage Contingency Planning	2020 WSCP Section 3.7
Section 8.7	10632(a)(7)(C)	Provide a statement that the supplier will coordinate with any city or county within which it provides water for the possible proclamation of a local emergency.	Water Shortage Contingency Planning	2020 WSCP Section 3.7
Section 8.8	10632(a)(8)(A)	Describe the potential revenue reductions and expense increases associated with activated shortage response actions.	Water Shortage Contingency Planning	2020 WSCP Section 3.8
Section 8.8	10632(a)(8)(B)	Provide a description of mitigation actions needed to address revenue reductions and expense increases associated with activated shortage responseactions.	Water Shortage Contingency Planning	2020 WSCP Section 3.8
Section 8.8	10632(a)(8)(C)	Retail suppliers must describe the cost of compliance with Water Code Chapter 3.3: Excessive Residential Water Use During Drought	Water Shortage Contingency Planning	2020 WSCP Section 3.8
Section 8.9	10632(a)(9)	Retail suppliers must describe the monitoring and reporting requirements and procedures that ensure appropriate data is collected, tracked, and analyzed for purposes of monitoring customer compliance.	Water Shortage Contingency Planning	2020 WSCP Section 3.9

2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location
Section 8.11	10632(b)	Analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas.	Water Shortage Contingency Planning	2020 WSCP Section 3.11
Sections 8.12 and 10.4	10635(c)	Provide supporting documentation that the Water Shortage Contingency Plan has been, or will be, provided to any city or county within which it provides water within 30 days after submission of plan to DWR.	Plan Adoption, Submittal, and Implementation	Section 10.3.4 2020 WSCP Section 3.12
Section 8.14	10632(c)	Make Water Shortage Contingency Plan available to customers and any city or county where it provides water within 30 days after adopting it.	Water Shortage Contingency Planning	Sections 10.3.4 and 10.4 2020 WSCP Section 3.12
Sections 9.1 and 9.3	10631(e)(2)	Wholesale suppliers shall describe specific demand management measures listed in code, their distribution system asset management program, and supplier assistance program.	Demand Management Measures	N/A (Wholesale Only)
Sections 9.2 and 9.3	10631(e)(1)	Retail suppliers shall provide a description of the nature and extent of each demand management measure implemented over the past five years. Description will address specific measures listed in code.	Demand Management Measures	Sections 9.1 and 9.2
Chapter 10	10608.26(a)	Retail suppliers shall conduct a public hearing to discuss adoption, implementation, and economic impact of water use targets (recommended to discuss compliance).	Plan Adoption, Submittal, and Implementation	Section 10.2
Section 10.2.1	10621(b)	Notify, at least 60 days prior to the public hearing, any city or county within which the supplier provides water that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. Reported in	Plan Adoption, Submittal, and Implementation	Sections 2.6.3 and 10.1.1

2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location
		Table 10-1.		
Section 10.4	10621(f)	Each urban water supplier shall update and submit its 2020 plan to the department by July 1, 2021.	Plan Adoption, Submittal, and Implementation	Section 10.3.1
Sections 10.2.2, 10.3, and 10.5	10642	Provide supporting documentation that the urban water supplier made the plan and contingency plan available for public inspection, published notice of the public hearing, and held a public hearing about the plan and contingency plan.	Plan Adoption, Submittal, and Implementation	Section 10.1.2 and Appendix E and Appendix D of the WSCP
Section 10.2.2	10642	The water supplier is to provide the time and place of the hearing to any city or county within which the supplier provides water.	Plan Adoption, Submittal, and Implementation	Section 10.1.2 and Appendix E
Section 10.3.2	10642	Provide supporting documentation that the plan and contingency plan has been adopted as prepared or modified.	Plan Adoption, Submittal, and Implementation	Appendix F of the UWMP and Appendix E of the WSCP
Section 10.4	10644(a)	Provide supporting documentation that the urban water supplier has submitted this UWMP to the California State Library.	Plan Adoption, Submittal, and Implementation	Sections 10.2.2 and 10.3.3
Section 10.4	10644(a)(1)	Provide supporting documentation that the urban water supplier has submitted this UWMP to any city or county within which the supplier provides water no later than 30 days after adoption.	Plan Adoption, Submittal, and Implementation	Sections 10.2.2 and 10.3.4
Sections 10.4.1 and 10.4.2	10644(a)(2)	The plan, or amendments to the plan, submitted to the department shall be submitted electronically.	Plan Adoption, Submittal, and Implementation	Section 10.6.1
Section 10.5	10645(a)	Provide supporting documentation that, not later than 30 days after filing a copy of its plan with the department, the supplier has or will make the plan available for public review during normal business	Plan Adoption, Submittal, and Implementation	Section 10.4

2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location
		hours.		
Section 10.5	10645(b)	Provide supporting documentation that, not later than 30 days after filing a copy of its water shortage contingency plan with the department, the supplier has or will make the plan available for public review during normalbusiness hours.	Plan Adoption, Submittal, and Implementation	Section 10.4
Section 10.6	10621(c)	If supplier is regulated by the Public Utilities Commission, include its plan and contingency plan as part of its general rate case filings.	Plan Adoption, Submittal, and Implementation	N/A – Suisun-Solano Water Authority is not regulated by the Public Utilities Commission.
Section 10.7.2	10644(b)	If revised, submit a copy of the water shortage contingency plan to DWR within 30 days of adoption.	Plan Adoption, Submittal, and Implementation	Section 10.6.2

APPENDIX B – SB X7-7 VERIFICATION FORM

Table B-0.1 SB X7-7. Table 0

SB X7-7 Table 0: Units of Measure Used in 2020 UWMP* *(select one from the drop down list)*
Million Gallons
**The unit of measure must be consistent throughout the UWMP, as reported in Submittal Table 2-3.*
NOTES:

Table B-0.2. SB X7-7. Table 2

SB X7-7 Table 2: Method for 2020 Population Estimate	
Method Used to Determine 2020 Population (may check more than one)	
☑	**1. Department of Finance** (DOF) or **American Community Survey** (ACS)
☑	**2. Persons-per-Connection Method**
☐	**3. DWR Population Tool**
☐	**4. Other** DWR recommends pre-review
NOTES: 2020 population value is from the Department of Finance Table E-5 for City of Suisun City plus a derived population of 72 people for Mankas Corner and 592 people for Tolenas, based on number of residential parcels times average household size per size of 3.1 per Association of Bay Area Governments.	

Table B-0.3. SB X7-7. Table 3

SB X7-7 Table 3: 2020 Service Area Population	
2020 Compliance Year Population	
2020	29,783
NOTES:	

Table B-0.4. SB X7-7. Table 4

SB X7-7 Table 4: 2020 Gross Water Use							
Compliance Year 2020	**2020 Volume Into Distribution System** *This column will remain blank until SB X7-7 Table 4-A is completed.*	**2020 Deductions**					**2020 Gross Water Use**
		Exported Water *	**Change in Dist. System Storage*** (+/-)	**Indirect Recycled Water** *This column will remain blank until SB X7-7 Table 4-B is completed.*	**Water Delivered for Agricultural Use***	**Process Water** *This column will remain blank until SB X7-7 Table 4-D is completed.*	
	1,173	-	-	-	-	-	**1,173**
*** Units of measure (AF, MG , or CCF)** must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.							
NOTES:							

Table B-0.5. SB X7-7. Table 4-A

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment
Complete one table for each source.

Name of Source	Solano County Water Agency under contract to City of Suisun City for Solano Project water
This water source is *(check one)* **:**	
☐	The supplier's own water source
☑	A purchased or imported source

Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional (+/-)*	Corrected Volume Entering Distribution System
	521	-	521

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.*
[2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES: Volume equals total right / safe yield contract volume.

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s) Meter Error Adjustment
Complete one table for each source.

Name of Source	Solano County Water Agency under contract to City of Suisun City for State Water Project water
This water source is *(check one)* **:**	
☐	The supplier's own water source
☑	A purchased or imported source

Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional (+/-)*	Corrected Volume Entering Distribution System
			0

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.*
[2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES: No State Water Project supply needed in 2020. Total reasonably available volume / right or safe yield is 424 MG; not used.

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment
Complete one table for each source.

Name of Source	Solano County Water Agency under contract to Solano Irrigation District for Solano Project water
This water source is *(check one)* **:**	
☐	The supplier's own water source
☑	A purchased or imported source

Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional (+/-)*	Corrected Volume Entering Distribution System
	652		652

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.*
[2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES: SID is under contract with SSWA to provide Solano Project water to SSWA to meet water demands after full utilization of City of Suisun City's allocated supplies. This was not needed this year.

Table B-0.6. SB X7-7. Table 4-C.1

SB X7-7 Table 4-C.1: 2020 Process Water Deduction Eligibility *(For use only by agencies that are deducting process water using Criteria 1)*				
Criteria 1 Industrial water use is equal to or greater than 12% of gross water use				
2020 Compliance Year	2020 Gross Water Use Without Process Water Deduction	2020 Industrial Water Use	Percent Industrial Water	**Eligible for Exclusion Y/N**
	1,173	-	0%	NO
NOTES:				

Table B-0.7. SB X7-7. Table 4-C.2

SB X7-7 Table 4-C.2: 2020 Process Water Deduction Eligibility *(For use only by agencies that are deducting process water using Criteria 2)*				
Criteria 2 Industrial water use is equal to or greater than 15 GPCD				
2020 Compliance Year	2020 Industrial Water Use	2020 Population	2020 Industrial GPCD	**Eligible for Exclusion Y/N**
		29,783	-	NO
NOTES:				

Table B-0.8. SB X7-7. Table 4-C.3

SB X7-7 Table 4-C.3: 2020 Process Water Deduction Eligibility *(For use only by agencies that are deducting process water using Criteria 3)*						
Criteria 3 Non-industrial use is equal to or less than 120 GPCD						
2020 Compliance Year	2020 Gross Water Use Without Process Water Deduction *Fm SB X7-7 Table 4*	2020 Industrial Water Use	2020 Non-industrial Water Use	2020 Population *Fm SB X7-7 Table 3*	Non-Industrial GPCD	**Eligible for Exclusion Y/N**
	1,173		1,173	29,783	108	YES
NOTES:						

Table B-0.9. SB X7-7. Table 4-C.4

SB X7-7 Table 4-C.4: 2020 Process Water Deduction Eligibility *(For use only by agencies that are deducting process water using Criteria 4)*				
Criteria 4 Disadvantaged Community. A "Disadvantaged Community" (DAC) is a community with a median household income less than 80 percent of the statewide average.				
SELECT ONE "Disadvantaged Community" status was determined using one of the methods listed below:				
☐ **1. IRWM DAC Mapping tool https://gis.water.ca.gov/app/dacs/**				
	If using the IRWM DAC Mapping Tool, include a screen shot from the tool showing that the service area is considered a DAC.			
2. 2020 Median Income				
☐	California Median Household Income*	Service Area Median Household Income	Percentage of Statewide Average	**Eligible for Exclusion? Y/N**
	2020 **$75,235**		0%	YES
	*California median household income 2015 -2019 as reported in US Census Bureau QuickFacts.			
NOTES				

Table B-0.10. SB X7-7. Table 5

SB X7-7 Table 5: 2020 Gallons Per Capita Per Day (GPCD)		
2020 Gross Water *Fm SB X7-7 Table 4*	**2020 Population** *Fm SB X7-7 Table 3*	**2020 GPCD**
1,173	29,783	**108**
NOTES:		

Table B-0.11. SB X7-7. Table 9

SB X7-7 Table 9: 2020 Compliance							
Actual 2020 GPCD[1]	Optional Adjustments to 2020 GPCD Enter "0" if Adjustment Not Used Extraordinary Events[1]	Weather Normalization[1]	Economic Adjustment[1]	TOTAL Adjustments[1]	Adjusted 2020 GPCD [1] *(Adjusted if applicable)*	2020 Confirmed Target GPCD [1, 2]	**Did Supplier Achieve Targeted Reduction for 2020?**
108	-	-	-	-	108	124	**YES**

[1] *All values are reported in GPCD*

[2] ***2020 Confirmed Target GPCD*** *is taken from the Supplier's SB X7-7 Verification Form Table SB X7-7, 7-F.*

NOTES:

APPENDIX C – DEMAND & PASSIVE SAVINGS METHODOLOGY

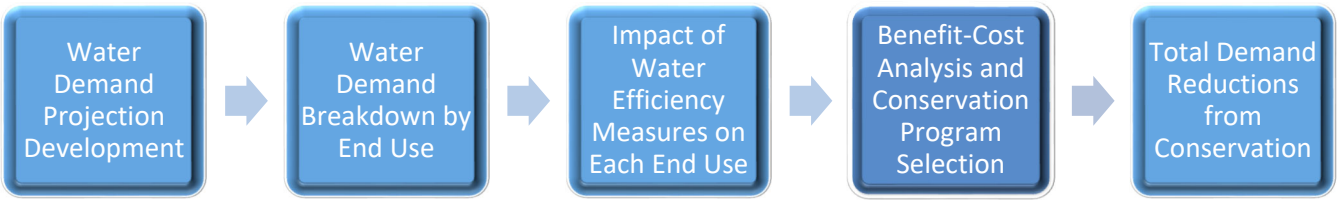


Figure C-1. DSS Model Main Page

DSS Model Overview: The Least Cost Planning Decision Support System Model (DSS Model) is used to prepare long-range, detailed demand projections. The purpose of the extra detail is to enable a more accurate assessment of the impact of water efficiency programs on demand and to provide a rigorous and defensible modeling approach necessary for projects subject to regulatory or environmental review.

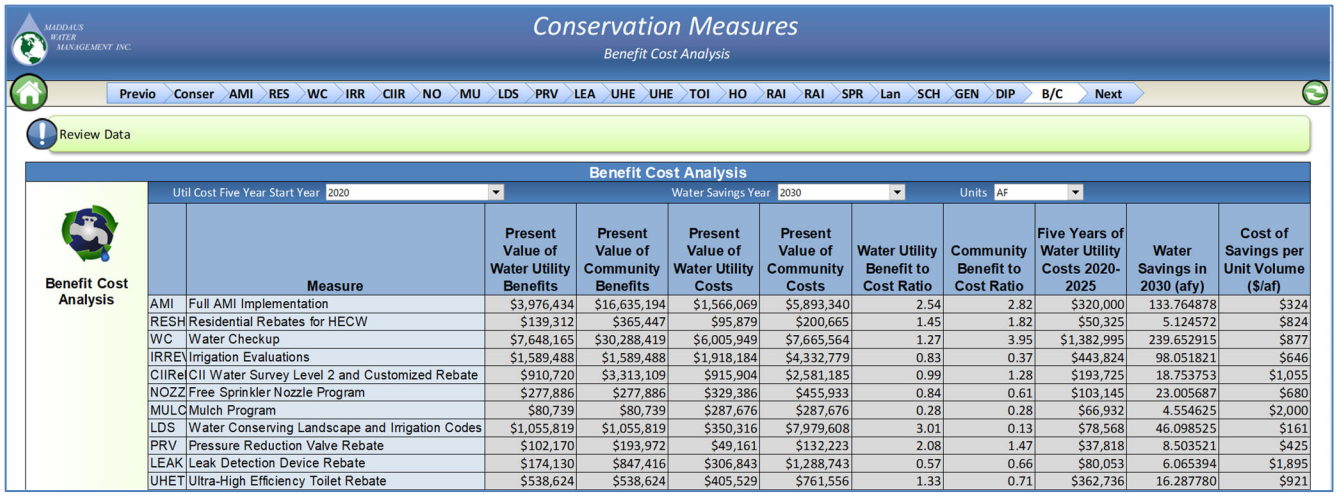
Originally developed in 1999 and continuously updated, the DSS Model is an "end-use" model that breaks down total water production (water demand in the service area) to specific water end uses, such as plumbing fixtures and appliances. The model uses a bottom-up approach that allows for multiple criteria to be considered when estimating future demands, such as the effects of natural fixture replacement, plumbing codes, and conservation efforts. The DSS Model may also use a top-down approach with a utility-prepared water demand forecast.

Demand Forecast Development and Model Calibration: To forecast urban water demands using the DSS Model, customer demand data is obtained from the water agency being modeled. Demand data is reconciled with available demographic data to characterize water usage for each customer category in terms of number of users per account and per capita water use. Data is further analyzed to approximate the split of indoor and outdoor water usage in each customer category. The indoor/outdoor water usage is further divided into typical end uses for each customer category. Published data on average per capita indoor water use and average per capita end use is combined with the number of water users to calibrate the volume of water allocated to specific end uses in each customer category. In other words, the DSS Model checks that social norms from end studies on water use behavior (e.g., flushes per person per day) are not exceeded or drop below reasonable use limits.

Passive Water Savings Calculations: The DSS Model is used to forecast service area water fixture use. Specific end-use type, average water use, and lifetime are compiled for each fixture. Additionally, state and national plumbing codes and appliance standards are modeled by customer category. These fixtures and plumbing codes can be added to, edited, or deleted by the user. This process yields two demand forecasts, one with plumbing codes and one without plumbing codes.

Active Conservation Measure Analysis Using Benefit-Cost Analysis: The DSS Model evaluates active conservation measures using benefit-cost analysis with the present value of the cost of water saved ($/Million Gallons or $/Acre-Feet). Benefits are based on savings in water and wastewater facility operations and maintenance (O&M) and any deferred capital expenditures. The figures on the previous page illustrate the processes for forecasting conservation water savings, including the impacts of fixture replacement due to existing plumbing codes and standards.

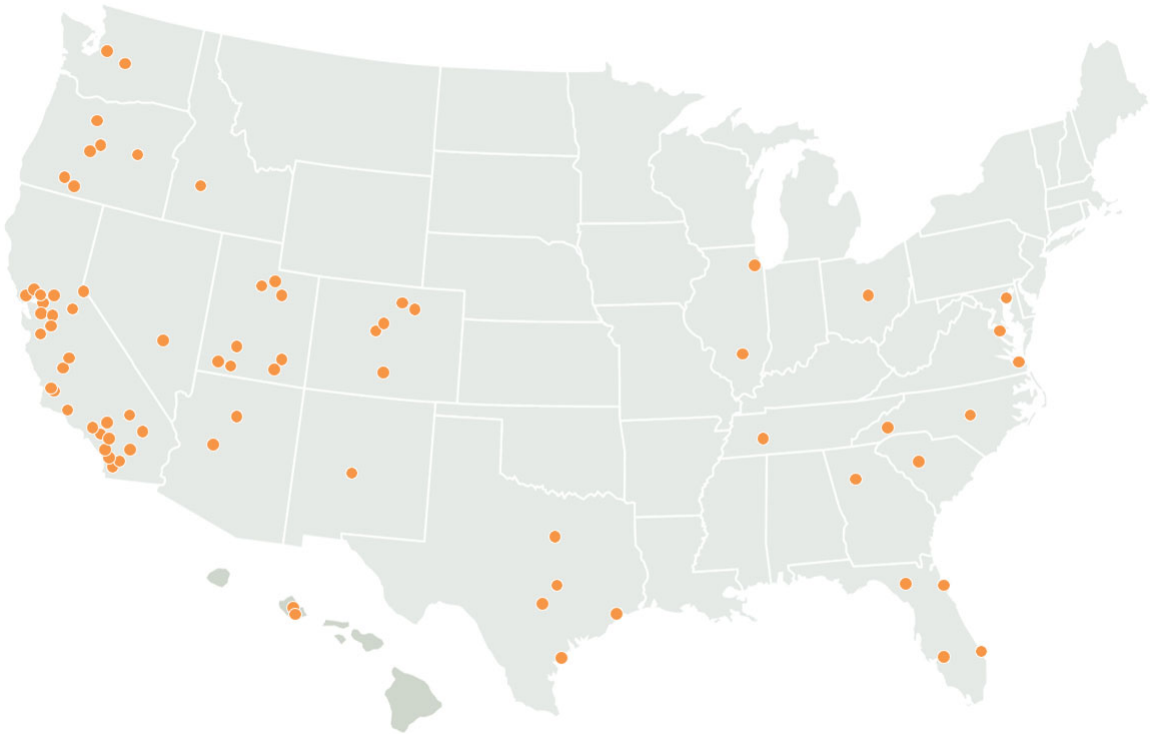
Figure C-2. Sample Benefit-Cost Analysis Summary



	Measure	Present Value of Water Utility Benefits	Present Value of Community Benefits	Present Value of Water Utility Costs	Present Value of Community Costs	Water Utility Benefit to Cost Ratio	Community Benefit to Cost Ratio	Five Years of Water Utility Costs 2020-2025	Water Savings in 2030 (afy)	Cost of Savings per Unit Volume ($/af)
AMI	Full AMI Implementation	$3,976,434	$16,635,194	$1,566,069	$5,893,340	2.54	2.82	$320,000	133.764878	$324
RESH	Residential Rebates for HECW	$139,312	$365,447	$95,879	$200,665	1.45	1.82	$50,325	5.124572	$824
WC	Water Checkup	$7,648,165	$30,288,419	$6,005,949	$7,665,564	1.27	3.95	$1,382,995	239.652915	$877
IRREV	Irrigation Evaluations	$1,589,488	$1,589,488	$1,918,184	$4,332,779	0.83	0.37	$443,824	98.051821	$646
CIIRe	CII Water Survey Level 2 and Customized Rebate	$910,720	$3,313,109	$915,904	$2,581,185	0.99	1.28	$193,725	18.753753	$1,055
NOZZ	Free Sprinkler Nozzle Program	$277,886	$277,886	$329,386	$455,933	0.84	0.61	$103,145	23.005687	$680
MULC	Mulch Program	$80,739	$80,739	$287,676	$287,676	0.28	0.28	$66,932	4.554625	$2,000
LDS	Water Conserving Landscape and Irrigation Codes	$1,055,819	$1,055,819	$350,316	$7,979,608	3.01	0.13	$78,568	46.098525	$161
PRV	Pressure Reduction Valve Rebate	$102,170	$193,972	$49,161	$132,223	2.08	1.47	$37,818	8.503521	$425
LEAK	Leak Detection Device Rebate	$174,130	$847,416	$306,843	$1,288,743	0.57	0.66	$80,053	6.065394	$1,895
UHET	Ultra-High Efficiency Toilet Rebate	$538,624	$538,624	$405,529	$761,556	1.33	0.71	$362,736	16.287780	$921

Model Use and Validation: The DSS Model has been used for over 20 years for practical applications of conservation planning in over 300 service areas representing 60 million people, including extensive efforts nationally and internationally in Australia, New Zealand, and Canada.

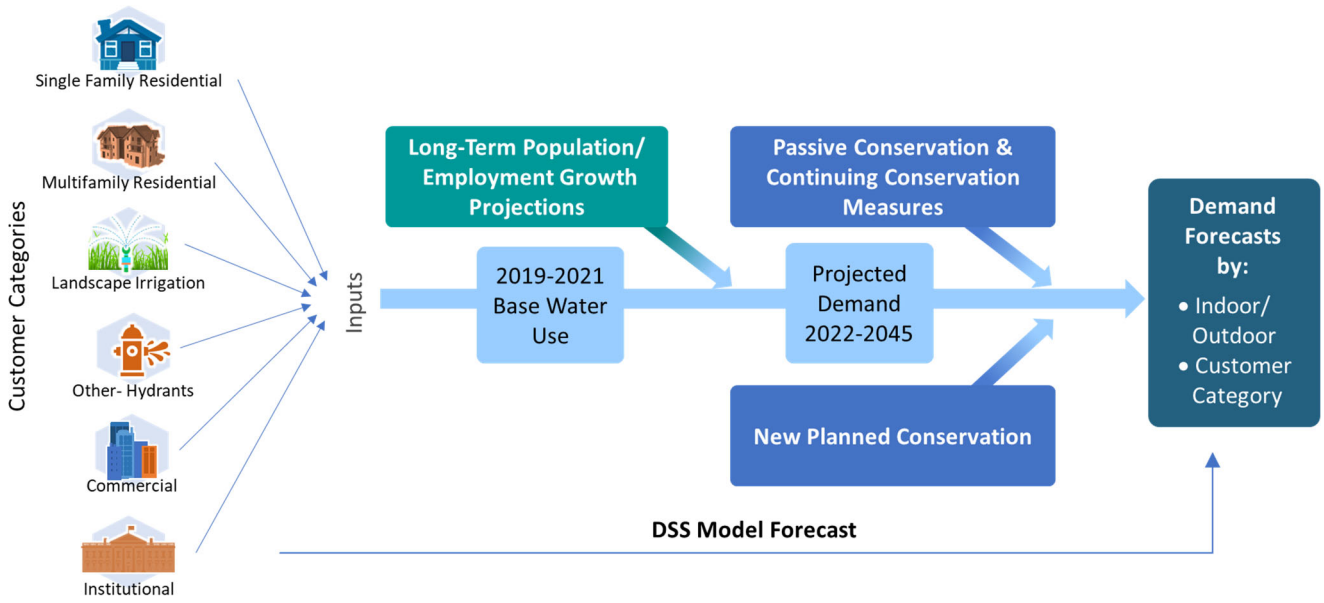
Figure C-3. DSS Model Analysis Locations in the U.S.



The California Water Efficiency Partnership, or CalWEP (formerly the CUWCC), has peer reviewed and endorsed the model since 2006. It is offered to all CalWEP members for use to estimate water demand, plumbing code, and conservation program savings.

The DSS Model can use one of the following: 1) a statistical approach to forecast demands (e.g., an econometric model); 2) a forecasted increase in population and employment; 3) predicted future demands; or 4) a demand projection entered into the model from an outside source. For the SSWA, baseline demand was developed based on an increase in residential population and regional employment projections. The following figure presents the flow of information in the DSS Model Analysis.

Figure C-4. DSS Model Analysis Flow



C.1 DSS Model Methodology

Each conservation measure targets a particular water use, such as indoor single family water use. Targeted water uses are categorized by water user group and by end use. Targeted water user groups include single family residential; multi-family residential; commercial, industrial, and institutional; and so forth. Measures may apply to more than one water user group. Targeted end uses include indoor and outdoor use. Targeted water use is important to identify because the water savings are generated from reductions in water use for the targeted end use. For example, a residential retrofit conservation measure targets single family and multi-family residential indoor use, and in some cases specifically shower use. When considering the water savings potential generated by a residential retrofit, one considers the water saved by installing low-flow showerheads in single family and multi-family homes.

The market penetration goal for a measure is the extent to which the product or service related to the conservation measure occupies the potential market. Essentially, the market penetration goal identifies how many fixtures, rebates, surveys, and so forth that the wholesale customer would have to offer or conduct over time to reach its water savings goal for that conservation measure. This is often expressed in terms of the number of fixtures, rebates, or surveys offered or conducted per year.

The potential for error in market penetration goal estimates for each measure can be significant because the estimates are based on previous experience, chosen implementation methods, projected utility effort, and funds allocated to implement the measure. The potential error can be corrected through reevaluation of the measure as the implementation of the measure progresses. For example, if the market penetration required to achieve specific water savings turns out to be different than predicted, adjustments to the implementation efforts can

be made. Larger rebates or additional promotions are often used to increase market penetration. The process is iterative to reflect actual conditions and helps to ensure that market penetration and needed savings are achieved regardless of future variances between estimates and actual conditions.

In contrast, market penetration for mandatory ordinances can be more predictable with the greatest potential for error occurring in implementing the ordinance change. For example, requiring dedicated irrigation meters for new accounts through an ordinance can assure an almost 100% market penetration for affected properties.

SSWA is constantly examining when a measure might reach saturation. Baseline surveys are the best approach to having the most accurate information on market saturation. This was considered when analyzing individual conservation measures where best estimates were made. MWM was not provided with any baseline surveys for this analysis, but discussions were held with SSWA regarding what the saturation best estimates were within its service area.

C.2 Present Value Analysis and Perspectives on Benefits and Costs

The determination of the economic feasibility of water conservation programs involves comparing the costs of the programs to the benefits provided using the DSS Model, which calculates the cost effectiveness of conservation measure savings at the end-use level. For example, the model determines the amount of water a toilet rebate program saves in daily toilet use for each single-family account.

Present value analysis using present-day dollars and a real discount rate of 3% is used to discount costs and benefits to the base year. From this analysis, benefit-cost ratios of each measure are computed. When measures are put together in programs, the model is set up to avoid double counting savings from multiple measures that act on the same end use of water. For example, multiple measures in a program may target toilet replacements. The model includes assumptions to apportion water savings between the multiple measures.

Economic analysis can be performed from several different perspectives, based on which party is affected. For planning water use efficiency programs for utilities, perspectives most commonly used for benefit-cost analyses are the “utility” perspective and the “community” perspective. The “utility” benefit-cost analysis is based on the benefits and costs to the water provider. The “community” benefit-cost analysis includes the utility benefit and costs together with account owner/customer benefits and costs. These include customer energy and other capital or operating cost benefits plus the costs of implementing the measure beyond what the utility pays.

The utility perspective offers two advantages. First, it considers only the program costs that will be directly borne by the utility. This enables the utility to fairly compare potential investments for saving versus supplying increased quantities of water. Second, revenue shifts are treated as transfer payments, which means program participants will have lower water bills and non-participants will have slightly higher water bills so that the utility’s revenue needs continue to be met. Therefore, the analysis is not complicated with uncertainties associated with long-term rate projections and retail rate design assumptions. It should be noted that there is a significant difference between the utility’s savings from the avoided cost of procurement and delivery of water and the reduction in retail revenue that results from reduced water sales due to water use efficiency. This budget impact occurs slowly and can be accounted for in water rate planning. Because it is the water provider’s role in developing a water use efficiency plan that is vital in this study, the utility perspective was primarily used to evaluate elements of this report.

The community perspective is defined to include the utility and the customer costs and benefits. Costs incurred by customers striving to save water while participating in water use efficiency programs are considered, as well as benefits received in terms of reduced energy bills (from water heating costs) and wastewater savings, among others. Water bill savings are not a customer benefit in aggregate for reasons described previously. Other factors external to the utility, such as environmental effects, are often difficult to quantify or are not necessarily under the control of the utility. They are therefore frequently excluded from economic analyses, including this one.

The time value of money is explicitly considered. Typically, the costs to save water occur early in the planning period whereas the benefits usually extend to the end of the planning period. A long planning period of over 30 years is often used because costs and benefits that occur beyond these 20 years (beyond the year 2045 in this UWMP) have very little influence on the total present value of the costs and benefits. The value of all future costs and benefits is discounted to the first year in the DSS Model (the base year) at the real interest rate of 3.01%. The DSS Model calculates this real interest rate, adjusting the current nominal interest rate (assumed to be approximately 6.1% at the time this report was drafted) by the assumed rate of inflation (3.0%).

The formula to calculate the real interest rate is:

(nominal interest rate – assumed rate of inflation) / (1 + assumed rate of inflation)

Cash flows discounted in this manner are herein referred to as "Present Value" sums.

C.3 Measure Cost and Water Savings Assumptions

In SSWA's DSS Model, to evaluate each water conservation measure, assumptions regarding the following variables were made for each measure:

- **Targeted Water User Group End Use** – Water user group (e.g., single family residential) and end use (e.g., indoor or outdoor water use).
- **Utility Unit Cost** – Cost of rebates, incentives, and contractors hired to implement measures. The assumed dollar values for the measure unit costs were closely reviewed by staff and are found to be adequate for each individual measure. The values in most cases are in the range of what is offered by other water utilities in the region.
- **Retail Customer Unit Cost** – Cost for implementing measures that is paid by retail customers (i.e., the remainder of a measure's cost that is not covered by a utility rebate or incentive).
- **Utility Administration and Marketing Cost** – The cost to the utility for administering the measure, including consultant contract administration, marketing, and participant tracking. The mark-up is sufficient (in total) to cover conservation staff time, general expenses, and overhead.

Costs are determined for each of the measures based on industry knowledge, past experience, and data provided by SSWA. Costs may include incentive costs, usually determined on a per-participant basis; fixed costs, such as marketing; variable costs, such as the cost to staff the measures and to obtain and maintain equipment; and a one-time set-up cost. The set-up cost is for measure design by staff or consultants, any required pilot testing, and preparation of materials that are used in marketing the measure. Measure costs are estimated each year through 2045. Costs are spread over the time period depending on the length of the implementation period for the measure and estimated voluntary customer participation levels.

Lost revenue due to reduced water sales is not included as a cost because the water use conservation measures evaluated herein generally take effect over a long span of time. This span is sufficient to enable timely rate adjustments, if necessary, to meet fixed cost obligations and savings on variable costs such as energy and chemicals.

The unit costs vary according to the type of customer account and implementation method being addressed. For example, a measure might cost a different amount for a residential single-family account than for a residential multi-family account, and for a rebate versus an ordinance requirement or a direct installation implementation method. Typically, water utilities have found there are increased costs associated with achieving higher market saturation, such as more surveys per year. The DSS Model calculates the annual costs based on the number of participants each year. The general formula for calculating annual utility costs is:

- Annual Utility Cost = Annual market penetration rate x total accounts in category x unit cost per account x (1+administration and marketing markup percentage)
- Annual Customer Cost = Annual number of participants x unit customer cost
- Annual Community Cost = Annual utility cost + annual customer cost

Data necessary to forecast water savings of measures include specifics on water use, demographics, market penetration, and unit water savings. Savings normally develop at a measured and predetermined pace, reaching full maturity after full market penetration is achieved. This may occur 3-10 years after the start of implementation, depending upon the implementation schedule.

For every water use efficient activity or replacement with more efficient devices, there is a useful life. The useful life is called the "Measure Life" and is defined to be how long water use conservation measures stay in place and continue to save water. It is assumed that measures implemented because of codes, standards, or ordinances (e.g., toilets) would be "permanent" and not revert to an old inefficient level of water use if the device needed to be replaced. However, some measures that are primarily behavior-based, such as residential surveys, are assumed to need to be repeated on an ongoing basis to retain the water savings (e.g., homeowners move away, and the new homeowners may have less efficient water using practices). Surveys typically have a measure life on the order of five years.

C.4 National Plumbing Code

The Federal Energy Policy Act of 1992, as amended in 2005, mandates that only fixtures (as listed below) meeting the following standards can be installed in new buildings:

- Toilet – 1.6 gal/flush maximum
- Urinals – 1.0 gal/flush maximum
- Showerhead – 2.5 gal/min at 80 pounds per square inch (psi)
- Residential faucets – 2.2 gal/min at 60 psi
- Public restroom faucets – 0.5 gal/min at 60 psi
- Dishwashing pre-rinse spray valves – 1.6 gal/min at 60 psi

Replacement of fixtures in existing buildings is also governed by the Federal Energy Policy Act, which mandates that only devices with the specified level of efficiency (as shown above) can be sold as of 2006. The net result of the plumbing code is that new buildings will have more efficient fixtures and old inefficient fixtures will slowly be replaced with new, more efficient models. The national plumbing code is an important piece of legislation and must be carefully taken into consideration when analyzing the overall water efficiency of a service area.

In addition to the plumbing code, the U.S. Department of Energy regulates appliances, such as residential clothes washers, further reducing indoor water demands. Regulations to make these appliances more energy efficient have driven manufactures to dramatically reduce the amount of water these machines use. Generally, front-loading washing machines use 30-50% less water than conventional (top-loading) models, which are still available but are becoming more water efficient.

In this analysis, the DSS Model forecasts a gradual transition to high efficiency clothes washers (using 12 gallons or less) so that by the year 2025 that will be the only type of machine available for purchase. In addition to the industry becoming more efficient, rebate programs for washers have been successful in encouraging customers to buy more water-efficient models. Given that machines last about 10 years, eventually all machines on the market will be the more water-efficient models. Energy Star washing machines have a water factor of 6.0 or less – the equivalent of using 3.1 cubic feet (or 23.2 gallons) of water per load. The maximum water factor for residential clothes washers under federal standards as of 2021 is 6.5 (equates to approximately 19 gallons per load based on an average 2.9 cubic ft. tub). The water factor equals the number of gallons used per cycle per cubic foot of capacity.

Water Factor (WF) = gallons per load/tub volume

OR

washer capacity (cubic ft.)/average tub volume

Prior to the year 2000, the water factor for a typical new residential clothes washer was around 12 (equates to approximately 35 gallons per load based on an average 2.9 cubic ft. tub). In March 2015, the federal standard reduced the maximum water factor for top- and front-loading machines to 8.4 and 4.7, respectively. In 2018, the maximum water factor for top-loading machines was further reduced to 6.5. For commercial washers, the maximum water factors were reduced in 2010 to 8.5 and 5.5 for top- and front-loading machines, respectively. Beginning in 2015, the maximum water factor for Energy Star certified washers was 3.7 for front-loading and 4.3 for top-loading machines. In 2011, the U.S. Environmental Protection Agency estimated that Energy Star washers comprised more that 60% of the residential market and 30% of the commercial market (Energy Star, 2011). A new Energy Star compliant washer uses about two-thirds less water per cycle than washers manufactured in the 1990s.

C.5 State Plumbing Code

This section describes California state codes applicable to SSWA's water use.

C.5.1 California State Law – AB 715

Plumbing codes for toilets, urinals, showerheads, and faucets were initially adopted by California in 1991, mandating the sale and use of ultra-low flush toilets (ULFTs) using 1.6 gpf, urinals using 1 gpf, and low-flow showerheads and faucets. AB 715 led to an update to California Code of Regulations Title 20 (see Section C.2.3) mandating that all toilets and urinals sold and installed in California as of January 1, 2014 must be high efficiency versions having flush ratings that do not exceed 1.28 gpf (toilets) and 0.5 gpf (urinals).

C.5.2 California State Laws – SB 407 and SB 837

SB 407 addresses plumbing fixture retrofits on resale or remodel. The DSS Model carefully considers the overlap with SB 407, the plumbing code (natural replacement), CALGreen, AB 715 and rebate programs (such as toilet rebates). SB 407 (enacted in 2009) requires that properties built prior to 1994 be fully retrofitted with water conserving fixtures by the year 2017 for single family residential houses and 2019 for multi-family and commercial properties. SB 407 program length is variable and continues until all the older high flush toilets have been replaced in the service area. The number of accounts with high flow fixtures is tracked to make sure that the situation of replacing more high flow fixtures than actually exist does not occur. Additionally, SB 407 conditions issuance of building permits for major improvements and renovations upon retrofit of non-compliant plumbing fixtures. SB 837 (enacted in 2011) requires that sellers of real estate property disclose in their Real Estate Transfer Disclosure Statement whether their property complies with these requirements. Both laws are intended to accelerate the replacement of older, low efficiency plumbing fixtures, and ensure that only high efficiency fixtures are installed in new residential and commercial buildings.

C.5.3 2019 CALGreen and 2015 CA Code of Regulations Title 20 Appliance Efficiency Regulations

Fixture characteristics in the DSS Model are tracked in new accounts, which are subject to the requirements of the 2019 California Green Building Code and 2015 California Code of Regulations Title 20 Appliance Efficiency Regulations adopted by the California Energy Commission (CEC) on September 1, 2015. The CEC 2015 appliance efficiency standards apply to the following new appliances, if they are sold in California: showerheads, lavatory faucets, kitchen faucets, metering faucets, replacement aerators, wash fountains, tub spout diverters, public

lavatory faucets, commercial pre-rinse spray valves, urinals, and toilets. The DSS Model accounts for plumbing code savings due to the effects these standards have on showerheads, faucet aerators, urinals, toilets, and clothes washers.

- Showerheads – July 2016: 2.0 gallons per minute (gpm); July 2018: 1.8 gpm
- Wall Mounted Urinals – January 2016: 0.125 gpf (pint)
- Lavatory Faucets and Aerator – July 2016: 1.2 gpm at 60 psi
- Kitchen Faucets and Aerator – July 2016: 1.8 gpm with optional temporary flow of 2.2 gpm at 60 psi
- Public Lavatory Faucets – July 2016: 0.5 gpm at 60 psi

In summary, the controlling law for **toilets** is AB 715, requiring high efficiency toilets of 1.28 gpf sold in California beginning in 2014. The controlling law for wall-mounted urinals is the 2015 CEC efficiency regulations requiring that ultra-high efficiency pint **urinals** (0.125 gpf) be exclusively sold in California beginning January 1, 2016. This is an efficiency progression for urinals from AB 715's requirement of high efficiency (0.5 gpf) urinals starting in 2014.

Standards for **residential clothes washers** fall under the regulations of the U.S. Department of Energy. In 2018, the maximum water factor for standard top-loading machines was reduced to 6.5.

Showerhead flow rates are regulated under the 2015 California Code of Regulations Title 20 Appliance Efficiency Regulations adopted by the CEC, which requires the exclusive sale in California of 2.0 gpm showerheads at 80 psi as of July 1, 2016 and 1.8 gpm showerheads at 80 psi as of July 1, 2018. The WaterSense specification applies to showerheads that have a maximum flow rate of 2.0 gpm or less. This represents a 20% reduction in showerhead flow rate over the current federal standard of 2.5 gpm as of 2021, as specified by the Energy Policy Act of 1992.

Faucet flow rates likewise have been regulated by the 2015 CEC Title 20 regulations. This standard requires that the residential faucets and aerators manufactured on or after July 1, 2016 be exclusively sold in California at 1.2 gpm at 60 psi; and public lavatory and kitchen faucets/aerators sold or offered for sale on or after July 1, 2016 be 0.5 gpm at 60 psi and 1.8 gpm at 60 psi (with optional temporary flow of 2.2 gpm), respectively. Previously, all faucets had been regulated by the 2010 California Green Building Code at 2.2 gpm at 60 psi.

C.6 Key Baseline Potable Demand Inputs, Passive Savings Assumptions, and Resources

The following tables present the key assumptions and references that are used in the DSS Model in determining projected demands with plumbing code savings. The assumptions having the most dramatic effect on future demands are the natural replacement rate of fixtures, how residential or commercial future use is projected, and the percentage of estimated real water losses.

Table C-0.1. List of Key Assumptions

Parameter	Model Input Value, Assumptions, and Key References				
Model Start Year for Analysis	2021				
Water Demand Factor Year (Base Year)	2018 & 2019				
Population Projection Source	Association Of Bay Area Government (ABAG)[27]				
Employment Projection Source	ABAG[28]				
Avoided Cost of Water	$5,470 / MG				
Potable Water System Base Year Water Use Profile					
Customer Categories	**Start Year Accounts**	**Total Water Use Distribution**	**Demand Factors (gpd/account)**	**Indoor Use %**	**2021 Residential Indoor Water Use (GPCD)**
Residential	8,286	75%	251	68%	55
Multi-family	104	7%	1,810	79%	39
Commercial	143	6%	1,221	63%	N/A
Institutional	15	0.2%	400	56%	N/A
Landscape Irrigation	139	12%	2,382	0%	N/A
Other / Hydrants	14	0.3%	635	0%	N/A
Total/Avg	**8,701**	**100%**	**N/A**	**N/A**	**N/A**

[27] Association of Bay Area Governments (ABAG). (2019). *ABAG projections_2017_juris_formated_nounits*. Data was provided by ABAG staff Aksel Olsen for years 2010-2040 based off of jurisdictional boundary, comparing the ABAG boundary to the SSWA service area boundary.

[28] ABAG Sustainable Communities Strategy Preferred Scenario, v2, May 24, 2013. Subregional Study Area 805 for Suisun City.

Table C-0.2. Key Assumptions Resources

Parameter	Resource
Residential End Uses	Key Reference: CA DWR Report "California Single Family Water Use Efficiency Study," (DeOreo, 2011 – Page 28, Figure 3: Comparison of household end-uses) and AWWA Research Foundation (AWWARF) Report "Residential End Uses of Water, Version 2 - 4309" (DeOreo, 2016). Table 2-A. Water Consumption by Water-Using Plumbing Products and Appliances - 1980-2012. PERC Phase 1 Report. Plumbing Efficiency Research Coalition. 2013. http://www.map-testing.com/assets/files/PERC%20Report_Final_Phase%20One_Nov%202011_v1.1.pdf Model Input Values are found in the "End Uses" section of the DSS Model on the "Breakdown" worksheet.
Non-Residential End Uses, percent	Key Reference: AWWARF Report "Commercial and Institutional End Uses of Water" (Dziegielewski, 2000 – Appendix D: Details of Commercial and Industrial Assumptions, by End Use). Santa Clara Valley Water District Water Use Efficiency Unit. "SCVWD CII Water Use and Baseline Study." February 2008. Model Input Values are found in the "End Uses" section of the DSS Model on the "Breakdown" worksheet.
Efficiency Residential Fixture Current Installation Rates	U.S. Census, housing age by type of dwelling plus natural replacement plus rebate program (if any). Key Reference: GMP Research, Inc. (2019). 2019 U.S. WaterSense Market Penetration Industry Report. Key Reference: Consortium for Efficient Energy (www.cee1.org). Model Input Values are found in the "Codes and Standards" green section of the DSS Model by customer category fixtures.
Water Savings for Fixtures, gal/capita/day	Key Reference: AWWARF Report "Residential End Uses of Water, Version 2 - 4309" (DeOreo, 2016). Key Reference: CA DWR Report "California Single Family Water Use Efficiency Study" (DeOreo, 2011 – Page 28, Figure 3: Comparison of household end-uses). Key Reference: California Energy Commission, Staff Analysis of Toilets, Urinals and Faucets, Report # CEC-400-2014-007-SD, 2014. Model Input Values are found in the "Codes and Standards" green section on the "Fixtures" worksheet of the DSS Model.
Non-Residential Fixture Efficiency Current Installation Rates	Key Reference: 2010 U.S. Census, Housing age by type of dwelling plus natural replacement plus rebate program (if any). Assume commercial establishments built at same rate as housing, plus natural replacement. California Energy Commission, Staff Analysis of Toilets, Urinals and Faucets, Report # CEC-400-2014-007-SD, 2014. Santa Clara Valley Water District Water Use Efficiency Unit. "SCVWD CII Water Use and Baseline Study." February 2008. Model Input Values are found in the "Codes and Standards" green section of the DSS Model by customer category fixtures.

Parameter	Resource
Residential Frequency of Use Data, Toilets, Showers, Faucets, Washers, Uses/user/day	Key Reference: AWWARF Report "Residential End Uses of Water, Version 2 - 4309" (DeOreo, 2016). Summary values can be found in the full report: https://www.waterrf.org/research/projects/residential-end-uses-water-version-2 Key Reference: California Energy Commission, Staff Analysis of Toilets, Urinals and Faucets, Report # CEC-400-2014-007-SD, 2014. Key Reference: Alliance for Water Efficiency, The Status of Legislation, Regulation, Codes & Standards on Indoor Plumbing Water Efficiency, January 2016. Model Input Values are found in the "Codes and Standards" green section on the "Fixtures" worksheet of the DSS Model and confirmed in each "Service Area Calibration End Use" worksheet by customer category.
Non-Residential Frequency of Use Data, Toilets, Urinals, and Faucets, Uses/user/day	Key References: Estimated based on AWWARF Report "Commercial and Institutional End Uses of Water" (Dziegielewski, 2000 – Appendix D: Details of Commercial and Industrial Assumptions, by End Use). Key Reference: California Energy Commission, Staff Analysis of Toilets, Urinals and Faucets, Report # CEC-400-2014-007-SD, 2014. Fixture uses over a 5-day work week are prorated to 7 days. Non-residential 0.5gpm faucet standards per Table 2-A. Water Consumption by Water-Using Plumbing Products and Appliances - 1980-2012. PERC Phase 1 Report. Plumbing Efficiency Research Coalition, 2012. http://www.map-testing.com/assets/files/PERC%20Report_Final_Phase%20One_Nov%202011_v1.1.pdf Model Input Values are found in the "Codes and Standards" green section on the "Fixtures" worksheet of the DSS Model and confirmed in each "Service Area Calibration End Use" worksheet by customer category.
Natural Replacement Rate of Fixtures (percent per year)	Residential Toilets 2%-4%
	Non-Residential Toilets 2%-3%
	Residential Showers 4% (corresponds to 25-year life of a new fixture)
	Residential Clothes Washers 10% (based on 10-year washer life). Key References: "Residential End Uses of Water" (DeOreo, 2016) and "Bern Clothes Washer Study, Final Report" (Oak Ridge National Laboratory, 1998).
	Residential Faucets 10% and Non-Residential Faucets 6.7% (every 15 years). CEC uses an average life of 10 years for faucet accessories (aerators). A similar assumption can be made for public lavatories, though no hard data exists and since CII fixtures are typically replaced less frequently than residential, 15 years is assumed. CEC, Analysis of Standards Proposal for Residential Faucets and Faucet Accessories, a report prepared under CEC's Codes and Standards Enhancement Initiative, Docket #12-AAER-2C, August 2013.
	Model Input Value is found in the "Codes and Standards" green section on the "Fixtures" worksheet of the DSS Model.
Residential Future Water Use	Increases Based on Population Growth and Demographic Forecast
Non-Residential Future Water Use	Increases Based on Employment Growth and Demographic Forecast

C.6.1 Fixture Estimates

Determining the level of efficient fixtures in a service area while evaluating the passive savings in the DSS Model is part of the standard process and is called "initial fixture proportions." MWM reconciled water-efficient fixtures and devices installed within the SSWA service area and estimated the number of outstanding inefficient fixtures.

MWM used the DSS Model to perform a saturation analysis for toilets, urinals, showerheads, faucets, and clothes washers. The process included a review of the age of buildings from census data, number of rebates per device, and assumed natural replacement rates. MWM presumed the fixtures that were nearing saturation and worth analysis would include residential toilets and residential clothes washers, as both have been included in recommended water use efficiency practices for over two decades.

In 2014, the Water Research Foundation updated its 1999 Residential End Uses of Water Study. Water utilities, industry regulators, and government planning agencies consider it the industry benchmark for single family home indoor water use. This incorporates recent study results that reflect the change to the water use profile in residential homes including adoption of more water-efficient fixtures over the 15 years that transpired from 1999 to 2014. The Residential End Uses of Water Study results were combined with SSWA historical rebate and billing data to enhance and verify assumptions made for all customer accounts, including saturation levels on the above-mentioned plumbing fixtures.

The DSS Model presents the estimated current and projected proportions of these fixtures by efficiency level within SSWA's service area. These proportions were calculated by:

- Using standards in place at the time of building construction,
- Taking the initial proportions of homes by age (corresponding to fixture efficiency levels),
- Adding the net change due to natural replacement, and
- Adding the change due to rebate measure minus the "free rider effect."

Further adjustments were made to initial proportions to account for the reduction in fixture use due to lower occupancy and based on field observations. The projected fixture proportions do **not** include any future active water use efficiency measures implemented by SSWA. More information about the development of initial and projected fixture proportions can be found in the DSS Model "Codes and Standards" section.

The DSS Model is capable of modeling multiple types of fixtures, including fixtures with different designs. For example, toilets can be purchased that flush at a rate of 0.8 gpf, 1.0 gpf or 1.28 gpf. The 1.6 gpf and higher toilets still exist but can no longer be purchased in California. Therefore, they cannot be used for replacement or new installation of a toilet. So, the DSS Model utilizes fixture replacement rates to determine what type of fixture should be used for a new construction installation or replacement. The replacement of the fixtures is listed as a percentage within the DSS Model. A value of 100% would indicate that all the toilets installed would be of one particular flush volume. A value of 75% means that three out of every four toilets installed would be of that particular flush volume. All the Fixture Model information and assumptions were carefully reviewed and accepted by SSWA staff.

The DSS Model provides inputs and analysis of the number, type, and replacement rates of fixtures for each customer category (e.g., single family toilets, commercial toilets, residential clothes washing machines.). For example, the DSS Model incorporates the effects of the 1992 Federal Energy Policy Act and AB 715 on toilet fixtures. A DSS Model feature determines the "saturation" of 1.6 gpf toilets as the 1992 Federal Energy Policy Act was in effect from 1992-2014 for 1.6 gpf toilet replacements. AB 715 now applies for the replacement of toilets at 1.28 gpf. Further consideration and adjustments were made to replacement rates to account for the reduction in fixture use and wear, due to lower occupancy and based on field observations.

APPENDIX D – NOTICE OF INTENT TO UPDATE UWMP

SUISUN-SOLANO WATER AUTHORITY

BOARD OF DIRECTORS
Alma Hernandez, Vice President
Princess Washington
Jenalee Dawson
Mike Hudson
Amit Pal

BOARD OF DIRECTORS
John D. Kluge, President
Michael J. Barrett
Derrick Lum
Pete Sanchez
Charles A. Herich

February 16, 2023

Solano County
Department of Resource Management
675 Texas Street
Fairfield, CA 94533

Re: **Notice of Preparation of Urban Water Management Plan and Water Shortage Contingency Plan – 2020 Update**

The Urban Water Management Planning Act (California Water Code §10608–10656) requires the Suisun-Solano Water Authority to update its Urban Water Management Plan (UWMP) and associated Water Shortage Contingency Plan (WSCP) every 5 years. Suisun-Solano Water Authority is currently reviewing its existing UWMP and associated WSCP, which were updated in 2016, and considering revisions to the documents. We invite your agency's participation in this revision process.

A draft of the 2020 UWMP and WSCP will be made available for public review and a public hearing will be scheduled in May 2023. In the meantime, if you would like more information regarding Suisun-Solano Water Authority's 2020 UWMP and WSCP and the update schedule, or if you would like to participate in the preparation of either of these documents, please contact the Suisun-Solano Water Authority General Manager Cary Keaten at:

Suisun-Solano Water Authority
810 Vaca Valley Parkway, Suite 201
Vacaville, CA 95688
Phone: (707) 455-4412
ckeaten@sidwater.org

Sincerely,

Cary Keaten
General Manager

Billing
701 Civic Center Blvd
Suisun City, CA 94585
(707) 421-7320

A Joint Powers Authority
Providing Drinking Water to the City of Suisun City

Operations
1090 Aviator Drive
Vacaville, CA 95688
(707) 448-6847

SUISUN-SOLANO WATER AUTHORITY

February 16, 2023

City of Benicia
Erik Upson, City Manager
Benicia City Hall, 250 East L Street
Benicia, CA 94510

Re: **Notice of Preparation of Urban Water Management Plan and Water Shortage Contingency Plan – 2020 Update**

The Urban Water Management Planning Act (California Water Code §10608–10656) requires the Suisun-Solano Water Authority to update its Urban Water Management Plan (UWMP) and associated Water Shortage Contingency Plan (WSCP) every 5 years. Suisun-Solano Water Authority is currently reviewing its existing UWMP and associated WSCP, which were updated in 2016, and considering revisions to the documents. We invite your city's participation in this revision process.

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Sincerely,

Cary Keaten
General Manager

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Suisun City, CA 94585
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SUISUN-SOLANO WATER AUTHORITY

February 16, 2023

City of Dixon
Jim Lindley, City Manager
600 East A St.
Dixon, CA 95620

Re: **Notice of Preparation of Urban Water Management Plan and Water Shortage Contingency Plan – 2020 Update**

The Urban Water Management Planning Act (California Water Code §10608–10656) requires the Suisun-Solano Water Authority to update its Urban Water Management Plan (UWMP) and associated Water Shortage Contingency Plan (WSCP) every 5 years. Suisun-Solano Water Authority is currently reviewing its existing UWMP and associated WSCP, which were updated in 2016, and considering revisions to the documents. We invite your city's participation in this revision process.

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810 Vaca Valley Parkway, Suite 201
Vacaville, CA 95688
Phone: (707) 455-4412
ckeaten@sidwater.org

Sincerely,

Cary Keaten
General Manager

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Suisun City, CA 94585
(707) 421-7320

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1090 Aviator Drive
Vacaville, CA 95688
(707) 448-6847

SUISUN-SOLANO WATER AUTHORITY

February 16, 2023

City of Fairfield
David Gassaway, City Manager
1000 Webster Street
Fairfield, CA 94533

Re: **Notice of Preparation of Urban Water Management Plan and Water Shortage Contingency Plan – 2020 Update**

The Urban Water Management Planning Act (California Water Code §10608–10656) requires the Suisun-Solano Water Authority to update its Urban Water Management Plan (UWMP) and associated Water Shortage Contingency Plan (WSCP) every 5 years. Suisun-Solano Water Authority is currently reviewing its existing UWMP and associated WSCP, which were updated in 2016, and considering revisions to the documents. We invite your city's participation in this revision process.

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Suisun-Solano Water Authority
810 Vaca Valley Parkway, Suite 201
Vacaville, CA 95688
Phone: (707) 455-4412
ckeaten@sidwater.org

Sincerely,

Cary Keaten
General Manager

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701 Civic Center Blvd
Suisun City, CA 94585
(707) 421-7320

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Vacaville, CA 95688
(707) 448-6847

SUISUN-SOLANO WATER AUTHORITY

February 16, 2023

City of Rio Vista
Phil Carter, Interim City Manager
One Main Street
Rio Vista, CA 94571

Re: **Notice of Preparation of Urban Water Management Plan and Water Shortage Contingency Plan – 2020 Update**

The Urban Water Management Planning Act (California Water Code §10608–10656) requires the Suisun-Solano Water Authority to update its Urban Water Management Plan (UWMP) and associated Water Shortage Contingency Plan (WSCP) every 5 years. Suisun-Solano Water Authority is currently reviewing its existing UWMP and associated WSCP, which were updated in 2016, and considering revisions to the documents. We invite your city's participation in this revision process.

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Suisun-Solano Water Authority
810 Vaca Valley Parkway, Suite 201
Vacaville, CA 95688
Phone: (707) 455-4412
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Sincerely,

Cary Keaten
General Manager

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701 Civic Center Blvd
Suisun City, CA 94585
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SUISUN-SOLANO WATER AUTHORITY

February 16, 2023

City of Suisun City
Greg Folsom, City Manager
701 Civic Center Blvd
Suisun City, CA 94585

Re: **Notice of Preparation of Urban Water Management Plan and Water Shortage Contingency Plan – 2020 Update**

The Urban Water Management Planning Act (California Water Code §10608–10656) requires the Suisun-Solano Water Authority to update its Urban Water Management Plan (UWMP) and associated Water Shortage Contingency Plan (WSCP) every 5 years. Suisun-Solano Water Authority is currently reviewing its existing UWMP and associated WSCP, which were updated in 2016, and considering revisions to the documents. We invite your city's participation in this revision process.

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810 Vaca Valley Parkway, Suite 201
Vacaville, CA 95688
Phone: (707) 455-4412
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Sincerely,

Cary Keaten
General Manager

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(707) 421-7320

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Vacaville, CA 95688
(707) 448-6847

SUISUN-SOLANO WATER AUTHORITY

February 16, 2023

City of Vacaville
Aaron Busch, City Manager
650 Merchant Street
Vacaville, CA 95688

Re: **Notice of Preparation of Urban Water Management Plan and Water Shortage Contingency Plan – 2020 Update**

The Urban Water Management Planning Act (California Water Code §10608–10656) requires the Suisun-Solano Water Authority to update its Urban Water Management Plan (UWMP) and associated Water Shortage Contingency Plan (WSCP) every 5 years. Suisun-Solano Water Authority is currently reviewing its existing UWMP and associated WSCP, which were updated in 2016, and considering revisions to the documents. We invite your city's participation in this revision process.

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Vacaville, CA 95688
Phone: (707) 455-4412
ckeaten@sidwater.org

Sincerely,

Cary Keaten
General Manager

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SUISUN-SOLANO WATER AUTHORITY

February 16, 2023

City of Vallejo
Mike Malone, City Manager
555 Santa Clara Street
Vallejo, CA 94590

Re: **Notice of Preparation of Urban Water Management Plan and Water Shortage Contingency Plan – 2020 Update**

The Urban Water Management Planning Act (California Water Code §10608–10656) requires the Suisun-Solano Water Authority to update its Urban Water Management Plan (UWMP) and associated Water Shortage Contingency Plan (WSCP) every 5 years. Suisun-Solano Water Authority is currently reviewing its existing UWMP and associated WSCP, which were updated in 2016, and considering revisions to the documents. We invite your city's participation in this revision process.

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810 Vaca Valley Parkway, Suite 201
Vacaville, CA 95688
Phone: (707) 455-4412
ckeaten@sidwater.org

Sincerely,

Cary Keaten
General Manager

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701 Civic Center Blvd
Suisun City, CA 94585
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APPENDIX E – NOTICE OF PUBLIC HEARING

Notice of Public Hearing published in the Daily Republic April 24, 2023 and May 1, 2023.

Public Hearing to be held May 8, 2023.

Notice of Public Hearing
The Suisun-Solano Water Authority (SSWA) intends to update its current Urban Water Management Plan (UWMP) and the Water Shortage Contingency Plan (WSCP). Updates are required every five (5) years in accordance with the California Water Code. This effort helps ensure we can provide the communities we serve with a reliable supply of high-quality water to meet current and future demands.
To ensure opportunity for public feedback and suggestions, the proposed plan will be available for review on both the City of Suisun's website (www.suisun.com) and the Solano Irrigation District's website (www.sidwater.org). Public comments may be submitted in writing to:
Paul Fuchslin, Director of Engineering/District Engineer
Suisun-Solano Water Authority
810 Vaca Valley Pkwy, Suite 201
Vacaville, CA 95688
email: pfuchslin@sidwater.org
Public comments can also be made in person at the Public Hearing. The public commenting period will conclude with a Public Hearing at the SSWA Regular Board Meeting held on May 8, 2023. The meeting begins at 6:00pm and is located at 701 Civic Center Blvd, Suisun City, CA 94585. At the conclusion of the Public Hearing the SSWA Board will be considering the proposed plan adoption.
DR#00062793
Published: April 24, May 1, 2023

APPENDIX F – ADOPTION RESOLUTION

Pending Adoption

APPENDIX G – WATER SHORTAGE CONTINGENCY PLAN

Due to the length of the Water Shortage Contingency Plan, this is included as a separate document.

APPENDIX H – WATER AUDIT REPORT

2020:

https://wuedata.water.ca.gov/public/awwa_uploads/5828733146/Certified%20Validation%20Report%20-%20Item%201-3.pdf

2019:

https://wuedata.water.ca.gov/public/awwa_uploads/2685544669/Certified%20Validation%20Report%20-%20Item%201-3.pdf

2018:

https://wuedata.water.ca.gov/public/awwa_uploads/4171582877/SuisunSolanoWA-Certified%20Validation%20Report%20-%20Item%201-3.pdf

2017:

https://wuedata.water.ca.gov/public/awwa_uploads/6100644767/SuisunSolanoWA-Certified%20Validation%20Report%20-%20Item%201-3.pdf

2016:
https://wuedata.water.ca.gov/public/awwa_uploads/7115781486/2016%20SSWA%20WaterLoss%20Audit%20Report.pdf

APPENDIX I – 2015 CITY OF SUISUN CITY 2015–2023 HOUSING ELEMENT

https://www.suisun.com/departments/development-services/planning/general-plan/housing-element/

APPENDIX J –1990 SUISUN-SOLANO WATER AUTHORITY IMPLEMENTATION AND LEASE AGREEMENT

SUISUN/SOLANO WATER AUTHORITY
IMPLEMENTATION AGREEMENT
AND LEASE AGREEMENT

THIS AGREEMENT is entered into as of January 1, 1990 by and between the CITY OF SUISUN CITY, a municipal corporation, (hereinafter called "CITY"), the SOLANO IRRIGATION DISTRICT, a state agency organized under the laws of the State of California, (hereinafter called "DISTRICT"), and the SUISUN/SOLANO WATER AUTHORITY, a joint powers authority organized under the laws of the State of California (hereinafter called "AUTHORITY") with reference to the following:

NOW THEREFORE, the undersigned parties agree, for full and valuable consideration, the receipt of which is hereby acknowledged as follows:

RECITALS

THIS AGREEMENT is made with reference to the following facts and conditions which the parties agree are a true and accurate description of the basis upon which the Agreement is made:

WHEREAS, in 1976 CITY and DISTRICT entered into a Joint Exercise of Powers Agreement (hereinafter called "JEPA"). DISTRICT through the issuance of general obligation bonds, constructed a water treatment plant, storage tank and appurtenant facilities, the design of which allowed for future expansion;

WHEREAS, water utilized by these facilities is provided by DISTRICT, under entitlement from the Solano Project, treated and delivered via DISTRICT facilities, to the Joint Service Area and then sold and distributed through a water distribution system owned jointly by CITY and DISTRICT under the JEPA;

WHEREAS, the lands served by these facilities are of two types: (1) areas within the boundaries of both the CITY and the DISTRICT, entitled Joint Service Area as shown on Exhibit "A" to this Agreement and (2) areas within the boundaries of the DISTRICT but outside the limits of CITY, and entitled District Service Area as shown on Exhibit "A" to this Agreement;

WHEREAS, lands within the boundaries of CITY but not within the boundaries of DISTRICT are currently provided with water by CITY through a treatment facility, transmission pipeline and distribution system owned and operated by CITY, which are described as the City Service Area as shown on Exhibit "A" to this Agreement;

WHEREAS, under an implementation agreement of the JEPA dated July 1, 1982 titled Agreement No. 1, DISTRICT agreed to and is responsible for operating and maintaining the water treatment

plant, storage tank, transmission facilities and appurtenant facilities which provide water to the Joint Service Area and District Service Area while CITY agreed to and is responsible for providing certain billing services and maintaining distribution mains and facilities within the limits of the Joint Service Area, the costs of which are reimbursed to CITY and DISTRICT from the JEPA;

WHEREAS, additional facilities are now necessary to provide water service to the Joint Service Area and the City Service Area which expansion and rehabilitation is described in the Master Plan prepared by Summers Engineering and attached hereto as Exhibit "B" to this Agreement;

WHEREAS, CITY and DISTRICT have agreed to provide for the integration of the facilities of CITY and DISTRICT, and to provide for the necessary expansion and rehabilitation of the facilities serving all areas of the CITY including those in common with the DISTRICT and have further agreed that the most practical and economical way to do so is by formation of the AUTHORITY which would finance the required expansion and rehabilitation of these facilities through the issuance of revenue bonds and operate all of these facilities;

WHEREAS, on December 31, 1988 CITY and DISTRICT entered into a written agreement which created the Suisun/Solano Water Authority for the purpose of accomplishing these goals; and

WHEREAS, CITY and DISTRICT recognize that in order to finance the necessary rehabilitation and expansion through revenue bonds, the AUTHORITY must exercise control over these facilities and, therefore CITY and DISTRICT have agreed to lease those facilities described in Exhibits "C" and "D" to this Agreement, to AUTHORITY.

AGREEMENT

Section 1

SUSPENSION OF JOINT EXERCISE OF POWERS

1.0 The Joint Exercise of Powers Agreement (JEPA) dated May 17, 1976, together with the Implementation Agreement thereto and any other related agreements, is suspended and superseded by the the AUTHORITY and this Agreement, except as to those provisions of that agreement which set standards and procedures for the day to day operation of the facilities contained in the JEPA and leased to AUTHORITY under this Agreement, and then only to the extent that said standards and procedures do not conflict with the terms of this Agreement. Said JEPA agreements shall not be terminated and shall be reactivated and re-implemented upon the termination of this AUTHORITY or the occurrence of other acts or events specified in this Agreement.

Section 2

ADOPTION AND IMPLEMENTATION OF THE MASTER PLAN PREPARED BY SUMMERS ENGINEERING

2.0 The Master Plan prepared by Summers Engineering dated February, 1989 as revised in April, 1989, Exhibit B to this Agreement, is adopted by the AUTHORITY and made a part of this agreement. The facilities leased to AUTHORITY by CITY and DISTRICT may be added to, modified, remodeled, rehabilitated or reconstructed in accordance with said Master Plan which is hereby agreed to be the plan for construction and implementation by AUTHORITY. It is the goal and intent of the AUTHORITY to construct the repairs and improvements described and recommended in said Master Plan unless otherwise agreed to by the parties.

2.1 The AUTHORITY may construct or perform such additional repairs, improvements, or new facilities to serve the needs and requirements of the water users within the geographical limits of the Joint Service Area, District Service Area and City Service Area as CITY and DISTRICT may from time to time agree on, which agreement shall be in writing either as a separate instrument or as an amendment to this Agreement.

Section 3

INCLUSION OF NEW LANDS

3.0 CITY and DISTRICT may agree to add additional lands to the Joint Service Area covered by this Agreement. Such action shall be accomplished only by amendment to this Agreement or by a separate written agreement. The inclusion of any new land to the Joint Service Area shall be conditioned on the annexation of said lands to Suisun City and also to the Solano Irrigation District. The inclusion of such new lands to the Joint Service Area shall be further conditioned on a determination of the source of water and ownership of the water entitlement which will serve the new lands under the following conditions:

(a) CITY shall provide for the purpose of serving newly annexed lands within the Joint Service Area all entitlement to Solano Project Water not used within the City Service Area.

(b) CITY shall provide for the purpose of serving newly annexed lands within the Joint Service Area any Solano Project water obtained under the exchange provisions of paragraph 4.7, below until such entitlement is exhausted.

(c) If the amount of Solano Project water including that from sources described in subparagraphs "a" and "b", above, are not sufficient to serve the proposed annexed lands, DISTRICT shall provide sufficient Solano Project water from its entitlement to serve said new lands and if sufficient water is not available from its entitlement to Solano Project water, shall take all reasonable steps to acquire an entitlement from this

source for this purpose, subject to any limitations created by place of use restrictions established by the State Water Resources Control Board, and further subject to the limitation that DISTRICT shall not be required to deprive other lands within the Solano Irrigation District of Solano Project water service entitlement to meet the needs of the proposed lands to be annexed.

3.1 In the event the parties agree to annex new lands into the Joint Service Area, DISTRICT and CITY shall make appropriate application for and shall seek to have lands being annexed into the City simultaneously annexed into the Solano Irrigation District. DISTRICT shall thereafter provide water to said lands from District's entitlement from the Solano Project subject to the priorities in water sources and other limitations set out in paragraph 3.0 above.

3.2 CITY shall not annex new lands into the City Service Area without a written agreement between CITY and DISTRICT which among other things shall establish the source and method of providing water to such newly annexed lands.

Section 4

NO TRANSFER OF WATER ENTITLEMENTS

4.0 By this agreement, including any action which may be taken under it, neither CITY or DISTRICT grants, transfers, assigns, encumbers to the other any interest in its water entitlements, water contracts, rights to receive water, or any expectancy to said rights in regard to water or water supply held by or anticipated to be held by CITY or DISTRICT. Except as specifically provided in paragraphs 4.5 below, each party covenants that it shall take no action nor make any claim that it is directly or indirectly entitled to any amounts of water which are otherwise available to the other, nor shall any party object to the renewal of any contract with the Solano County Flood Control and Water Conservation District or any successor organization thereto, by either DISTRICT or CITY for any water right or entitlement held by that party on the effective date of this agreement.

4.1 Each party, by execution hereof, specifically waives and disclaims as to the other, the following:

(a) Any claim to additional waters from the Solano Water Project, the acquisition of which would reduce the water quantity available to the other party that existed on the effective date of this Agreement;

(b) Any right to exchange waters from the Solano Water Project or any other source with the other, except as is otherwise set out herein in paragraph 4.7 or as the parties may agree upon in writing specifically reforming or amending this provision;

(c) Any right to claim water as a result of municipal and industrial use in such a manner or fashion that the right, entitlement or capacity of the other shall be reduced, qualified or impaired below that which existed on the effective date of this agreement.

4.2 During the term of this agreement, and subject to the provisions of paragraphs 3.0(a) through 3.0(c), DISTRICT shall provide, from its water entitlement for delivery from the Putah South Canal to the Cement Hill Water Treatment Plant, a quantity of water sufficient to provide treated water service to the lands within the District Service Area and Joint Service Area and lying within the boundaries of the Solano Irrigation District. The cost of providing such water, both direct and indirect, shall be payable semi-annually to DISTRICT by AUTHORITY.

4.3 During the term of this agreement CITY shall provide, from its water entitlement for delivery from the Putah South Canal to the Cement Hill Water Treatment Plant or the Gregory Hills Water Treatment Plant, a quantity of water sufficient to provide treated water service to the lands within the boundaries of the City Service Area and the Joint Service Area as provided in Paragraphs 3.0(a) through 3.0(c). The cost of providing such water, both direct an indirect, shall be payable semi-annually to CITY by AUTHORITY.

4.4 The maximum amount payable by the AUTHORITY to either CITY or DISTRICT under paragraphs 4.2 and 4.3, above, shall be the price payable per acre foot for municipal and industrial water delivered from the Putah South Canal which water originates from the Solano Project, except that as to any water provided by DISTRICT or CITY pursuant to paragraphs 4.7, 3.0(a),3.0(b) and 3.0(c), DISTRICT and/or CITY shall be reimbursed by AUTHORITY for all direct and indirect costs incurred by it.

4.5 In the event DISTRICT ever totally dissolves, ceases to exist and otherwise ceases to own its entitlement to Solano Project water, CITY shall have the right to acquire an entitlement for water from the Solano Project equal to that used by DISTRICT to serve the Joint Service Area at the time of dissolution. Also in such event, CITY shall have the right to acquire the Cement Hill Treatment Plant and the Potrero Hills storage facility together with the transmission lines connecting those facilities to the Authority water system. The Cement Hill Treatment Plant distribution and transmission facilities, shall be purchased from DISTRICT at their value, as defined in paragraph 9.1(a), below at the time of acquisition and the Potrero Hills Facilities distribution and transmission facilities shall be purchased for one-half of their value, value as defined in paragraph 9.1(a), below, at the time of acquisition. DISTRICT or its successor shall retain the right to serve the District Service Area via these facilities.

4.6 The amount of water delivered by each party from its

entitlement shall concur on a calendar-month basis with the use by CITY in the City Service Area and with the use by DISTRICT in the District Service Area and the Joint Service Area combined.

4.7 Subject to the creation of a point of transfer which shall be the subject of a separate agreement, and subject to the provisions established in Section 3, above, DISTRICT shall, upon request from CITY, exchange on a one-for-one basis, at no cost to DISTRICT any water entitlement of CITY from the North Bay Aqueduct for water from the Solano Project for use within the lands served by AUTHORITY and/or from the well owned by CITY located in Suisun Valley. This separate agreement shall address all issues of transfer including by not limited to the method of transfer, costs of transfer, compensation for the burden of transfer and each party's obligation to bear a portion of these costs. This right to exchange shall terminate upon termination of the leases and termination of the JEPA as provided in Sections 7 and 10 herein.

Section 5

DISTRICT LEASE OF FACILITIES TO AUTHORITY

5.0 DISTRICT leases to AUTHORITY, and AUTHORITY leases from DISTRICT for the term set forth in Section 7 of this Agreement those facilities described in Exhibit D together with all right, title and interest (an undivided half interest) DISTRICT has, or may have in the distribution lines, valves and meters serving the Joint Service Area, and all DISTRICT'S interest (an undivided half interest) in the receivables, equipment and other tangible and intangible property held by DISTRICT and CITY pursuant to the JEPA.

5.1 The AUTHORITY'S right to the facilities described above shall be subject to DISTRICT'S continuing right to utilize the Cement Hill Treatment Plant, Storage Facility and associated transmission lines to provide water service to the District Service Area.

Section 6

CITY LEASE OF FACILITIES TO AUTHORITY

6.0 CITY leases to AUTHORITY and AUTHORITY leases from CITY for the term set forth in paragraph 7 of this agreement those facilities described in Exhibit C, together with all right, title and interest (an undivided half interest) CITY has, or may have in the distribution lines, valves and meters serving the City Service Area and Joint Service Area and all of CITY'S interest (an undivided half interest) in the receivables, equipment and other tangible and intangible property held by DISTRICT and CITY pursuant to the JEPA.

Section 7

TERM OF AGREEMENT AND LEASES

7.0 The term of this agreement and the leases hereunder shall be the term of the AUTHORITY as set forth in the Agreement forming the AUTHORITY, including any renewals or extensions thereof, except that no lease shall extend for a period of more than fifty years unless specifically renewed by the parties hereto. Either CITY or DISTRICT may terminate the lease of their facilities to AUTHORITY prior to the termination of this agreement (and termination of the AUTHORITY), providing all bond indebtedness or any other indebtedness secured by the stream of revenue generated by the leased premises have been satisfied. Termination of its lease by one party shall automatically terminate the lease of the other under the same terms and conditions unless otherwise agreed in writing by CITY and DISTRICT. Upon termination the improvements and additions to leased facilities shall be the property of the owner/lessor of the leased facilities.

7.1 Termination of the leases shall be accomplished by either party giving written notice to the other of its intent to terminate. The notice of termination shall specify an effective date of termination of the leases (hereafter called the "termination date") which shall be not less than two years, nor more than five years from the date the notice of termination is given. The giving of a notice of termination by a party shall constitute an election which may not be rescinded or withdrawn without the written consent of the other.

Section 8

PAYMENT TO DISTRICT FOR DETACHED LANDS AND USE OF DISTRICT FACILITIES

8.0 DISTRICT now receives ad valorem assessments upon the lands served by DISTRICT and lying within the boundaries of the Solano Irrigation District. Said assessments are made on a per acre basis on developed and undeveloped land and include a portion for debt service of DISTRICTS 1978 Water Bond Issue. So long as DISTRICT continues to receive assessments from the Joint Service Area in an amount proportional to the amounts presently received by DISTRICT on a yearly basis, as adjusted for changes in the indebtedness of DISTRICT and for the value of lands subject to assessment within the Solano Irrigation District, AUTHORITY shall make no additional payment to DISTRICT for use of the Cement Hill Water Treatment Plant and storage facilities other than as provided in Section 13.0 of this Agreement.

8.1 If during the term of this agreement, any lands within the Joint Service Area are detached from the Solano Irrigation District, without payment of detachment fees which are sufficient to reimburse DISTRICT for all amounts which would have been received during the term of the Authority for ad valorem

assessments upon such land, or if a change should occur in the law or assessment procedures applicable to ad valorem assessments which deprives DISTRICT of such income, in whole or in part, then the AUTHORITY shall pay annually to DISTRICT the amount of income lost, provided however, that the amount paid shall not, exceed the total revenues which DISTRICT would have received from said detached lands.

8.2 DISTRICT shall not voluntarily waive payment of such detachment fees or assessment payments or take any action to seek a waiver of such fees or payments.

8.3 DISTRICT shall have the right to restructure, refinance or prepay the outstanding balance of the 1978 Water Bond Issue. Any such restructure, refinance or prepayment shall not alter the obligation of AUTHORITY to pay DISTRICT any sum, described in paragraph 8.1. DISTRICT shall not be required to utilize any payment by AUTHORITY for the purpose of retirement or refinancing of such 1978 Water Bond Issue and each party hereto stipulates that such payment is not for the purpose of retiring or restructuring this debt.

8.4 Upon retirement of the 1978 Water Bond indebtedness or any refinance thereto, all facilities constructed with those bond proceeds, including later improvements or expansions to those facilities, shall remain the property of DISTRICT subject only to any leasehold interest of AUTHORITY established under this agreement including any amendment or modification thereof.

Section 9

PAYMENT OF VALUE UPON TERMINATION OF LEASES

9.0 Upon termination of the leases described herein, those facilities belonging to CITY shall return to CITY and those belonging to DISTRICT shall return to DISTRICT. Prior to the termination date of the leases, the AUTHORITY shall prepare and submit to both CITY and DISTRICT a statement setting forth the value of facilities constructed, repaired, expanded or modified by AUTHORITY as described in paragraph 9.1 below. The value of the facilities shall not include the value of any facilities, equipment, site improvements or other property leased to AUTHORITY by CITY or DISTRICT. Upon the termination date, the party having received the greater value attributable to the improvements, modifications, replacements or alterations of the leased facilities shall pay to the other one-half of the amount by which the value for the AUTHORITY Constructed facilities received by that party exceeds the value received by the other.

9.1 The term "value" shall mean and include:

(a) The value of the additions or improvement built by and/or paid for by the AUTHORITY as of the termination date of the leases of the facilities leased to the AUTHORITY by the CITY or DISTRICT. Value is defined as the actual cost of the

additions or improvements less the cost of all physical depreciation or deterioration as determined at the time of actual termination of the lease.

(b) The total of any unrecovered operation, maintenance, repair, management or other costs incurred by the AUTHORITY from the effective date of this agreement to the date of termination, plus the amount of any such expenses which were the obligation of the AUTHORITY but were paid by either CITY or DISTRICT which are attributable to the respective leased facilities of each party. The total of the value and costs described in sub-paragraphs (a) and (b), shall be allocated to the party owning the facilities to which said costs or value are allocated and shall constitute the value as used in paragraph 9.0, above.

9.2 The difference in values received by the parties upon termination of the leases as described in paragraph 9.0, above, shall be due and payable upon the date of termination. However, a party may choose to pay this obligation over a period of five years with equal annual installments of principal plus interest on the unpaid balance equal to the U.S. Treasury Bill five year notes interest rate in existence upon the date of termination. The party seeking such installment arrangements shall notify the other no later than six months prior to the termination date and shall execute an appropriate promissory note or other debt instrument evidencing this obligation.

9.3 Any dispute involving the the computation of value and costs or means of payment, or any other aspect of this section shall be resolved by the arbitration procedures set forth herein.

Section 10

RE-ACTIVATION OF JOINT EXERCISE OF POWERS UPON TERMINATION OF LEASE

10.0 Upon termination of the leases as provided in Section 7 of this Agreement, the JEPA shall be reactivated and all facilities previously operated under that agreement shall resume operation under that agreement, including the First Implementation Agreement thereof.

10.1 Upon termination of the lease, both CITY and DISTRICT shall re-establish the JEPA operating fund by each depositing Five Hundred Thousand Dollars ($500,000) into the operating fund of the JEPA. This amount shall be increased, or decreased, in accordance with a ratio based on the change in the Consumer Price Index for the Urban Wage Earners and Clerical Workers, All U.S. Index wherein the index as of January 1, 1989 shall be used as the denominator and the index as of first of January in the year of the date of termination shall be used as the numerator.

10.2 Upon termination of the leases, any moneys due DISTRICT by AUTHORITY under Section 8 of this Agreement shall

thereafter be paid to DISTRICT from JEPA operating revenues.

10.3 In accordance with the JEPA and its implementation agreement, DISTRICT shall provide for the management, operation, maintenance, repair and reconstruction of all facilities operated under the JEPA and CITY shall provide all billing services to customers within the Joint Service Area.

Section 11

DISPOSITION OF AUTHORITY OWNED FACILITIES UPON TERMINATION OF AUTHORITY

11.0 In the event the AUTHORITY terminates for any reason, any facilities which have been constructed by and/or are owned by the AUTHORITY other than leased facilities and improvements thereto shall be jointly owned one-half by CITY and one-half by DISTRICT and operated under the JEPA, unless otherwise agreed on in writing by the parties. All leased facilities including all improvements, modifications, and alterations thereto shall be returned to, and shall become the sole property and be owned by the respective lessors upon termination of the leases.

11.1 In the event the AUTHORITY terminates, and ownership of the Cement Hill Treatment Facility reverts to DISTRICT, DISTRICT agrees to provide to CITY and to assure that CITY continues to have the right to have Solano Project water from CITY'S entitlement thereto treated at and delivered to the City Service Area through the Cement Hill Treatment Facility in a quantity equal to that required to serve the needs of the City Service Area as of the date of termination of the AUTHORITY leases. This quantity and capacity shall be determined based upon operations utilizing the Gregory Hill storage and transmission facilities owned by CITY and the continued availability of all other facilities and operating practices previously available to produce the required quantity and capacity. The cost of treatment charged to CITY shall reflect a pro rata share of all costs of providing water treatment services including maintenance costs, replacement costs, capital depreciation and all other indirect costs associated with this service.

11.2 Upon termination of the leases, the facilities owned by CITY and serving the City Service Area shall be isolated by valves from the facilities serving Joint Service Area. The cost of such valves shall be borne one-half (1/2) by each party and shall be of a locking type. Unless otherwise agreed by CITY and AUTHORITY in writing,said valves shall be opened only in and for an emergency need to provide water service to either the City Service Area or the Joint Service Area from the other and in such case, only for the duration of the emergency circumstances and only with prior oral or written notice by the party declaring the emergency to the other. Nothing contained in the paragraph shall

limit CITY'S right to receive treated water through the Cement Hill Treatment Facility as described in paragraph 11.1 above.

11.3 Upon termination of the Authority, the storage facility at Potrero Hills, together with the line transmitting water to and from such facility, the twelve-inch line connecting the City Service Area to the Joint Service Area, if constructed as described in Exhibit "B" and any other improvements owned and constructed by the Authority shall continue to be owned in equal shares by CITY and DISTRICT. Upon termination of the Authority, these facilities shall be utilized, maintained and operated under the terms of the JEPA Agreements. The JEPA shall pay monthly for the costs of operation, maintenance, repair and reconstruction allocable to these facilities. If the JEPA is terminated these costs shall be shared equally by CITY and DISTRICT. DISTRICT shall provide for the operation, maintenance and repair of those facilities and the transmission pipelines shall be owned equally by CITY and DISTRICT as tenants in common and the benefits and costs thereof shall be enjoyed and borne in equal shares. DISTRICT shall be reimbursed monthly for its costs of maintaining, operating and repairing the facilities.

11.4 If there shall hereafter be constructed facilities other than additions or improvements to the leased facilities, or new facilities not described in the Summers Report, Exhibit"B", are constructed or acquired, a new agreement shall be entered into prior to that construction or acquisition, setting out disposition of said assets upon dissolution of the AUTHORITY, sharing of costs and other terms of use after termination of the leases, the AUTHORITY and the JEPA.

Section 12

ESTABLISHMENT OF RATES AND CHARGES OF AUTHORITY

12.0 The AUTHORITY shall from time to time establish, by Resolution, rates, charges and levies sufficient to provide for the cost of all operation, maintenance, repairs, water supplies or materials, reasonable reserves for operation and maintenance, accounts for depreciation and sinking funds, together with funds for rehabilitation or expansion of existing facilities and acquisition of further facilities as may be agreed on by the AUTHORITY. Any dispute over the setting of rates or charges which continues for at least 60 days shall entitle either party to declare an impasse, and the dispute shall be submitted to arbitration as provided for in Section 15 of this agreement.

12.1 Each party agrees to make all reasonable efforts to enforce the payment of those rates and charges established by the AUTHORITY. Each party shall condition the provision of any other services, including the granting of any approval to a customer or landowner by CITY or DISTRICT, upon the payment and collection of all fees and charges owed to the AUTHORITY by said customer or landowner. Neither party shall take any action which directly or indirectly impairs, reduces or delays the collection of such

fees, charges or levies by AUTHORITY.

12.2 DISTRICT shall set and collect all charges for service with the District Service Area and shall pay to AUTHORITY a pro rata share of all treatment costs for water delivered to the District Service Area. DISTRICT shall bear all costs of operating, maintaining, repairing and replacing the water distribution system within the District Service Area and all costs of water delivered to the Cement Hill Treatment Facility.

Section 13

OPERATION, MAINTENANCE, REPAIR AND RECONSTRUCTION OF FACILITIES RESPONSIBILITIES OF CITY AND DISTRICT

13.0 Effective on the first day January, 1990, the effective date of this agreement, DISTRICT shall assume the responsibility for, and shall provide for the maintenance, operation, repair, reconstruction, and management of all water purification, storage, distribution, transmission and control facilities under the control of AUTHORITY, and otherwise described in Exhibits "C" & "D" to this Agreement. Subject to prior approval by AUTHORITY, AUTHORITY shall reimburse DISTRICT monthly for all its costs, both direct and indirect, incurred in providing these services, including overhead, expenses including a sum to repay DISTRICT for the time expended by the Secretary/Manager of of the DISTRICT on AUTHORITY affairs. The actual rates or amounts of compensation shall be determined by the AUTHORITY Board but the rate for both DISTRICT and CITY shall be equal.

13.1 Effective on the first day of the month following the effective date of this agreement, CITY shall assume the responsibility to provide all billing of water service on behalf of the AUTHORITY and for the collection, maintenance and investment of all moneys held by AUTHORITY. CITY shall provide periodic reports of the collection of delinquencies and the status of all funds. Subject to prior approval by AUTHORITY, AUTHORITY shall reimburse CITY monthly for all its costs, both direct and indirect, incurred in providing these services together with the cost to the CITY of any other efforts incurred by CITY for the water system, including overhead, and a sum to repay CITY for the time of the City Manager devoted to AUTHORITY affairs as a rate to be set by the AUTHORITY as described in paragraph 13.0, above.

13.2 In providing those services described in paragraph 13.0, above, the parties recognize and acknowledge that the portion of the water system serving the City Service Area is aged and in general disrepair which may require extraordinary maintenance efforts and costs until such time as the rehabilitation efforts contemplated under this Agreement can be accomplished. The parties agree that CITY shall bear the cost of all extraordinary maintenance costs incurred by AUTHORITY in the City Service Area, prior to the sale of revenue bonds, the

purpose of which is to provide funds to repair and rehabilitate this portion of the water system, which costs shall be paid or repaid to AUTHORITY by CITY. This obligation of CITY shall terminate upon the sale of any revenue bonds the purpose of which is to provide funds to repair and rehabilitate this portion of the water system.

13.3 The term "extraordinary maintenance costs" as used in paragraph 13.2, above, shall mean and include any cost or repair directly attributable to the extreme age, condition of disrepair or obsolescence of the water storage and distribution system serving the City Service Area and which is in excess of the repair and maintenance performed in the Joint Service Area. The term "extraordinary maintenance" specifically does not mean nor include any project of rehabilitation, repair, or construction contained in the Summers Engineering Report and Plan which is Exhibit B to this Agreement.

13.4 The payment by CITY to AUTHORITY for extraordinary maintenance costs incurred shall be made by City within the fiscal year the expense was incurred by AUTHORITY, but in no event sooner than four months from the date the cost was incurred. In the event that CITY is unwilling or unable to make such payment to AUTHORITY, AUTHORITY shall be entitled to recover said cost by imposing an increased service charge to the customers of the City Service Area.

Section 14

INDEMNIFICATION

14.0 AUTHORITY shall indemnify and hold harmless DISTRICT and/or CITY, its directors, officers, officials, employees, agents and independent contractors from any and all liability to any third party, arising directly or indirectly from any act or omission or alleged act or omission arising from the performance or failure to perform any duty or obligation to AUTHORITY or the other party under this Agreement including but not limited to all expenses, attorney's fees and other costs.

14.1 AUTHORITY shall indemnify and hold harmless DISTRICT and CITY for any and all damage or loss to DISTRICT or CITY arising from the performance of their duties and obligations under this Agreement. This indemnity shall apply to and include acts or omissions claimed to be negligently undertaken or omitted except that AUTHORITY shall assume no liability for any misappropriation, embezzlement or loss of funds by either party.

Section 15

ARBITRATION

15.0 In the event of a dispute between the parties as to any right, alleged right, obligation or alleged obligation under this agreement including any action, proposed action or other issue

requiring agreement between CITY and DISTRICT the parties shall make a good faith effort to resolve the dispute. In the event that a resolution of the dispute cannot be reached despite these efforts, either party may declare an impasse and its intent to submit the matter to arbitration as provided in this Section. Notice of such impasse shall be given in writing to the other and shall include a description of the disputed issue or issues, a description of the possible solutions or resolutions to the dispute and the course of action or solution advocated by the party declaring the impasse.

15.1 The party receiving the notice of impasse described in paragraph 15.0 shall respond in writing within 21 days. Said response shall contain that party's response to the issues raised and the responding party's proposed resolution to the impasse. The parties shall then meet within ten days and attempt to resolve the impasse.

15.2 In the event that the impasse is not resolved the parties shall jointly appoint a mutually agreeable arbitrator who is a licensed civil engineer with experience and expertise in the area in dispute. The arbitrator shall be selected upon within 30 days and in the event that the parties cannot do so, application may be made, by either or both parties, to the Superior Court of Solano County to appoint an arbitrator meeting these qualifications.

15.3 The arbitrator appointed pursuant to paragraph 15.2 shall set a date within 30 days of his appointment to meet with the parties and review all aspects of the issue in contention. The arbitrator shall receive and consider any documents or other written evidence submitted by the parties together with any oral presentation of information by either or both of the parties. The arbitrator shall be entitled to conduct his own inquiry in to the facts of the dispute or require further information of either or both of the parties. The arbitrator shall render his decision in writing within 10 days of receipt of all information he deems necessary to his decision.

15.4 The arbitrator's determination may provide for mechanisms of enforcement and terms of compliance. The arbitrator may direct the preparation, execution, and recordation of any agreement, or conveyance resulting from his determination. The arbitrator may determine issues involving adjustment of contractual obligations based on changed circumstances and appropriate limits of insurance coverage,insurance. The arbitrator award to the prevailing party, as may be determined by the arbitrator, attorneys fees, expert and consultant fees and costs reasonably incurred in pursuing the arbitration to the prevailing party, or may divide such fees and cost between the parties. Unless appealed, as set forth in paragraph 15.4 below, the arbitrator decision shall be binding and enforceable against the parties.

15.5 If either party to the arbitration wishes to contest the decision of the arbitrator, that party may do so, only under the following conditions:

(a) The notice of intent to appeal the arbitration decision must be made within 30 days of receipt of that decision.

(b) The party seeking to appeal the decision shall pay for all cost of the appeal including any experts, consultants or other expenses deemed necessary by the appellate panel.

(c) The party seeking the appeal shall abide by the original arbitration decision including and payments required thereunder, unless doing so would create an irrevocable situation or condition making further arbitration moot. In this case the party seeking appeal shall pay any money awarded by the arbitrator and abide by as much of the decision as possible without creating an irrevocable condition.

15.6 The appeal of an arbitration decision shall be made to a panel consisting of three arbitrators. Each arbitrator shall be a civil engineer licensed in California. The arbitrator who made the decision being appealed shall not be a member of the panel. Each party to the dispute shall appoint one arbitrator to the panel who shall then appoint a third arbitrator mutually agreeable to them. Each party shall appoint its arbitrator within 30 days of initiation of the notice of appeal. The two arbitrators shall then make their appointment of the third arbitrator within 20 days of the date on which the last arbitrator was appointed by a party. If the two members of the arbitration panel are unable to agree on the selection of the third member the parties may apply to the Superior Court of Solano County to appoint that arbitrator.

b **15.7** The arbitration appeal panel shall have the right to consult with the original arbitrator, conduct its own inquiry into the facts of the dispute or require further information of either or both of the parties. The panel shall have the right to employ consultants or other experts to assist in rendering its determination. The panel shall render its decision in writing within 10 days of receipt of all information it deems necessary to its decision.

15.8 The decision of the arbitration panel shall be final and binding upon the parties and shall be implemented in accordance with any provisions contained in the arbitration determination. The parties waive the right to commence any court proceeding involving any issue which is subject to arbitration, except as may be necessary to enforce any final decision of arbitration. In the event court proceedings are necessary to enforce any decision of the arbitrator, the court may award reasonable attorneys fees and costs incurred in connection with said action upon a finding that said action was reasonably necessary to enforce or accomplish the arbitration determination.

Section 16

AMENDMENT

16.0 This agreement may be amended only in writing. Any amendment shall require the approval of the Board of Directors of the AUTHORITY which must include a concurring vote from at least three of the members from both CITY and DISTRICT.

Section 17

CONTINUATION OF AUTHORITY AGREEMENT UPON TERMINATION OF LEASES

17.1 Upon the termination of the lease agreements, the other terms of this implementation agreement shall continue in full force and effect and the covenants provided herein shall remain in full force and effect regardless of the termination of the lease, termination of the JEPA, dissolution of the AUTHORITY or any other event.

Section 18

NOTICES

17.0 All notices required under this Agreement shall be sent to the parties as shown below:

CITY:
City of Suisun City
701 Civic Center Boulevard
Suisun City, CA 94585

DISTRICT:
Solano Irrigation District
508 Elmira Road
Vacaville, CA 95688

AUTHORITY:
Suisun/Solano Water Authority
508 Elmira Road
Vacaville, CA 95688

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the date for shown above.

CITY OF SUISUN CITY

Mayor

Attest:

SOLANO IRRIGATION DISTRICT

President

City Clerk

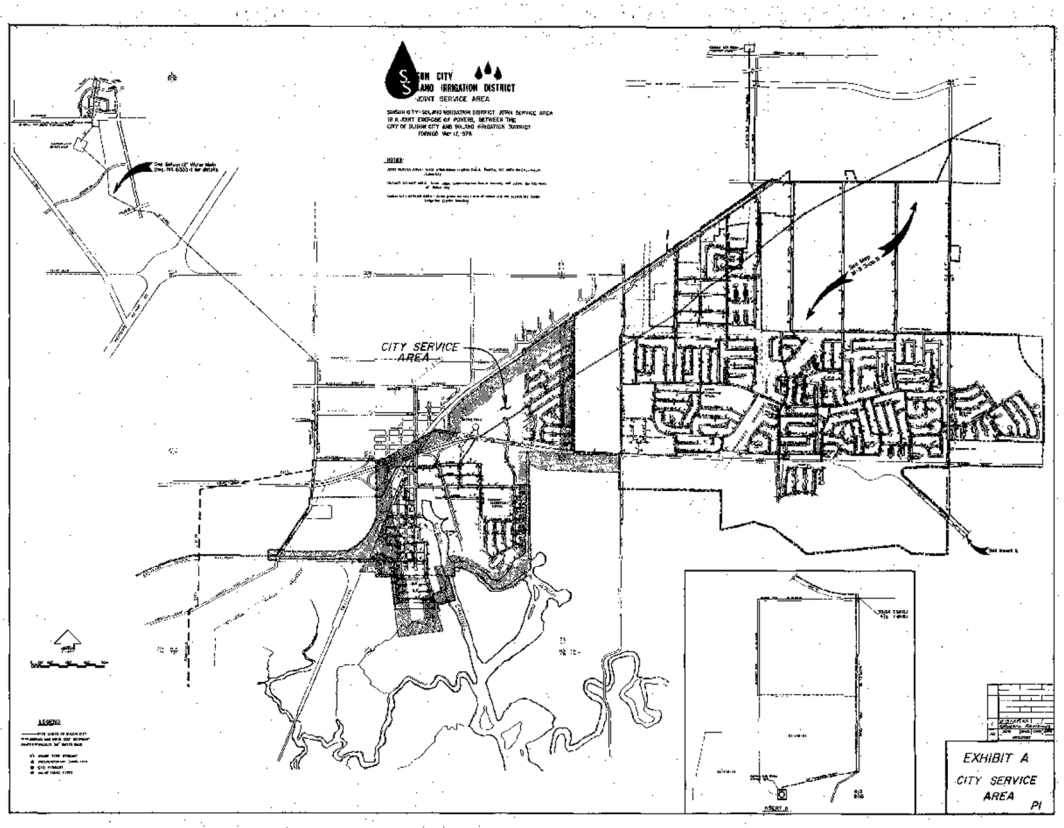
Secretary

SUISUN/SOLANO WATER AUTHORITY

President

Secretary

EXHIBITS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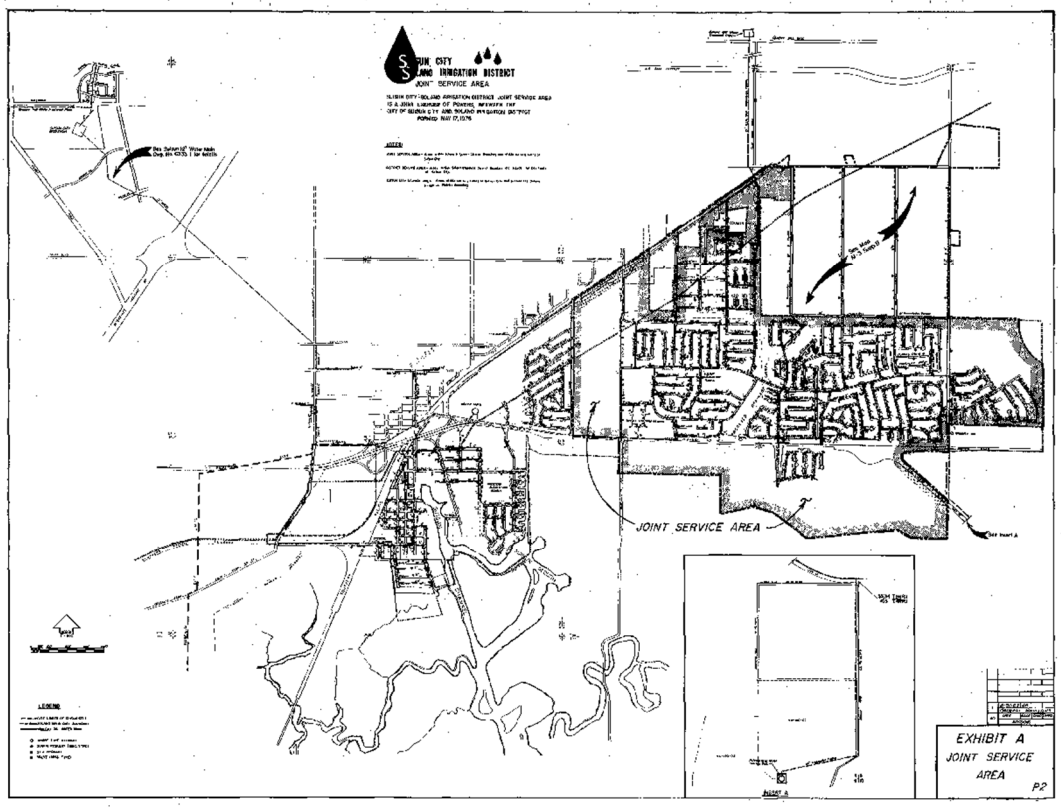
SOLANO IRRIGATION DISTRICT
JOINT SERVICE AREA
CITY SERVICE AREA
EXHIBIT A
CITY SERVICE AREA
P1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JOINT SERVICE AREA
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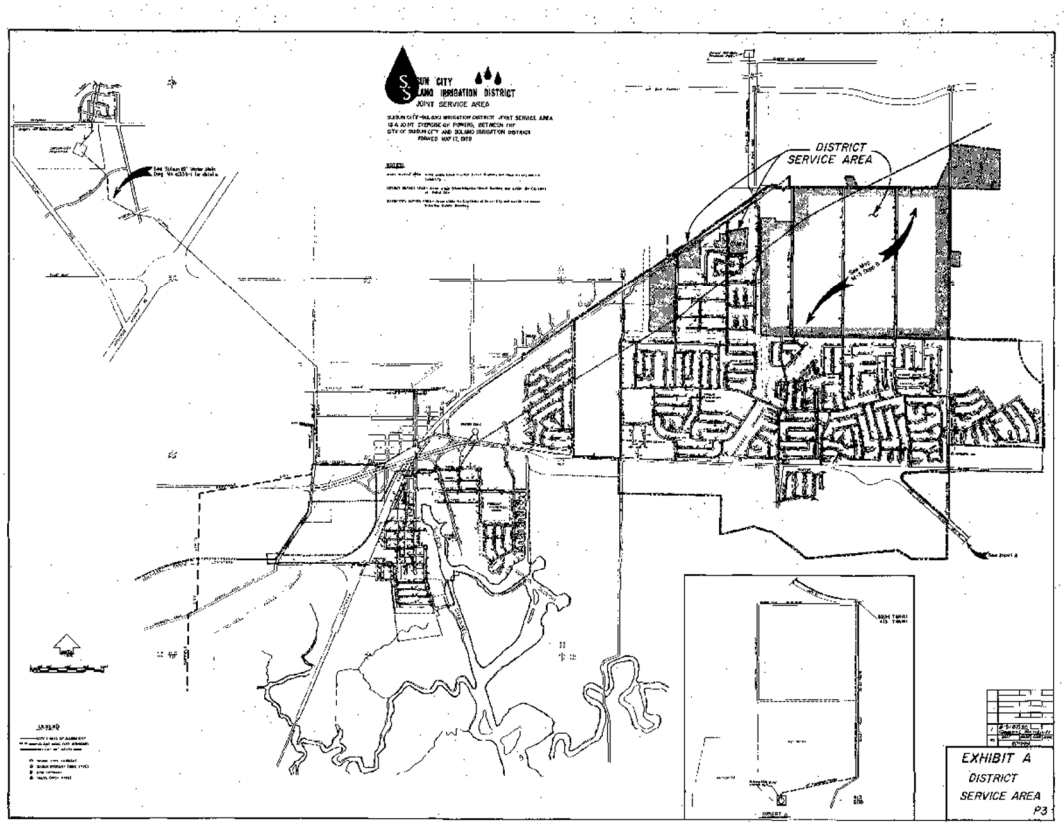
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SOLANO IRRIGATION DISTRICT
JOINT SERVICE AREA
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EXHIBIT A
DISTRICT
SERVICE AREA
P3

MASTER PLAN

Joint Suisun City/Solano Irrigation District
Domestic Water Supply Facilities Expansion

February 1989

Revised April 1989

Prepared by:
SUMMERS ENGINEERING, INC.
Consulting Engineers
Hanford, California

EXHIBIT B

INTRODUCTION

During August 1988, the firm of Charpier, Martin & Associates submitted their final report to the Suisun City/Solano Irrigation District Joint Service Area Committee. The purpose of the report was to analyze the future domestic water needs, to develop alternates for meeting the future demands, and to evaluate the feasibility of consolidating all water production and distribution responsibilities under the existing Joint Exercise of Powers.

The Suisun City/Solano Irrigation District Joint Service Area Committee, following review of this report, determined no single alternate provided the optimum system for meeting the future domestic water needs of the service area. After additional review, a two-phased Master Plan was developed to provide the needed facilities to reliably meet the future demands of the service area. The proposed Master Plan was approved in concept at a Joint Meeting of the Solano Irrigation District Board of Directors and the Suisun City Council Members in December 1988. The purpose of this report is to summarize the detailed review which has been made of the proposed Master Plan and provide cost estimates for the proposed bond issue which will finance the construction of the proposed facilities.

MASTER PLAN

The facilities originally proposed for the Master Plan are listed in Table 1. These facilities are indicated on the attached Location Map.

Table 1

PROPOSED MASTER PLAN FOR
JOINT SUISUN CITY/SOLANO IRRIGATION DISTRICT
DOMESTIC WATER SERVICE FACILITIES EXPANSION

Phase 1

1. 2 Million Gallon Gregory Hill Storage Tank
2. 20" Pipeline from Gregory Hill to Suisun City
3. Suisun City to Tolenas Area Pipeline
4. Suisun City (Old Town) Distribution System Upgrade
5. Enlarge Cement Hill Water Treatment Plant to 10 Million Gallons per Day Capacity (5.4 MGD Expansion)

Phase 2

1. 4 Million Gallon Potrero Hills Storage Tank
2. 24" Potrero Hills Pipeline
3. 18" Pipeline Along Putah South Canal from Cement Hill Water Treatment Plant to Gregory Hill Storage Tank

Following approval of the proposed Master Plan, a detailed review of the proposed facilities was made. A hydraulic analysis using a computer model of the proposed facilities was developed. Peak demands under future development were determined and the model was operated to verify that the proposed transmission pipelines and storage tanks were adequately sized to meet the peak demand and fire flows in the service area.

The hydraulic analysis determined it was not necessary to construct both the Suisun City to Tolenas Area Pipeline, and the 18 inch transmission pipeline between the Cement Hill Water Treatment Plant and Gregory Hill. The future peak demands in the service area could be met if either facility was constructed. The hydraulic analysis also determined it would be more reasonable to construct a one million gallon storage tank at Gregory Hill. A one million gallon tank would provide sufficient storage to meet the peak day demands, including fire flow in the Old Town area. A two million gallon storage tank at Gregory Hill would result in infrequent turnover, which would be compounded during low demand periods. It is our recommendation that a one million gallon tank be constructed. The hydraulic analysis also determined that the proposed pipeline to the proposed Potrero Hills Water Storage Tank could be reduced in size from 24 inch to 18 inch and still meet the anticipated peak demand flows when the joint service area has reached future development.

ESTIMATE OF COST

An in-depth review of the proposed facilities has been made to verify and refine the preliminary cost estimates for the proposed Master Plan facilities. The cost estimates were developed using current data from suppliers and contractors and from previous experience on work of a similar nature. Table 2 is a Master Plan estimate of cost, which includes the construction of a two million gallon Gregory Hill Storage Tank, a 24 inch Potrero Hills pipeline, and the construction of the Putah South Canal 18 inch transmission pipeline from the Cement Hill Water Treatment Plant to the Gregory Hill Storage Tank. The facilities included in this estimate would be the maximum cost alternate for the proposed Master Plan.

Included in Table 3 is an estimate of cost for a one million gallon Gregory Hill Storage Tank, an 18 inch Potrero Hills pipeline, and the construction of the Suisun City to Tolenas Area 12 inch transmission pipeline rather than the construction of the 18 inch pipeline along the Putah South Canal from Cement Hill Water Treatment Plant to the Gregory Hill Storage Tank. Using the estimated costs for the facilities in Table 3 would provide the least cost alternate for the proposed Master Plan. An amount from 15% to 25% was added to the construction cost of the various facilities to cover contingencies, incidentals, administration, and engineering. A lower contingency and incidental percentage was used when the anticipated construction requirements were more definite.

The estimate of cost was broken down into Phase 1 and Phase 2 costs. Phase 1 facilities will need to be constructed during the next few years, while Phase 2 facilities will not be needed for approximately five to six years. The proposal is to have two separate bond sales under one issue to cover the cost of the proposed facilities expansion. Table 4 projects the anticipated construction schedule and costs for the proposed Master Plan using the Table 2 facilities. A 4% annual inflation factor was used to inflate the construction costs of the individual facilities based on the year they would be needed. A bond issue construction cost summary for the proposed Phase 1 and Phase 2 facilities is included in Table 5.

Appendix A has been added to discuss the potential impact on the construction cost of the Gregory Hill Storage Tank due to a proposed change in elevation discussed during meetings in March 1989 with the City of Fairfield staff.

Table 2

MASTER PLAN
Estimate of Cost 1/
Phase I

	Item	Amount		
1.	2 Million Gallon Gregory Hill Storage Tank	$ 633,600		
	15% Contingencies & Incidentals	86,400		
			$ 720,000	
2.	20 Inch Pipeline from Gregory Hill to Suisun City	$1,727,475		
	25% Contingencies & Incidentals	432,525		
			$2,160,000	
3.	Upgrade "Old Town" Distribution System	$1,060,600		
	15% Contingencies & Incidentals	159,400		
			$1,220,000	
4.	Enlarge Cement Hill Water Treatment Plant Capacity to 10 Million Gallons Per Day	$1,855,420		
	25% Contingencies & Incidentals	464,580		
			$2,320,000	
	TOTAL PHASE I			$6,420,000
	Phase II			
5.	4 Million Gallon Potrero Hills Storage Tank	$ 925,450		
	25% Contingencies & Incidentals	234,550		
			$1,160,000	
6.	24 Inch Potrero Hills Pipeline	$1,094,950		
	25% Contingencies & Incidentals	275,050		
			$1,370,000	
7.	18 Inch Pipeline Along Putah South Canal from Cement Hill Water Treatment Plant to Gregory Hill	$1,554,475		
	20% Contingencies & Incidentals	310,525		
			$1,865,000	
	TOTAL PHASE II			$4,395,000
	TOTAL COST			$10,815,000

1/ Based on 1989 costs.

Table 3

	Item	Amount	
1.	1 Million Gallon Gregory Hill Storage Tank	$ 461,350	
	20% Contingencies & Incidentals	88,650	
			$ 550,000
2.	18 Inch Potrero Hills Pipeline	$ 929,450	
	25% Contingencies & Incidentals	230,550	
			$1,160,000
3.	Suisun City to Tolenas Area 12 Inch Transmission Pipeline	$ 564,750	
	25% Contingencies & Incidentals	135,250	
			$ 700,000

1/ Based on 1989 Costs.

Table 4

Projected Construction
Schedule and Costs

Item No.	Facility	Year	Inflation Factor 1/	Amount 2/
1.	2 Million Gallon Gregory Hill Storage Tank	1989	1.0	$ 720,000
2.	20 Inch Pipeline Gregory Hill to Suisun City	1990	1.04	2,246,400
3.	Upgrade "Old Town" Distribution System	1990	1.04	1,268,800
4.	Enlarge Cement Hill Water Treatment Plant	1990	1.04	2,412,800
5.	4 Million Gallon Potrero Hills Storage Tank	1994	1.22	1,415,200
6.	24 Inch Potrero Hills Pipeline	1994	1.22	1,671,400
7.	18 Inch Pipeline Along Putah South Canal from Cement Hill Water Treatment Plant to Gregory Hill Storage Tank	1995	1.26	2,349,900

1/ Based on an annual inflation rate of 4%.

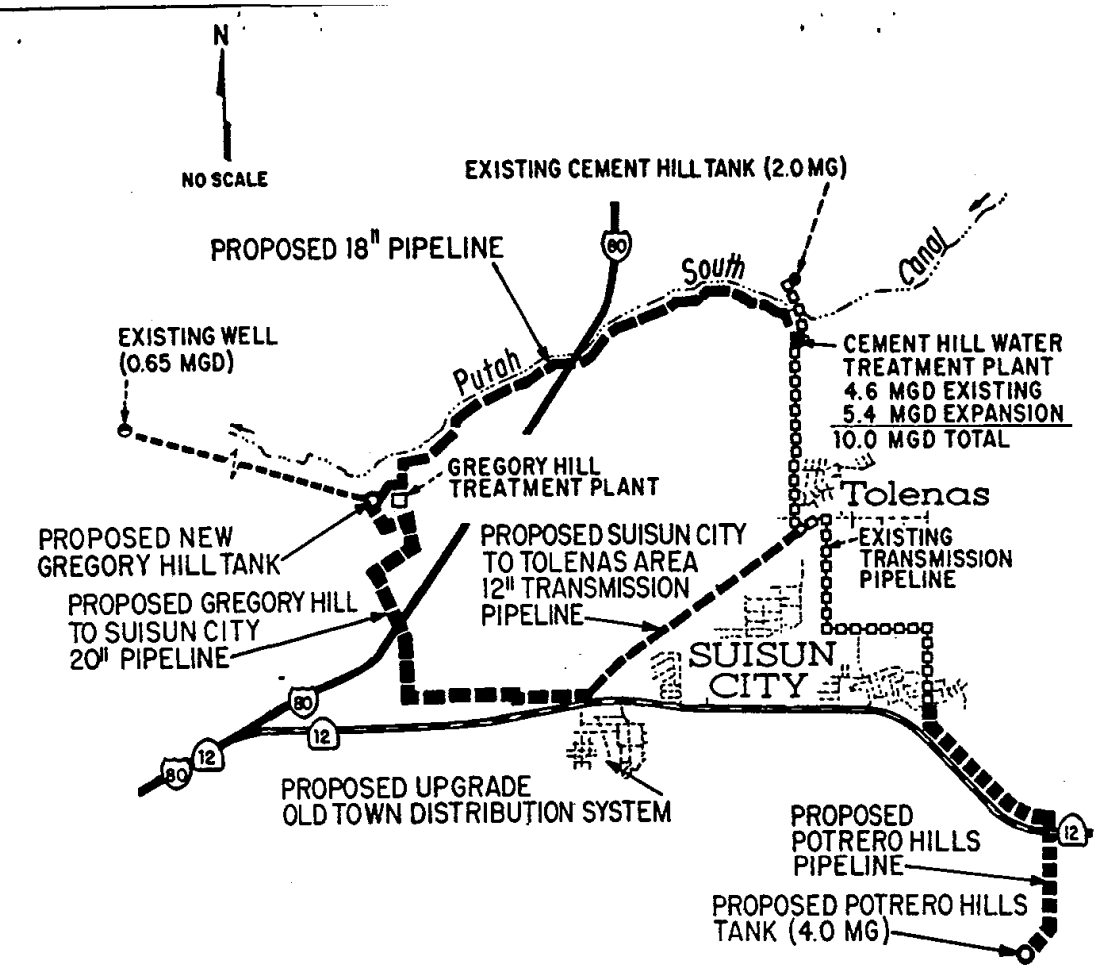
2/ 1989 Table 2 costs multiplied by the inflation factor.

Table 5

Bond Issue [1/]
Construction Cost Summary

	Item	Amount	
1.	2 Million Gallon Gregory Hill Storage Tank	$ 720,000	
2.	20 Inch Pipeline from Gregory Hill to Suisun City	2,246,400	
3.	Upgrade "Old Town" Distribution System	1,268,800	
4.	Enlarge Cement Hill Water Treatment Plant	2,412,800	
	SUBTOTAL PHASE I CONSTRUCTION COST		$6,648,000
5.	4 Million Gallon Potrero Hills Storage Tank	$1,415,200	
6.	24 Inch Potrero Hills Pipeline	1,671,400	
7.	18 Inch Pipeline along Putah South Canal from Cement Hill Water Treatment Plant to Gregory Hill Storage Tank	2,349,900	
	SUBTOTAL PHASE II CONSTRUCTION COST		$5,436,500
8.	Other Costs: CEQA Requirements		$ 50,000

[1/] Applicable inflation factors have been applied to construction costs per Table 4.



LOCATION MAP

JOINT
SOLANO IRRIGATION DISTRICT/SUISUN CITY
FACILITIES EXPANSION

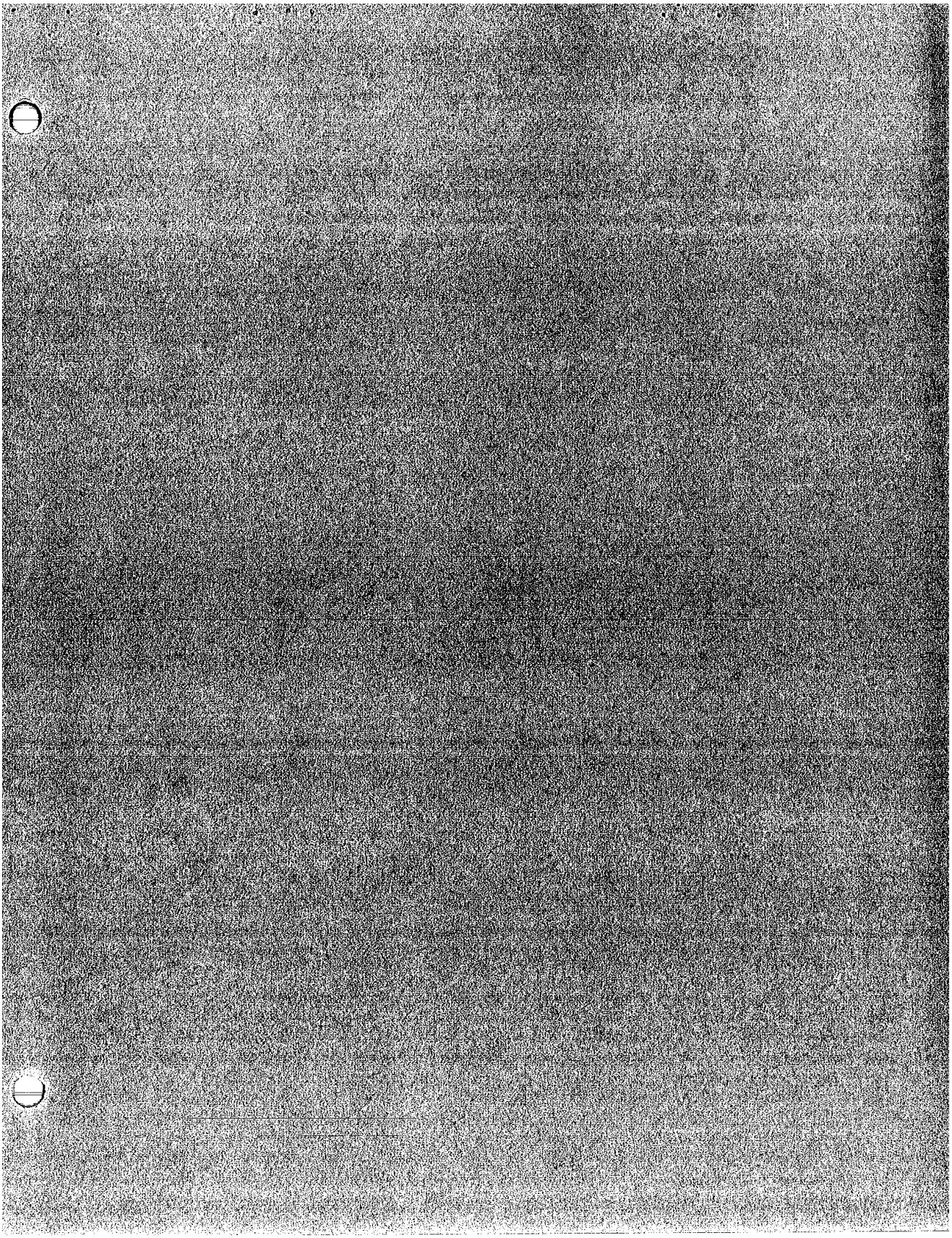
FEBRUARY 1989

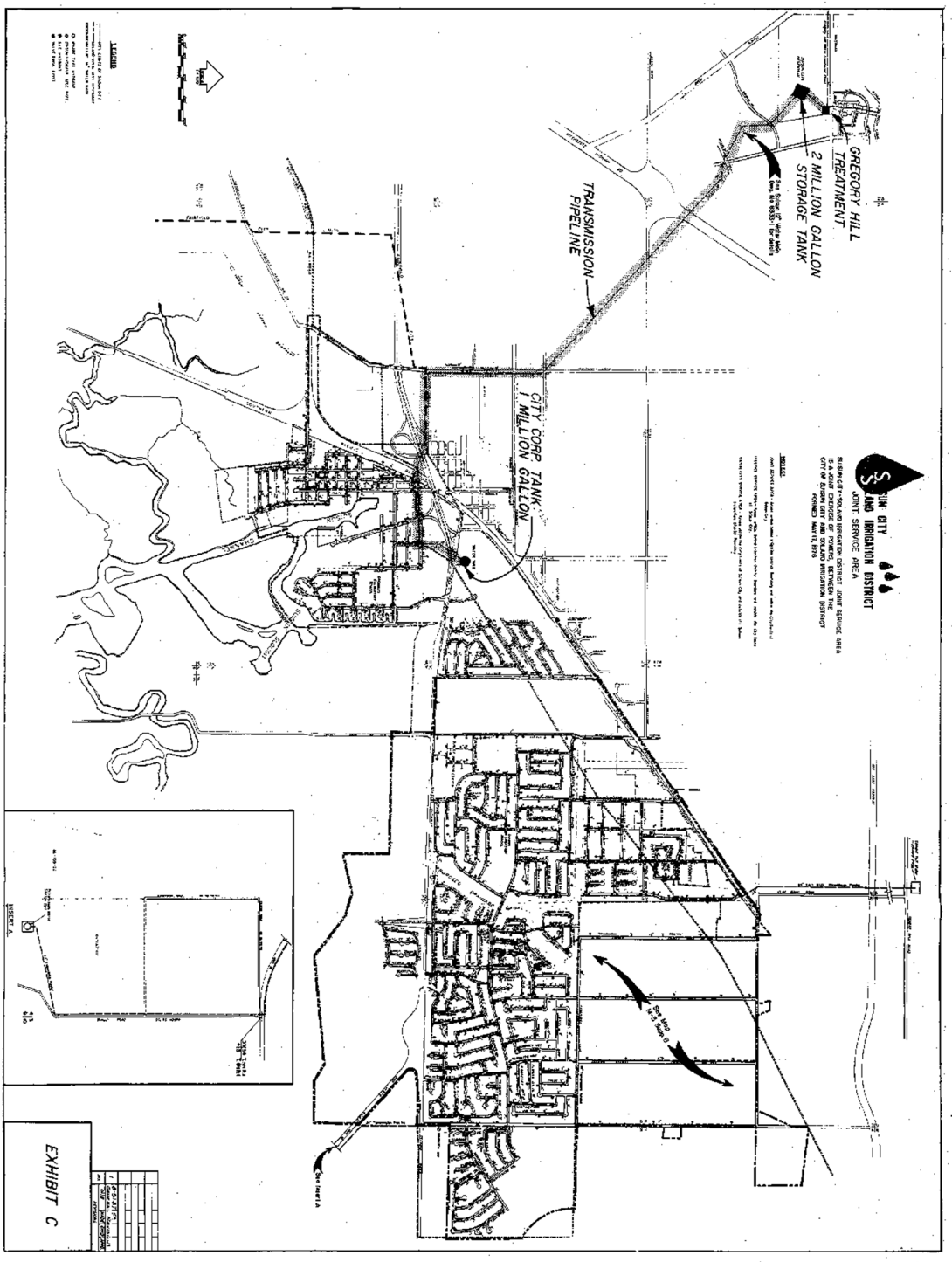
SUMMERS ENGINEERING, INC.
CONSULTING ENGINEERS
HANFORD CALIFORNIA

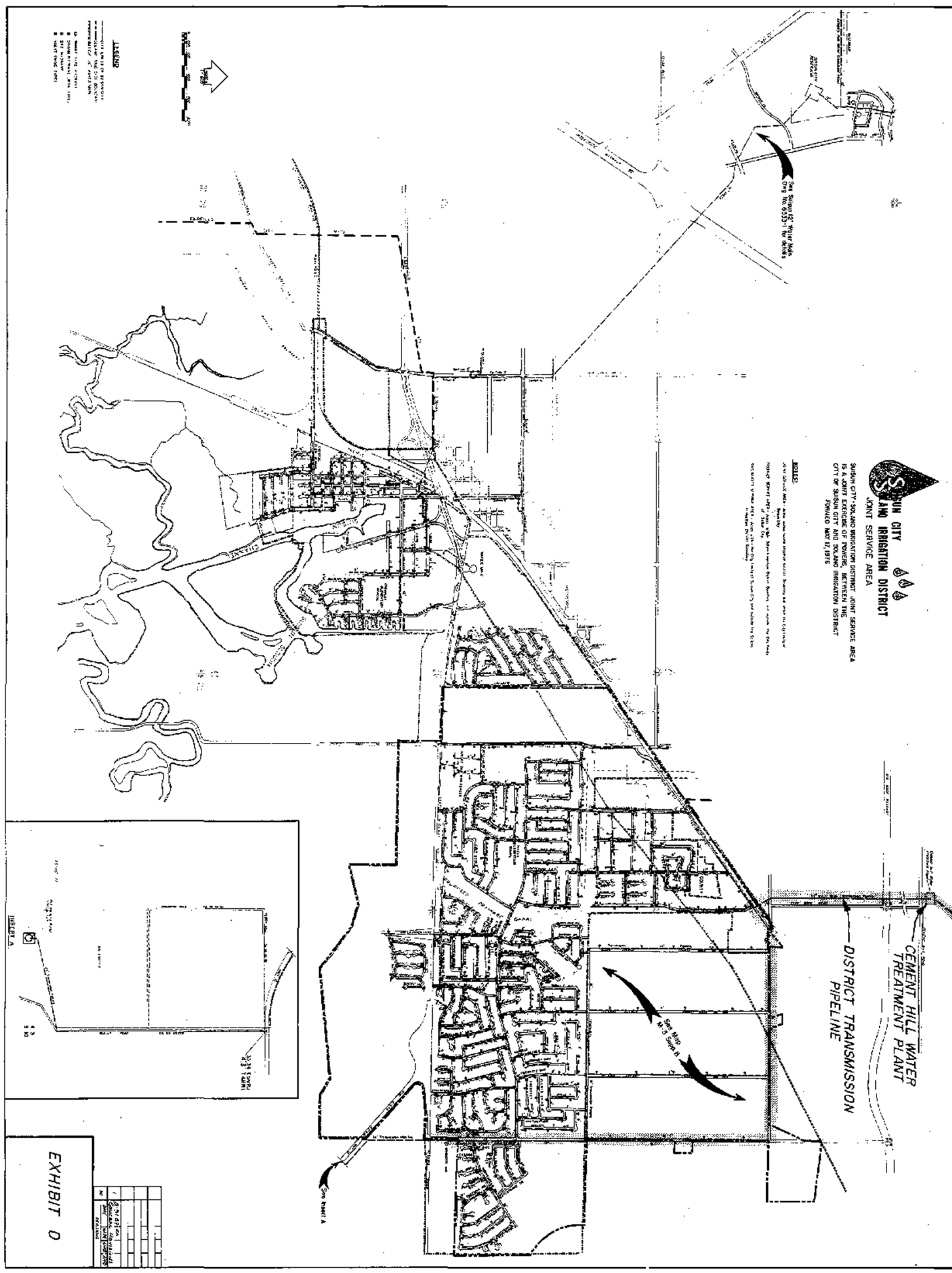
APPENDIX A

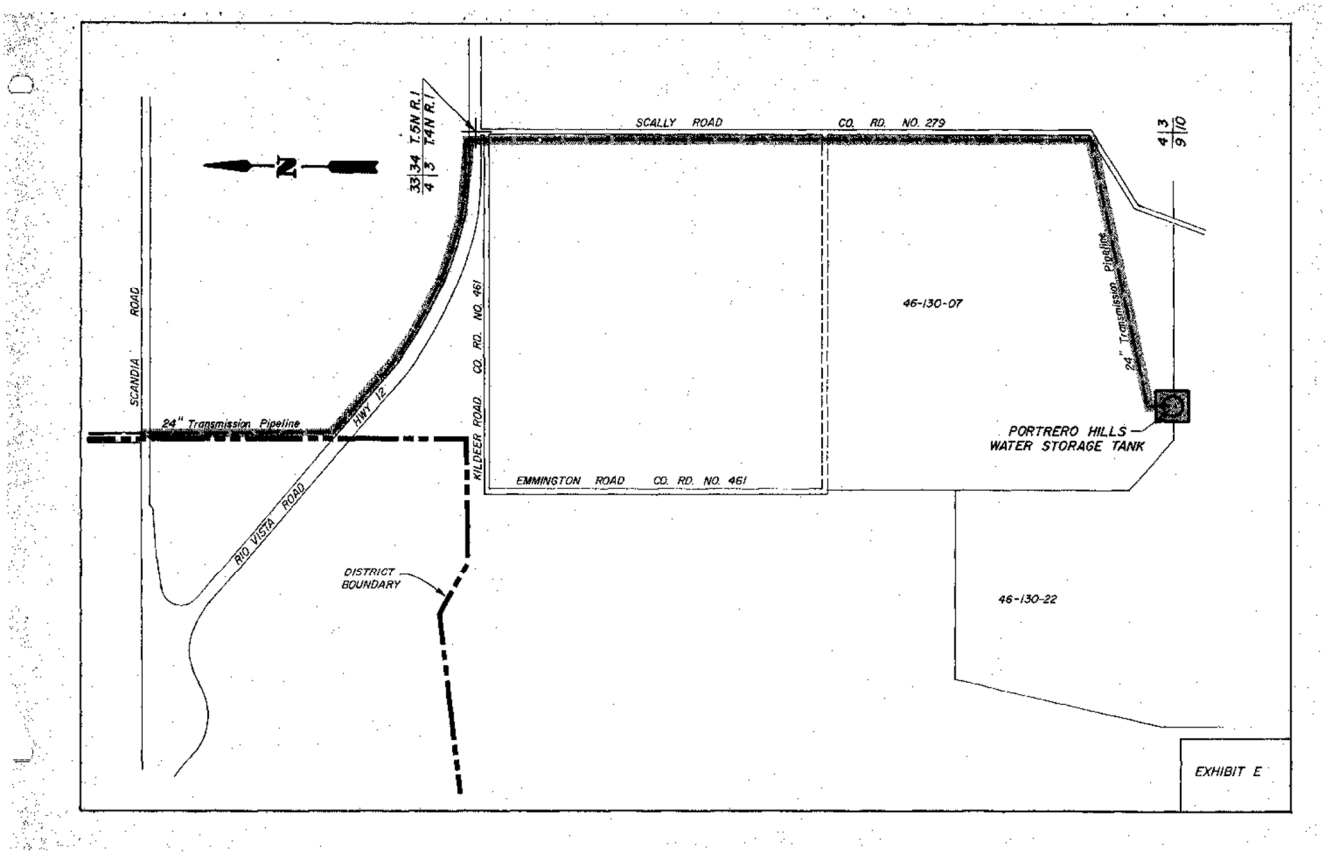
Gregory Hill Storage Tank

During March 1989, a meeting was held with the City of Fairfield, Director of Public Works, and City staff to review the proposed construction of the 2,000,000 gallon Gregory Hill water storage tank. The site for the existing and proposed Gregory Hill tank is within the City of Fairfield and is surrounded by lands currently under development. The construction plans for the proposed tank need to be approved by the City of Fairfield Planning Department. The Public Works Director wants the top of the proposed new tank to be no higher in elevation than the existing tank. This requirement will significantly increase the amount of excavation at the proposed site. This additional excavation was not included in the estimate of cost listed in Table 2 for the construction of the Gregory Hill tank. If City of Fairfield approval for the proposed tank is given as anticipated, the construction cost for the Gregory Hill 2,000,000 gallon water storage tank could increase by approximately $300,000.




GREGORY HILL TREATMENT
2 MILLION GALLON STORAGE TANK
TRANSMISSION PIPELINE
CITY CORP TANK 1 MILLION GALLON
SUISUN CITY
AND CITY IRRIGATION DISTRICT
JOINT SERVICE AREA
EXHIBIT C


2 MILLION GALLON WATER STORAGE
CEMENT HILL WATER TREATMENT PLANT
DISTRICT TRANSMISSION PIPELINE
JOINT SERVICE AREA
EXHIBIT D


N
33|34 T.5N R.1
4|3 T.4N R.1
SCALLY ROAD
CO. RD. NO. 279
4|3
9|10
SCANDIA ROAD
CO. RD. NO. 461
46-130-07
24" Transmission Pipeline
24" Transmission Pipeline
HWY 12
KILDEER ROAD
PORTRERO HILLS
WATER STORAGE TANK
EMMINGTON ROAD CO. RD. NO. 461
RIO VISTA ROAD
DISTRICT BOUNDARY
46-130-22
EXHIBIT E

RESOLUTION NO. 90-08

A RESOLUTION AUTHORIZING EXECUTION OF THE SUISUN/SOLANO WATER AUTHORITY IMPLEMENTATION AGREEMENT AND LEASE AGREEMENT

WHEREAS, the City Council, at its January 2, 1990 meeting, adopted Resolution No. 90-03, Approving, Authorizing and Directing Execution of an Amendment to the Joint Exercise of Powers Agreement Between the Solano Irrigation District and the City Forming the Suisun/Solano Water Authority; Approving, Authorizing, and Directing Execution of an Implementation Agreement Among the City, the District and the Authority; and Directing Certain Actions with Respect Thereto: and

WHEREAS, since the adoption of Resolution No. 90-03, staff has found that several minor changes needed in the Implementation Agreement, generally correcting drafting errors and providing additional clarification; and

WHEREAS, the changes requested by staff do not appear to in anyway affect the City's rights and liabilities under the contract nor in anyway materially alter the Agreement; and

WHEREAS, those changes have been incorporated into the Implementation Agreement and Lease Agreement dated January 30, 1990.

NOW, THEREFORE, BE IT RESOLVED that the City Council of the City of Suisun City does approve the requested changes to the Implementation Agreement and Lease Agreement and authorizes the Mayor to sign the Implementation Agreement and Lease Agreement dated January 30, 1990.

CERTIFICATION:

I, ARLYS HERBAUGH, City Clerk of the City of Suisun City, and ex-officio Clerk of the City Council of said City, do hereby certify that the above and foregoing is a full, true and correct copy of a resolution duly introduced, passed and adopted by the said City Council at a regular meeting thereof on Tuesday, the 30th day of January, 1990 by the following vote:

AYES: COUNCILMEMBERS Lotz, Rundlett, Day, Dodini, Spering

NOES: COUNCILMEMBERS None

ABSENT: COUNCILMEMBERS None

WITNESS my hand and the seal of the said City this 30th day of January, 1990.

City Clerk

(resJPA.AG1)

RESOLUTION 90-02

APPROVING, AUTHORIZING AND DIRECTING EXECUTION OF AN IMPLEMENTATION AGREEMENT AMONG THE DISTRICT, THE CITY AND THE AUTHORITY

At a meeting of the Solano Irrigation District held at the Solano Irrigation District Office on the 5th day of February, 1990, the following resolution was approved and adopted.

WHEREAS, the Solano Irrigation District (District) and the City of Suisun City (City) have heretofore entered into a Joint Exercise of Powers Agreement, dated December 31, 1988 (Agreement), creating the Suisun/Solano Water Authority (Authority);

WHEREAS, the Authority contemplates the issuance of its Revenue Bonds (as such term is defined in the Agreement) to finance the expansion and rehabilitation of water facilities, including treatment, storage and distribution facilities, for the benefit of the Members (as such term is defined in the Agreement);

WHEREAS, Section 21 of the Agreement provides that the Agreement may be made by supplemental agreement executed by the Members at any time prior to the issuance of Revenue Bonds; and

WHEREAS, the District desires to approve and authorize execution of an implementation agreement among the District, the City and the Authority;

BE AND IT IS HEREBY RESOLVED that the Solano Irrigation District Board of Directors approves and authorizes execution of the following:

1. An implementation agreement, in the form attached hereto as Exhibit A, is hereby approved, and the Board President and Secretary are hereby authorized and directed to execute said agreement.
2. The Board President and District Manager are hereby authorized and directed to execute such other agreements, documents and certificates as may be necessary to effect the purposes of this resolution.

PASSED AND ADOPTED at a meeting of the Solano Irrigation Board of Directors on the 5th day of February, 1990, by the following vote:

AYES: Maginnis, Wetzel, Alonzo, Hansen and Rogers

NOES: None

ABSENT: None

Brice Bledsoe, Secretary to the
Board of Directors of the
Solano Irrigation District

SUISUN-SOLANO WATER AUTHORITY

RESOLUTION 90-1

APPROVING, AUTHORIZING AND DIRECTING EXECUTION OF AN IMPLEMENTATION AGREEMENT AMONG THE AUTHORITY, SUISUN CITY AND SOLANO IRRIGATION DISTRICT

At a meeting of the Suisun-Solano Water Authority held at the Solano Irrigation District Office on the 26th day of February, 1990, the following resolution was approved and adopted.

WHEREAS, the Solano Irrigation District (District) and the City of Suisun City (City) have heretofore entered into a Joint Exercise of Powers Agreement, dated December 31, 1988 (Agreement), creating the Suisun-Solano Water Authority; and

WHEREAS, the Authority contemplates the issuance of its Revenue Bonds (as such term is defined in the Agreement) to finance the expansion and rehabilitation of water facilities, including treatment, storage and distribution facilities, for the benefit of the Members (as such term is defined in the Agreement); and

WHEREAS, Section 21 of the Agreement provides that the Agreement may be made by supplemental agreement executed by the Members at any time prior to the issuance of Revenue Bonds; and

WHEREAS, the Authority desires to approve and authorize execution of an implementation agreement among the Authority, the City and the District;

BE AND IT IS HEREBY RESOLVED that the Suisun-Solano Water Authority approves and authorizes execution of the following:

1. An implementation agreement, in the form attached hereto as Exhibit A, is hereby approved, and the Authority President and Secretary are hereby authorized and directed to execute said agreement.

2. The Authority President and Secretary are hereby authorized and directed to execute such other agreements, documents and certificates as may be necessary to effect the purposes of this resolution.

PASSED AND ADOPTED at a meeting of the Suisun-Solano Water Authority on the 26th day of February, 1990, by the following votes:

AYES: Spering, Rundlett, Day, Dodini, Maginnis, Alonzo and Rogers

NOES: None

ABSENT: Lotz, Hansen and Wetzel

ATTEST: I hereby certify that the foregoing Resolution was duly made, seconded and adopted by the Board of Directors of the Suisun-Solano Water Authority at a meeting of this Board held February 26, 1990.

Brice Bledsoe, Secretary-Manager
Suisun-Solano Water Authority

APPENDIX K – SOLANO COUNTY WATER AGENCY 2021 RELIABILITY TECHNICAL MEMORANDUM

Kennedy Jenks

26 April 2021

Technical Memorandum (April 2021 Revision)

To: Jeff Barich, Solano County Water Agency

From: Allison Fry, Kennedy/Jenks Consultants

CC: Sachi Itagaki and Alex Page, Kennedy/Jenks Consultants

Subject: SCWA Water Supply Reliability
KJ 2170001*00

Introduction

This Technical Memorandum (TM) is part of Task 3 of the Solano County Water Agency (SCWA) 2020 Urban Water Management Plan (UWMP) Population and Reliability Support. This TM will help SCWA provide technical support for the SCWA Participating Agencies to address water supply reliability for their 2020 Urban Water Management Plans. This TM provides:

- A review of 2019 California Department of Water Resources (DWR) State Water Project (SWP) Delivery Capability Report (DCR) for applicable delivery reliability assumptions, particularly for SCWA. This analysis has been updated to reflect input from retail agencies.
- A review and summary of Solano Project Reliability.

SCWA supplies untreated water from the Solano Project and the SWP for agriculture, and municipal and industrial uses. SCWA Participating Agencies that are also urban water suppliers include:

- City of Benicia
- City of Dixon
- City of Fairfield
- City of Rio Vista
- Suisun City
- City of Vacaville
- City of Vallejo

State Water Project Supply

SCWA has a long-term water master water supply contract with DWR for water supply from the SWP that currently expires in 2035 but is renewable. SCWA is a North of Delta SWP Contractor and receives SWP water via the North Bay Aqueduct (NBA), which is owned and operated by DWR to deliver wholesale water supply for municipal and industrial uses from the Barker Slough Pumping Plant in the Sacramento-San Joaquin Delta to Napa and Solano Counties. SCWA's contract with DWR includes a maximum allocation of 47,756 acre-feet per year (AFY), known as Table A water. Supplemental SWP water, "Advanced Table A" (ATA), under specific conditions, is available to SCWA. Additional supplemental water, Non-SWP Settlement Water (SW), is also available from year to year with some restrictions.

Attachments 1-9 provide additional SWP supply materials for retail agencies to utilize during the development of their 2020 Urban Water Management Plans (UWMPs).

State Water Project Capability Report

DWR prepares a biennial report to assist SWP contractors assess the availability of supplies from the SWP. The most recent update, the 2019 DWR State Water Project DCR was finalized in August 2020 (excerpts in Attachment 10). In this 2019 update, DWR provides SWP supply estimates for SWP contractors to use in their planning efforts, including for use in their 2020 UWMPs. The 2019 DCR includes DWR's estimates of SWP water supply availability under both current and future conditions using the CalSim II model; a CalSim III model is currently under development. Further details on modeling assumptions can be found in the DCR and its appendices which are available at: https://water.ca.gov/Library/Modeling-and-Analysis/Central-Valley-models-and-tools/CalSim-2/DCR2019.

Terms and Definitions

Table A Water (Table A Amounts)

Each SWP contractor's State Water Supply Contract (SWP Contract) contains a "Table A," which lists the maximum amount of annual allocated water supply, or "Table A water," an agency may request each year throughout the life of the contract. The Table A Amounts in each contractor's SWP Contract ramp up over time, based on projections at the time the contracts were signed and considerate of future increases in population and water demand, until they reach a maximum Table A Amount. Table A Amounts are used in determining each contractor's proportionate share, or "allocation," of the total SWP water supply DWR determines to be available each year. Table 1 below shows SCWA's active Participating Agencies' Table A allocation. Vacaville and Fairfield numbers include the permanent Table A transfer to Kern County Water Agency that began in 2001; the 5,756 AF transfer is split evenly between the two cities, assuming 100% South of Delta (SOD) allocation (discussed below in "SWP Allocation").

Table 1: SCWA Participating Agency Maximum SWP Table A Amounts (AF)

SCWA Participating Agency	Maximum Table A Amounts (AF)
City of Benicia	17,200
City of Fairfield	14,678
Suisun City	1,300
City of Vacaville	8,978
City of Vallejo	5,600
TOTAL	**47,756**

The cities of Dixon and Rio Vista have a right to obtain a specified portion of SCWA Table A supply (1,500 AF each) in the future. However, they currently do not have a means to deliver the water into their service areas but may call upon their water with a 5-year notice. This

allocation is currently being utilized by Benicia (1,125 AF), Fairfield (750 AF), and Vallejo (1,125 AF).

SWP Allocation

The amount of water that is allocated and delivered by the SWP to each contractor in a given year is determined annually by DWR. Table A Amounts determine the maximum amount of water a contractor may request in any year from DWR. SWP allocations are based on CALSIM modeling runs that take into consideration SWP storage in Oroville and San Luis reservoirs, SOD Contractor demand, hydrology, operational requirements and regulatory constraints. The allocation is typically reported as a percentage of maximum Table A amounts and is finalized by May 1 each year.

North of Delta Allocation

As a result of the North of Delta Settlement (December 31, 2013), DWR issues a separate SWP annual allocation for SCWA, Napa, and Yuba City ("the North of Delta (NOD) Contractors"), defined as the NOD Allocation. The NOD Allocation cannot exceed the Annual Table A Amounts. The NOD Allocation amounts to an additional increment of annual allocation above the current SWP Allocation described above. The other SOD contractors receive the baseline SWP allocation.

The concept of the NOD is to not penalize the NBA for conveyance restrictions exclusive to the SOD pumping plants. Currently, DWR's D1641 CALSIM model run is used as a surrogate for determining the NOD Allocation. All regulatory requirements under D1641 are met before allocations are met, so all contractors share in the responsibility to meet those regulatory requirements. D1641 was what the SWP operated to prior to the new ESA regulations, the 2008 and 2009 Biological Opinions. The Old-Middle River restrictions (OMR) part of the ESA regulations greatly impact the SOD pumping plant, but do not impact NOD diversions. However, the NOD allocation does provide an equitable share of any additional Delta outflow and water quality requirements, such as Fall X2. If Delta regulations change in the future, the NOD Allocation may be affected commensurately.

Since the implementation of the NOD Allocation in 2014, SCWA has received an additional increment of: 0% (2017), 10% (2018), 10% (2019) and 10% (2020 as of April 1). Analysis performed by DWR estimated that SCWA could receive an additional 11 TAF in approximately 50% of years compared to existing Table A deliveries.[1] The actual differential varies each year and is less in drier years. For the purposes of this analysis, the Table A allocations have been increased by 10% in all but the driest years to account for incremental reliability associated with the NOD Allocation.

[1] California Department of Water Resources State Water Project Analysis Office, *Initial Study/Proposed Negative Declaration State Water Project Supply Allocation Settlement Agreement*. Prepared by AECOM. July 2013.

Carryover Water

Carryover is unused Table A water "stored" in SWP reservoirs, when storage capacity is available, for use in the following years. SCWA Carryover is accounted for in San Luis Reservoir and may be partially or completely lost when San Luis "spills" meaning that carryover is displaced by higher priority, new State Water Project water pumped into storage. The amount of Table A that can be converted and added to storage at the end of each year as new Carryover is governed by Article 56 of the SWP Contract. The amount of new Carryover allowed each year by Article 56 ranges from 25% to 50%, with interpolation in between, depending on the SWP Allocation for that year. There is no limit to the amount of accumulated carryover that can be stored.

Advanced Table A (ATA)

Another component of the North of Delta Settlement (December 31, 2013), Advanced Table A (ATA), is supplemental SWP water that can be used to make up shortfalls of the NOD Allocation in a given year under specific conditions. The annual NOD Allocation plus Advanced Table A requested cannot exceed SCWA contract amount of 47,756 acre-feet per year. ATA is limited to a maximum of 15,000 acre feet per year and a cumulative balance of 60,000 acre feet. ATA is only accessible when the SWP Allocation is greater than 20% and all available SCWA Table A and Carryover is used. Computer simulations show that a 20% or lower allocation would occur only once in the 82 years of record. In these years of less than 20% Table A allocation, the cumulative ATA limit is temporarily increased by 16,800 acre feet (or the current Advanced Table A balance, whichever is lessor) for use in future years. The ATA limit and cumulative balance resets when Oroville Reservoir spills and has limited pay-back provisions after 5 years. All active SCWA Participating Agencies have access to proportional allocation of ATA, at a minimum, when available.

Article 21 Water

Water identified in Article 21 of SWP Contract is additional unregulated water above the annual NOD Allocation available for diversion at the NBA when the Delta is in "excess" conditions. Solano, as a North Bay contractor, can access this water when DWR and the US Bureau of Reclamation mutually agree and declare that the Delta is in "excess" conditions which typically occur in winter and spring with storm runoff. The Delta is considered in "excess" conditions when the SWP and Central Valley Project (CVP) are pumping the maximum amount allowed, all Delta standards are met, and there is still water available for export. "Balanced" conditions in the Delta occur when the SWP and CVP are releasing stored water into the Delta to meet their obligations and there is no extra water available in the system.

Non-SWP Settlement Water

Non-SWP Settlement Water (SW) is additional non-project water provided by a settlement agreement (executed May 19, 2003) among DWR, SCWA, and the cities of Fairfield, Vacaville, and Benicia. The agreement provides for delivery of up to 31,620 AFY of SW to SCWA for delivery through the NBA, a SWP facility, to the three cities to help meet their current and future

municipal and industrial water needs. SW is not available when the Standard Water Right Term 91 is in effect. The Settlement expires December 31, 2035 with the option to renew.[2]

Standard Water Right Term 91 (Term 91)

Term 91 is declared by the State Water Resources Control Board when it is determined that the SWP and CVP are releasing stored water into the Delta in excess of natural flow ("natural" flow is the flow that would have been present if the dams did not exist) to meet in-Delta demands and Delta water standards.

2014, 2020 and 2021 SWP Water Supply Allocation

The extremely dry sequence from the beginning of January 2013 through the end of 2014 was one of the driest two-year periods in the historical record. Water year 2013 was a year with two hydrologic extremes.[3] October through December 2012 was one of the wettest fall periods on record but was followed by the driest consecutive 12 months on record. Accordingly, the 2013 SWP supply allocation was a low 35% of Table A Amounts. The 2013 hydrology ended up being even drier than DWR's conservative hydrologic forecast, so the SWP began 2014 with reservoir storage lower than targeted levels and less stored water available for 2014 supplies. Compounding this low storage situation, 2014 also was an extremely dry year, with runoff for water year 2014 the fourth driest on record. Due to extraordinarily dry conditions in 2013 and 2014, the 2014 SWP water supply allocation was a historically low 5% of Table A Amounts. The 2020 SWP allocation was initially 10% and increased to 20% while the 2021 SWP allocation was reduced from 10% to 5%.

The dry hydrologic conditions that led to the low 2014 SWP water supply allocation were unusual, and to date hydrology through 2014 has not been included in the CalSim II modeling that estimates future SWP delivery presented in DWR's 2019 Delivery Capability Report.[4] It is anticipated that the hydrologic record used in the DWR model will be extended to include the period through 2021 during one of the next updates of the model. For the reasons stated above, the SCWA UWMP uses a conservative assumption that a 5% allocation of SWP Table A Amounts represents the "worst case" scenario.

SCWA SWP Reliability

Table A-28 from the 2019 DCR, found in Appendix A of the DCR (excerpted and shown in Attachment 10) provides a scenario that represents existing supply conditions for SCWA. Table A-28 was agreed upon by the SWP Contractors as an appropriate scenario to estimate existing supply availability. Therefore, existing SWP supply availability presented in Table 2 is based on the 2019 DCR Table A-28 and includes 10% to account for the NOD Allocation

[2] DWR. 2014. *Management of the California State Water Project: Bulletin 132-14.* <http://www.water.ca.gov/swpao/bulletin_home.cfm>
[3] A water year begins in October and runs through September. For example, water year 2013 is October 2012 through September 2013.
[4] SWP delivery estimates from DWR's 2019 SWP Delivery Capability Report are from computer model studies which use 82 years of historical hydrologic inflows from 1922 through 2003.

available to SCWA. The single dry year availability is based on single dry years 2015 and 2021. This was determined to be a realistic and conservative estimate for single dry year SWP supply. The multiple dry year availability is based on actual percentage deliveries that have occurred in the last ten years which reflect current SWP operating conditions. All but the driest year in the multiple dry year have been augmented by 10% to account for the NOD Allocation. Therefore, the percentage deliveries represent a realistic and conservative estimate of single and multiple dry year reliability.

Table 2: SWP SCWA Table A Supply Reliability (AF)[(a)(b)]

DWR (SWP) Table A Supply	% of Table A Amount[(c)]	2025	2030	2035	2040-2045
Average Water Year[(d)]	83%	39,637	39,637	39,637	39,637
Single Dry Year[(e)]	5%	2,388	2,388	2,388	2,388
Multiple-Dry Year					
Year 1[(f)]	45%	21,490	21,490	21,490	21,490
Year 2[(f)]	30%	14,327	14,327	14,327	14,327
Year 3	5%	2,388	2,388	2,388	2,388
Year 4[(f)]	15%	7,163	7,163	7,163	7,163
Year 5[(f)]	30%	14,327	14,327	14,327	14,327

Notes:
(a) Supplies to SCWA are based on DWR analyses presented in its "2019 State Water Project Delivery Capability Report" (2019 DCR), assuming existing SWP facilities and current regulatory and operational constraints.
(b) Table A supplies include supplies allocated in one year that are carried over for delivery the following year.
(c) Supply as a percentage of SCWA's Table A Amount of 47,756 AF per 2019 DCR and adjust per narrative above.
(d) Based on average deliveries over a repeat of the study's historic hydrologic period of 1922 through 2003. The 2014 North of Delta Settlement allocation of 10% is included in this percentage.
(e) Based on a repeat of single dry years 2015 and 2021.
(f) Supplies shown are annual average percentage deliveries that have occurred in the last ten years. The 2014 North of Delta Settlement allocation of 10% is included in this percentage

SCWA has subsequent long term water service contracts for SWP water supply deliveries with Participating Agencies. The SWP Table A Supply Reliability values in Table 2 can be applied directly to SCWA supply reliability and need to be adjusted to reflect individual SCWA Participating Agencies contract terms with SCWA. The following tables show the SCWA Participating Agency SWP allocations based on Table 2 and Participating Agency maximum SCWA contract allocations in Table 1:

Table 3a: SWP SCWA Participating Agency Supply Reliability (AF)[(a)(b)]
City of Benicia

DWR (SWP) Table A Supply	% of Table A Amount[(c)]	2025	2030	2035	2040-2045
Average Water Year[(d)]	83%	14,276	14,276	14,276	14,276
Single Dry Year[(e)]	5%	860	860	860	860
Multiple-Dry Year					
Year 1[(f)]	45%	7,740	7,740	7,740	7,740
Year 2[(f)]	30%	5,160	5,160	5,160	5,160
Year 3	5%	860	860	860	860
Year 4[(f)]	15%	2,580	2,580	2,580	2,580
Year 5[(f)]	30%	5,160	5,160	5,160	5,160

Notes:
(a) Supplies to SCWA are based on DWR analyses presented in its "2019 State Water Project Delivery Capability Report" (2019 DCR), assuming existing SWP facilities and current regulatory and operational constraints.
(b) Table A supplies include supplies allocated in one year that are carried over for delivery the following year.
(c) Supply as a percentage of City of Benicia's SCWA contract amount for SWP supply of 17,200 AF, not including Advanced Table A Water or Rio Vista Water.
(d) Based on average SWP deliveries over a repeat of the study's historic hydrologic period of 1922 through 2003. The 2014 North of Delta Settlement allocation of 10% is included in this percentage.
(e) Based on a repeat of single dry years 2015 and 2021.
(f) Supplies shown are annual average percentage deliveries that have occurred in the last ten years. The 2014 North of Delta Settlement allocation of 10% is included in this percentage.

In addition to SWP supplies, the City of Benicia has access to 10,500 AFY of Non-SWP Settlement Water delivered through the North Bay Aqueduct when available.

Table 3b: SWP SCWA Participating Agency Supply Reliability (AF)[(a)(b)]
City of Fairfield

DWR (SWP) Table A Supply	% of Table A Amount[(c)]	2025	2030	2035	2040-2045
Average Water Year[(d)]	83%	12,183	12,183	12,183	12,183
Single Dry Year[(e)]	5%	734	734	734	734
Multiple-Dry Year					
Year 1[(f)]	45%	6,605	6,605	6,605	6,605
Year 2[(f)]	30%	4,403	4,403	4,403	4,403
Year 3	5%	734	734	734	734
Year 4[(f)]	15%	2,202	2,202	2,202	2,202
Year 5[(f)]	30%	4,403	4,403	4,403	4,403

Notes:
(a) Supplies to SCWA are based on DWR analyses presented in its "2019 State Water Project Delivery Capability Report" (2019 DCR), assuming existing SWP facilities and current regulatory and operational constraints.
(b) Table A supplies include supplies allocated in one year that are carried over for delivery the following year.
(c) Supply as a percentage of City of Fairfield's SCWA contract amount for SWP supply of 14,678 AF, not including Advanced Table A Water or Rio Vista Water.
(d) Based on average SWP deliveries over a repeat of the study's historic hydrologic period of 1922 through 2003. The 2014 North of Delta Settlement allocation of 10% is included in this percentage.
(e) Based on a repeat of single dry years 2015 and 2021.
(f) Supplies shown are annual average percentage deliveries that have occurred in the last ten years. The 2014 North of Delta Settlement allocation of 10% is included in this percentage.

In addition to SWP supplies, the City of Fairfield has access to 11,800 AFY of Non-SWP Settlement Water, delivered through the North Bay Aqueduct when available.

Table 3c: SWP SCWA Participating Agency Supply Reliability (AF)[(a)(b)]
City of Suisun City

DWR (SWP) Table A Supply	% of Table A Amount[(c)]	2025	2030	2035	2040-2045
Average Water Year[(d)]	83%	1,079	1,079	1,079	1,079
Single Dry Year[(e)]	5%	65	65	65	65
Multiple-Dry Year					
Year 1[(f)]	45%	585	585	585	585
Year 2[(f)]	30%	390	390	390	390
Year 3	5%	65	65	65	65
Year 4[(f)]	15%	195	195	195	195
Year 5[(f)]	30%	390	390	390	390

Notes:
(a) Supplies to SCWA are based on DWR analyses presented in its "2019 State Water Project Delivery Capability Report" (2019 DCR), assuming existing SWP facilities and current regulatory and operational constraints.
(b) Table A supplies include supplies allocated in one year that are carried over for delivery the following year.
(c) Supply as a percentage of Suisun City's SCWA contract amount for SWP supply of 1,300 AF.
(d) Based on average SWP deliveries over a repeat of the study's historic hydrologic period of 1922 through 2003. The 2014 North of Delta Settlement allocation of 10% is included in this percentage.
(e) Based on a repeat of single dry years 2015 and 2021.
(f) Supplies shown are annual average percentage deliveries that have occurred in the last ten years. The 2014 North of Delta Settlement allocation of 10% is included in this percentage.

Table 3d: SWP SCWA Participating Agency Supply Reliability (AF)[(a)(b)]
City of Vacaville

DWR (SWP) Table A Supply	% of Table A Amount[(c)]	2025	2030	2035	2040-2045
Average Water Year[(d)]	83%	7,452	7,452	7,452	7,452
Single Dry Year[(e)]	5%	449	449	449	449
Multiple-Dry Year					
Year 1[(f)]	45%	4,040	4,040	4,040	4,040
Year 2[(f)]	30%	2,693	2,693	2,693	2,693
Year 3	5%	449	449	449	449
Year 4[(f)]	15%	1,347	1,347	1,347	1,347
Year 5[(f)]	30%	2,693	2,693	2,693	2,693

Notes:
(a) Supplies to SCWA are based on DWR analyses presented in its "2019 State Water Project Delivery Capability Report" (2019 DCR), assuming existing SWP facilities and current regulatory and operational constraints.
(b) Table A supplies include supplies allocated in one year that are carried over for delivery the following year.
(c) Supply as a percentage of City of Vacaville's SCWA contract amount for SWP supply of 8,978 AF, not including Advanced Table A Water.
(d) Based on average SWP deliveries over a repeat of the study's historic hydrologic period of 1922 through 2003. The 2014 North of Delta Settlement allocation of 10% is included in this percentage.
(e) Based on a repeat of single dry years 2015 and 2021.
(f) Supplies shown are annual average percentage deliveries that have occurred in the last ten years. The 2014 North of Delta Settlement allocation of 10% is included in this percentage.

In addition to SWP supplies, the City of Vacaville has access to 9,320 AFY of Non-SWP Settlement Water delivered through the North Bay Aqueduct when available.

Table 3e: SWP SCWA Participating Agency Supply Reliability (AF)[(a)(b)]
City of Vallejo

DWR (SWP) Table A Supply	% of Table A Amount[(c)]	2025	2030	2035	2040-2045
Average Water Year[(d)]	83%	4,648	4,648	4,648	4,648
Single Dry Year[(e)]	5%	280	280	280	280
Multiple-Dry Year					
Year 1[(f)]	45%	2,520	2,520	2,520	2,520
Year 2[(f)]	30%	1,680	1,680	1,680	1,680
Year 3	5%	280	280	280	280
Year 4[(f)]	15%	840	840	840	840
Year 5[(f)]	30%	1,680	1,680	1,680	1,680

Notes:
(a) Supplies to SCWA are based on DWR analyses presented in its "2019 State Water Project Delivery Capability Report" (2019 DCR), assuming existing SWP facilities and current regulatory and operational constraints.
(b) Table A supplies include supplies allocated in one year that are carried over for delivery the following year.
(c) Supply as a percentage of City of Vallejo's SCWA contract amount for SWP supply of 5,600 AF, not including Rio Vista Water.
(d) Based on average SWP deliveries over a repeat of the study's historic hydrologic period of 1922 through 2003. The 2014 North of Delta Settlement allocation of 10% is included in this percentage.
(e) Based on a repeat of single dry years 2015 and 2021.
(f) Supplies shown are annual average percentage deliveries that have occurred in the last ten years. The 2014 North of Delta Settlement allocation of 10% is included in this percentage.

Solano Project

The Solano Project is a federal facility owned by the Bureau of Reclamation (USBR) that stores water in Lake Berryessa for delivery to agriculture and municipal and industrial users throughout Solano County. SCWA has a long-term master water supply agreement with USBR that currently expires in 2025 but is renewable. The Solano Project first delivered water in 1959. The major facilities are:

- Monticello Dam, which captures water from Putah Creek in Lake Berryessa;
- Putah Diversion Dam, which diverts water out of Lower Putah Creek just downstream of Monticello Dam; and
- Putah South Canal, which delivers water to local agencies. The Putah South Canal is 33 miles long, concrete lined and has a maximum capacity of 956 cubic feet per second.

The annual firm yield of the Solano Project is 207,350 AFY. Solano Project water is designated for Agricultural (AG) and Municipal and Industrial (M&I) uses allocated to Participating Agencies as follows in Table 4:

Table 4: SCWA Participating Agency Maximum Solano Project Allocation (AF)

Participating Agency	Maximum Allocation (AFY)	Use
City of Fairfield	9,200	M&I
City of Suisun	1,600	M&I
City of Vacaville	5,750	M&I
City of Vallejo	14,600	M&I
Solano Irrigation District	141,000	AG+M&I
Maine Prairie Water District	15,000	AG
University of California - Davis	4,000	AG
California State Prison - Solano	1,200	AG+M&I
SCWA	15,000	Operating Loss
TOTAL	**207,350**	

Reliability estimates for the Solano Project are developed based on historic hydrology from 1906-2019, Lake Berryessa inflows, and the Sacramento Valley Index (SVI) for hydrologic year types (wet, above normal, below normal, dry, critically dry). The SVI was further categorized into Average Year (above normal, below normal), Single Dry Year, and Multi-Dry Year. The update of the Solano Project reliability analysis from 2015-2020 (Attachment 11) resulted in a slight change to the reliability since 2016, therefore, it is recommended that the updated reliability estimates be utilized for the 2020 SCWA UWMP. The recommended 2020 Solano Project Reliability estimates are presented in Table 5 below.

Table 5: Solano Project Supply Reliability (AF)

Solano Project Supply[a]	2025	2030	2035	2040-2045
Average Water Year[b]	206,021	206,021	206,021	206,021
% of Contract Amount[b]	99.4%	99.4%	99.4%	99.4%
Single Dry Year[c]	204,326	204,326	204,326	204,326
% of Contract Amount[c]	98.5%	98.5%	98.5%	98.5%
Multi-Dry Year[d]	192,375	192,375	192,375	192,375
% of Contract Amount[d]	92.8%	92.8%	92.8%	92.8%

Notes:
(a) SCWA's Total Participating Agency Contract Amounts equal 207,350 AF and includes 15,000 AF of canal losses.
(b) Based on average percent allocation (including canal losses) during Average Years over the study's historic hydrologic period of 1906 through 2020, rounded to the nearest whole percent.
(c) Based on the average percent allocation (including canal losses) during Single Dry Years over the study's historic hydrologic period of 1906 through 2020, rounded to the nearest whole percent.
(d) Supplies shown are average percent allocation (including canal losses) over four consecutive dry years, based on a repeat of the historic five-year dry period with low inflow to Lake Berryessa of 1990-1994, rounded to the nearest whole percent.

SCWA has subsequent long-term water service contracts for Solano Project water supply deliveries with Participating Agencies. Similar to the SWP Table A Supply Reliability, Solano Project Reliability shown in Table 5 are for SCWA and need to be adjusted to reflect individual Participating Agencies contract terms. The following tables show the SCWA Participating Agency Solano Project allocations based on Table 5 and Participating Agency maximum contract allocations in Table 4:

Table 6a: City of Fairfield Solano Project Supply Reliability (AF)

Solano Project Supply[a]	2025	2030	2035	2040-2045
Average Water Year[b]	9,141	9,141	9,141	9,141
% of Contract Amount[b]	99.4%	99.4%	99.4%	99.4%
Single Dry Year[c]	9,066	9,066	9,066	9,066
% of Contract Amount[c]	98.5%	98.5%	98.5%	98.5%
Multi-Dry Year[d]	8,536	8,536	8,536	8,536
% of Contract Amount[d]	92.8%	92.8%	92.8%	92.8%

Notes:
(a) City of Fairfield's Solano Project Contract Amount is 9,200 AF, not including canal losses.
(b) Based on average percent allocation (including canal losses) during Average Years over the study's historic hydrologic period of 1906 through 2020, rounded to the nearest whole percent.
(c) Based on the average percent allocation (including canal losses) during Single Dry Years over the study's historic hydrologic period of 1906 through 20120, rounded to the nearest whole percent.
(d) Supplies shown are average percent allocation (including canal losses) over four consecutive dry years, based on a repeat of the historic five-year dry period with low inflow to Lake Berryessa of 1990-1994, rounded to the nearest whole percent.
(e) The City of Fairfield may have additional water supply agreements in place with other agencies. See the City of Fairfield's most recently adopted UWMP for descriptions of their water supply portfolio.

Table 6b: City of Suisun City Solano Project Supply Reliability (AF)

Solano Project Supply[a]	2025	2030	2035	2040-2045
Average Water Year[b]	1,590	1,590	1,590	1,590
% of Contract Amount[b]	99.4%	99.4%	99.4%	99.4%
Single Dry Year[c]	1,577	1,577	1,577	1,577
% of Contract Amount[c]	98.5%	98.5%	98.5%	98.5%
Multi-Dry Year[d]	1,484	1,484	1,484	1,484
% of Contract Amount[d]	92.8%	92.8%	92.8%	92.8%

Notes:
(a) Suisun City's Solano Project Contract Amount is 1,600 AF, not including canal losses.
(b) Based on average percent allocation (including canal losses) during Average Years over the study's historic hydrologic period of 1906 through 2020, rounded to the nearest whole percent.
(c) Based on the average percent allocation (including canal losses) during Single Dry Years over the study's historic hydrologic period of 1906 through 2020, rounded to the nearest whole percent.
(d) Supplies shown are average percent allocation (including canal losses) over four consecutive dry years, based on a repeat of the historic five-year dry period with low inflow to Lake Berryessa of 1990-1994, rounded to the nearest whole percent.
(e) Suisun City may have additional water supply agreements in place with other agencies. See Suisun City's most recently adopted UWMP for descriptions of their water supply portfolio.

Table 6c: City of Vacaville Solano Project Supply Reliability (AF)

Solano Project Supply[a]	2025	2030	2035	2040-2045
Average Water Year[b]	5,713	5,713	5,713	5,713
% of Contract Amount[b]	99.4%	99.4%	99.4%	99.4%
Single Dry Year[c]	5,666	5,666	5,666	5,666
% of Contract Amount[c]	98.5%	98.5%	98.5%	98.5%
Multi-Dry Year[d]	5,335	5,335	5,335	5,335
% of Contract Amount[d]	92.8%	92.8%	92.8%	92.8%

Notes:
(a) City of Vacaville's Solano Project Contract Amount is 5,750 AF, not including canal losses.
(b) Based on average percent allocation (including canal losses) during Average Years over the study's historic hydrologic period of 1906 through 2020, rounded to the nearest whole percent.
(c) Based on the average percent allocation (including canal losses) during Single Dry Years over the study's historic hydrologic period of 1906 through 2020, rounded to the nearest whole percent.
(d) Supplies shown are average percent allocation (including canal losses) over four consecutive dry years, based on a repeat of the historic five-year dry period with low inflow to Lake Berryessa of 1990-1994, rounded to the nearest whole percent.
(e) The City of Vacaville may have additional water supply agreements in place with other agencies. See the City of Vacaville's most recently adopted UWMP for descriptions of their water supply portfolio.

Table 6d: City of Vallejo Solano Project Supply Reliability (AF)

Solano Project Supply[a]	2025	2030	2035	2040-2045
Average Water Year[b]	14,506	14,506	14,506	14,506
% of Contract Amount[b]	99.4%	99.4%	99.4%	99.4%
Single Dry Year[c]	14,387	14,387	14,387	14,387
% of Contract Amount[c]	98.5%	98.5%	98.5%	98.5%
Multi-Dry Year[d]	13,546	13,546	13,546	13,546
% of Contract Amount[d]	92.8%	92.8%	92.8%	92.8%

Notes:
(a) City of Vallejo's Solano Project Contract Amount is 14,600 AF, not including canal losses.
(b) Based on average percent allocation (including canal losses) during Average Years over the study's historic hydrologic period of 1906 through 2020, rounded to the nearest whole percent.
(c) Based on the average percent allocation (including canal losses) during Single Dry Years over the study's historic hydrologic period of 1906 through 2020, rounded to the nearest whole percent.
(d) Supplies shown are average percent allocation (including canal losses) over four consecutive dry years, based on a repeat of the historic five-year dry period with low inflow to Lake Berryessa of 1990-1994, rounded to the nearest whole percent.
(e) The City of Vallejo may have additional water supply agreements in place with other agencies. See the City of Vallejo's most recently adopted UWMP for descriptions of their water supply portfolio.

Table 6e: California State Prison Solano Project Supply Reliability (AF)

Solano Project Supply[a]	2025	2030	2035	2040-2045
Average Water Year[b]	1,192	1,192	1,192	1,192
% of Contract Amount[b]	99.4%	99.4%	99.4%	99.4%
Single Dry Year[c]	1,183	1,183	1,183	1,183
% of Contract Amount[c]	98.5%	98.5%	98.5%	98.5%
Multi-Dry Year[d]	1,113	1,113	1,113	1,113
% of Contract Amount[d]	92.8%	92.8%	92.8%	92.8%

Notes:
(a) California State Prison's Solano Project Contract Amount is 1,200 AF, not including canal losses.
(b) Based on average percent allocation (including canal losses) during Average Years over the study's historic hydrologic period of 1906 through 2020, rounded to the nearest whole percent.
(c) Based on the average percent allocation (including canal losses) during Single Dry Years over the study's historic hydrologic period of 1906 through 2020, rounded to the nearest whole percent.
(d) Supplies shown are average percent allocation (including canal losses) over four consecutive dry years, based on a repeat of the historic five-year dry period with low inflow to Lake Berryessa of 1990-1994, rounded to the nearest whole percent.

Table 6f: Maine Prairie Water District Solano Project Supply Reliability (AF)

Solano Project Supply[a]	2025	2030	2035	2040-2045
Average Water Year[b]	14,904	14,904	14,904	14,904
% of Contract Amount[b]	99.4%	99.4%	99.4%	99.4%
Single Dry Year[c]	14,781	14,781	14,781	14,781
% of Contract Amount[c]	98.5%	98.5%	98.5%	98.5%
Multi-Dry Year[d]	13,917	13,917	13,917	13,917
% of Contract Amount[d]	92.8%	92.8%	92.8%	92.8%

Notes:
(a) Maine Prairie Water District's Solano Project Contract Amount is 15,000 AF, not including canal losses.
(b) Based on average percent allocation (including canal losses) during Average Years over the study's historic hydrologic period of 1906 through 2020, rounded to the nearest whole percent.
(c) Based on the average percent allocation (including canal losses) during Single Dry Years over the study's historic hydrologic period of 1906 through 2020, rounded to the nearest whole percent.
(d) Supplies shown are average percent allocation (including canal losses) over four consecutive dry years, based on a repeat of the historic five-year dry period with low inflow to Lake Berryessa of 1990-1994, rounded to the nearest whole percent.
(e) Maine Prairie Water District may have additional water supply agreements in place with other agencies, which are not shown in this table.

Table 6g: Solano Irrigation District Solano Project Supply Reliability (AF)

Solano Project Supply[a]	2025	2030	2035	2040-2045
Average Water Year[b]	140,096	140,096	140,096	140,096
% of Contract Amount[b]	99.4%	99.4%	99.4%	99.4%
Single Dry Year[c]	138,944	138,944	138,944	138,944
% of Contract Amount[c]	98.5%	98.5%	98.5%	98.5%
Multi-Dry Year[d]	130,817	130,817	130,817	130,817
% of Contract Amount[d]	92.8%	92.8%	92.8%	92.8%

Notes:
(a) Solano Irrigation District's Solano Project Contract Amount is 141,000 AF, not including canal losses.
(b) Based on average percent allocation (including canal losses) during Average Years over the study's historic hydrologic period of 1906 through 2020, rounded to the nearest whole percent.
(c) Based on the average percent allocation (including canal losses) during Single Dry Years over the study's historic hydrologic period of 1906 through 2020, rounded to the nearest whole percent.
(d) Supplies shown are average percent allocation (including canal losses) over four consecutive dry years, based on a repeat of the historic five-year dry period with low inflow to Lake Berryessa of 1990-1994, rounded to the nearest whole percent.
(e) Solano Irrigation District may have additional water supply agreements in place with other agencies, which are not shown in this table.

Table 6h: University of California, Davis Solano Project Supply Reliability (AF)

Solano Project Supply[a]	2025	2030	2035	2040-2045
Average Water Year[b]	3,974	3,974	3,974	3,974
% of Contract Amount[b]	99.4%	99.4%	99.4%	99.4%
Single Dry Year[c]	3,942	3,942	3,942	3,942
% of Contract Amount[c]	98.5%	98.5%	98.5%	98.5%
Multi-Dry Year[d]	3,711	3,711	3,711	3,711
% of Contract Amount[d]	92.8%	92.8%	92.8%	92.8%

Notes:
(a) University of California, Davis's Solano Project Contract Amount is 4,000 AF, not including canal losses.
(b) Based on average percent allocation (including canal losses) during Average Years over the study's historic hydrologic period of 1906 through 2020, rounded to the nearest whole percent.
(c) Based on the average percent allocation (including canal losses) during Single Dry Years over the study's historic hydrologic period of 1906 through 2020, rounded to the nearest whole percent.
(d) Supplies shown are average percent allocation (including canal losses) over four consecutive dry years, based on a repeat of the historic five-year dry period with low inflow to Lake Berryessa of 1990-1994, rounded to the nearest whole percent.

Suggested Language for UWMP and WSCP

Language that could be used by each member agency to aid in the preparation of 2020 Water Shortage Contingency Plans might include the following:

> "Solano County Water Agency evaluates Solano Project reservoir conditions each spring and will provide agency-specific supply estimates by April of each year. SCWA also monitors the SWP delivery estimates throughout the winter and can provide an estimated SWP supply to each agency by February of each year. Both of these water supplies' delivery estimates will be updated throughout the year as hydrologic conditions change, and SCWA will provide updated estimates as they become available."

As noted earlier, SWP specific language regarding UWMP preparation is provided in Attachments 1-9.

Suggested SWP Availability for DWR Table 7-5 – Drought Risk Assessment

It is suggested that Table 7-5 Five Year Drought Risk Assessment of the DWR UWMP Submittal tables be modified to reflect changes made during the preparation of this technical memorandum. It is suggested for the 5-year Drought Risk Assessment table that the SWP availability be adjusted such that 5% is moved to the first year (2021 actual), 45% moved to year two, 30% moved to year three, 15% moved to year four, and 30% moved to year five to simulate if the next five years reflect the 5-year dry period.

Attachments:

1. 5%_SWP_Allocation_UWMP_Insert_011721_c1
2. 2019_BiOp_ITP_write_up_for_UWMP_012721_c1
3. ACP_WP_SWP_Contract_Extension_WMP_DCP-AIP_UWMP_Inserts _011721_c1
4. COA_UWMP_Insert_012721_c1
5. Emergency_Freshwater_Pathway_Description_UWMP_Insert_011721_c1
6. Sisk_UWMP_Insert_011721_c1
7. SWP_Seismic_Improvements_UWMP_Insert_011721_c1
8. SWP_Water_Supply_Estimates_UWMP_Insert_011721_c1
9. WQCP_VA_UWMP_Insert_012721_c1
10. 2019 SWP Delivery Capability Report Excerpt of Appendices A & B
11. Appendix C – Solano Project Water Supply Reliability – LBI Index_2020

Attachment 1_5%_SWP_Allocation_UWMP_Insert_011721_c1

ACP/WP/Subject to Common Interest Agreement

Insert for 2020 UWMP

Lowest SWP Water Supply Allocation

DWR's 2019 Delivery Capability Report indicates that the modeled single dry year SWP water supply allocation is 7% under the existing conditions. However, historically the lowest SWP allocations were at 5% in 2014. Due to extraordinarily dry conditions in 2013 and 2014, the initial 2014 SWP allocation was a historically low 5% of Table A Amounts, was later reduced to 0% in January 2014, and was later raised back to 5%, the lowest ever final total SWP water supply allocation. The circumstances that led to the low 2014 SWP water supply allocation were unusual, and although possible, likely have a low probability of occurrence.

Each year by October 1, SWP contractors submit their requests for SWP supplies for the following calendar year. By December 1, DWR estimates the available water supply for the following year and sets an initial supply allocation based on: the total of all contractors' requests, current reservoir storage, forecasted hydrology through the next year, and target reservoir storage for the end of the next year. The most uncertain of these factors is the forecasted hydrology. In setting water supply allocations, DWR uses a conservative 90% hydrologic forecast, where nine out of ten years will be wetter and one out of ten years drier than assumed. DWR re-evaluates its estimate of available supplies throughout the runoff season of winter and early spring, using updated reservoir storage and hydrologic forecasts, and revises SWP supply allocations as warranted. Since most of California's annual precipitation falls in the winter and early spring, by the end of spring the supply available for the year is much more certain, and in most years DWR issues its final SWP allocation by this time. While most of the water supply is certain by this time, runoff in the late fall remains somewhat variable as the next year's runoff season begins. A drier than forecasted fall can result in not meeting end-of-year reservoir storage targets, which means less water available in storage for the following year.

Water year 2013 was a year with two hydrologic extremes.[1] October through December 2012 was one of the wettest fall periods on record, but was followed by the driest consecutive 12 months on record. The supply allocation for 2013 was a low 35% allocation. However, the 2013 hydrology ended up being even drier than DWR's conservative hydrologic forecast, so the SWP began 2014 with reservoir storage lower than targeted levels and less stored water available for 2014 supplies. Compounding this low storage situation, 2014 also was a critically dry year, with runoff for water year 2014 the fourth driest on record.

The exceedingly dry sequence from the beginning of January 2013 through the end of 2014 was one of the driest two-year periods in the historical record. As noted above, the circumstances that led to the low 2014 SWP water supply allocation were unusual, and likely have a low probability of occurrence in the future. Thus, the assumption for SWP contractors such as AGENCY NAME is that a 5% allocation represents the "worst-case" scenario.

[1] A water year begins in October and runs through September. For example, water year 2013 is October 2012 through September 2013.

2019 BiOp / 2020 ITP Litigation Write Up for 2020 UWMP

In late 2019, the U.S. Fish and Wildlife Service (FWS) and National Marine Fisheries Service (NMFS) issued new Biological Opinions for the Long-Term Operation of the Central Valley Project (CVP) and State Water Project (SWP). Reinitiation of consultation on the Biological Opinions began in 2016 to update the prior 2008 and 2009 Biological Opinions and provide Federal Endangered Species Act (ESA) compliance for the CVP and SWP. Additionally, in early 2020, the California Department of Fish and Wildlife (DFW) issued DWR an Incidental Take Permit for the Long-Term Operation of the SWP pursuant to the California Endangered Species Act (CESA) with regards to state-protected longfin smelt and state- and federally-protected delta smelt, winter-run Chinook and spring-run Chinook. Previously, DFW had issued the SWP an Incidental Take Permit for the state-listed longfin smelt and Consistency Determinations with the 2008 and 2009 Biological Opinions for the state and federally listed species, not a separate permit. Some of the operational restrictions in the 2019 Biological Opinions differ from those in the 2020 Incidental Take Permit. Specifically, even though the projects' operations are coordinated, the SWP is subject to additional operational constraints that reduce SWP supplies and create operational conflicts. Both the 2019 Biological Opinions and the 2020 Incidental Take Permit are subject to multiple court challenges.

ESA Biological Opinion Litigation. Two cases were filed challenging the Biological Opinions under the ESA, Administrative Procedure Act, and National Environmental Policy Act. The first case filed, *Pacific Coast Federation of Fisherman's Association, et al. v. Ross (Case No. 1:20-CV-00431-DAD-SAB ("PCFFA v. Ross")*, was brought by six environmental organizations. The second case, *California Natural Resources Agency, et al. v. Ross* (Case No. 1:20) (*"CNRA v. Ross"*), was brought by the California Natural Resources Agency, the California Environmental Protection Agency and the California Attorney General. The State's case includes a cause of action under CESA alleging that the federal CVP must comply with CESA. The cases were coordinated and transferred to the Eastern District. State and federal water contractors have intervened as defendants in both cases.

In Spring of 2020, plaintiffs in both cases brought motions for preliminary injunction. The environmental organizations sought broad relief, asking the court to require the federal defendants to abide by the 2008 and 2009 Biological Opinions pending a determination on the merits. The State sought a narrow injunction requiring the federal defendants to operate pursuant to the inflow to export ratio in the 2009 NMFS Biological Opinion for the final 20 days of May based on alleged irreparable harm to delta smelt, longfin smelt and San Joaquin River steelhead. The court issued an order on May 11, 2020 granting the State's narrow injunction on limited grounds for the protection of steelhead. The court denied the other elements of the *PCFFA v. Ross* plaintiffs' motion for preliminary injunction finding the evidence presented was insufficient to show irreparable harm to the species or that the requested injunction was likely to materially improve conditions for the species during the specified period.

In *CNRA v. Ross*, the Federal Defendants and several intervenors filed motions to dismiss the State's CESA cause of action for lack of subject matter jurisdiction or, alternatively, failure to state a claim. As of this date, the court has not scheduled a hearing or ruled on the motion.

CESA Incidental Take Permit Litigation. Eight cases, listed below, have been filed in state court by public agencies, environmental organizations, and a Native American tribe challenging DWR's approval

of the Long Term Operations of the SWP and associated environmental review. Most of the cases also challenge CDFW's issuance of an Incidental Take Permit for the SWP.

- *North Coast Rivers Alliance, et al. v. Department of Water Resources, et al.*, County of San Francisco Superior Court Case No. CPF-20-517078, filed April 28, 2020;
- *State Water Contractors, et al. v. California Department of Water Resources, et al.*, County of Fresno Superior Court Case No. 20CECG01302, electronically filed April 28, 2020;
- *Tehama-Colusa Canal Authority, et al. v. California Department of Water Resources, et al.*, County of Fresno Superior Court Case No. 20CECG01303, electronically filed April 28, 2020;
- *The Metropolitan Water District of Southern California, et al. v. California Department of Water Resources, et al.*, County of Fresno Superior Court Case No. 20CECG01347, electronically filed April 28, 2020;
- *Sierra Club, et al. v. California Department of Water Resources*, County of San Francisco Superior Court Case No. CPF-20-517120, filed April 29, 2020;
- *Central Delta Water Agency, et al. v. California Department of Fish and Wildlife, et al.*, County of Sacramento Superior Court Case No. 34-2020-80003368, filed May 6, 2020;
- *San Bernardino Valley Municipal Water District v. California Department of Water Resources, et al.*, County of Fresno Superior Court Case No. 20CECG01556, filed May 28, 2020;
- *San Francisco Baykeeper, et al. v. California Department of Water Resources, et al.*, County of Alameda Superior Court Case No. RG20063682, filed June 5, 2020.

The challenges are raised on several legal grounds, including CESA, California Environmental Quality Act, the Delta Reform Act, Public Trust Doctrine, area of origin statutes, breach of contract, and breach of covenant of good faith and fair dealing. All eight cases have been coordinated in Sacramento County Superior Court.

Litigation over the 2019 Biological Opinions and 2020 Incidental Take Permit will likely take several years. The projects began operating to the new requirements in 2020. Throughout implementation any party may seek preliminary injunctive relief during the litigation, such as that sought by the plaintiffs in the 2019 Biological Opinion cases. It is likely that the 2019 Biological Opinions and 2020 Incidental Take Permit will govern operations until final judicial determinations on the merits are made. Thus, it is unlikely that SWP water supply would increase beyond that resulting from the limitations in the 2019 BiOps and 2020 ITP during this timeframe.

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ACP/WP/Subject to Common Interest Agreement
Insert for 2020 UWMP

SWP Contract Amendments for 2020 UMWP

Contract Extension

The Department of Water Resources (DWR) provides water supply from the State Water Project (SWP) to 29 SWP Contractors (Contractors) in exchange for Contractor payment of all costs associated with providing that supply. DWR and each of the Contractors entered into substantially uniform long-term water supply contracts (Contracts) in the 1960s with 75-year terms. The first Contract terminates in 2035, and most of the remaining Contracts terminate within three years after that.

The majority of the capital costs associated with the development and maintenance of the SWP is financed using revenue bonds. These bonds have historically been sold with 30-year terms. It has become more challenging in recent years to affordably finance capital expenditures for the SWP because bonds used to finance these expenditures are limited to terms that only extend to the year 2035, less than 30 years from now. To ensure continued affordability of debt service to Contractors, it was necessary to extend the termination date of the Contracts to allow DWR to continue to sell bonds with 30-year terms.

Public negotiations to extend the Contracts took place between DWR and the Contractors during 2013 and 2014. An AIP was reached and was the subject of analysis under the requirements of the California Environmental Quality Act (CEQA) (Notice of Preparation dated September 12, 2104). On December 11, 2018 DWR Director approved the Water Supply Contract Extension Project. In accordance with CEQA, DWR also filed its Notice of Determination for the project with the Governor's Office of Planning and Research. In addition, DWR filed an action in Sacramento County Superior Court to validate the Contract Extension Amendments (https://water.ca.gov/Programs/State-Water-Project/Management/Water-Supply-Contract-Extension). After CEQA was completed and contract language was finalized, DWR and 18 contractors have executed the Extension Amendment. The Extension Amendment would extend the contracts through 2085 and improve the project's overall financial integrity and management. The Extension Amendment is the subject to a validation action and two CEQA lawsuits.

Water Management Tools

In a December 2017 Notice to Contractors, DWR indicated its desire to supplement and clarify the water management tools through this public process. Seeking greater flexibility to manage the system in order to address changes in hydrology and further constraints placed on DWR's operation of the SWP, PWAs and DWR conducted public negotiations in 2017 to improve water management tools (WMT Amendment). The goal of the negotiations was to develop concepts to supplement and clarify the existing SWP Contract's water transfer and exchange provisions to provide improved water management amongst the PWAs. Importantly, the transfers and exchanges provided for in the contract amendment are limited to those transfers and exchanges amongst the PWAs with SWP Contracts.

In June 2018, PWAs and DWR completed an AIP which included specific principles to accomplish this goal. These principles included adding contract language to include a process for transparency for transfers and exchanges. The principles also include amending existing contract provisions to provide new flexibility for single and multi-year non-permanent water transfers, allowing PWAs to set terms of compensation for transfers and exchanges, and providing for the limited transfer of carryover and Article 21 water.

In October 2018, a Draft Environmental Impact Report (DEIR) was circulated for the contract amendments. The AIP at that time included cost allocation for the California WaterFix project (WaterFix). In early 2019, the Governor decided not to move forward with WaterFix and DWR rescinded its approvals for WaterFix. After this shift, the PWAs and DWR held a public negotiation session and agreed to remove the WaterFix cost allocation sections from AIP, but to keep all the water management provisions in the AIP. The AIP for water management provisions was finalized on May 20, 2019. In February 2020, DWR amended and recirculated the Partially Recirculated DEIR for the State Water Project Supply Contract Amendments for Water Management and in August 2020, DWR certified the Final EIR. The EIR is being challenged in court. The WMT Amendment is effective when 24 SWP PWAs approve the amendment. The transfer and exchange tools will be available during litigation unless there is a final court order prohibiting their implementation.

Delta Conveyance Project

The third set of amendments would allocate Delta Conveyance Project costs and benefits among the SWP PWAs. Public negotiations between Department of Water Resources ("DWR") and Public Water Agencies ("PWA's") for the Delta Conveyance Project began in 2019 and were completed in April 2020. These negotiations led to an Agreement in Principle ("AIP") for an Amendment to the State Water Contract regarding the Delta Conveyance Project. The Parties' goal was to equitably allocate costs and benefits of a Delta Conveyance Facility and to preserve State Water Project operational flexibility. A decision by each participating PWA for approving a contract amendment with DWR would not occur until after the environmental review for the Delta Conveyance Project is completed. That decision would likely occur in 2023, at the earliest.

Attachment 4_COA_UWMP_Insert_012721_c1

ACP/WP/Subject to Common Interest Agreement:

2020 UWMP Insert

Coordinated Operations Agreement (COA)

The Coordinated Operation Agreement (COA) was originally signed in 1986 and defines how the state and federal water projects share the available water supply and the obligations including senior water right demands, water quality and environmental flow requirements imposed by regulatory agencies. The agreement calls for periodic review to determine whether updates are needed in light of changed conditions. After completing a joint review process, DWR and Reclamation agreed to an addendum to the COA in December 2018, to reflect water quality regulations, biological opinions and hydrology updated since the agreement was signed.

The COA Addendum includes changes to the percentages for sharing responsibilities for in basin uses, sharing available export capacity, and the review process. The 1986 Agreement required CVP to meet 75% of the in basin uses and the SWP to meet 25%. The COA Addendum now distinguishes responsibility based on water year type and CVP responsibilities range from 80% in wet years to 60% in critical years. SWP responsibility ranges from 20% in wet years to 40% in critical years. Additionally, the COA Addendum changed sharing export capacity. Previously, export capacity was shared 50% to CVP and 50% to SWP. The COA addendum changed this formula to be 65% CVP and 35% SWP during balanced conditions and 60% CVP and 40 % SWP during excess conditions. Overall, based on modeling, these change results in an approximately 115,000 AFY on average reduction in SWP supplies.

Finally, the 2018 COA Addendum updated the review process to require review of the COA Agreement and Addendum every 5 years. Litigation regarding the COA addendum environmental review is ongoing. The litigation is unlikely to change the negotiated COA addendum and implementation has already begun.

Attachment 5_Emergency_Freshwater_Pathway_Description_UWMP_Insert_011721_c1

ACP/WP/Subject to Common Interest Agreement

Insert for 2020 UWMP

Emergency Freshwater Pathway Description (Sacramento-San Joaquin Delta)

It has been estimated by the California Department of Water Resources (DWR) that in the event of a major earthquake in or near the Delta, water supplies could be interrupted for up to three years, posing a significant and unacceptable risk to the California business economy. A post-event strategy would provide necessary water supply protections to avert this catastrophe. Such a plan has been coordinated through DWR, Corps of Engineers (Corps), Bureau of Reclamation (Reclamation), California Office of Emergency Services (Cal OES), the Metropolitan Water District of Southern California and the State Water Contractors.

DWR Delta Flood Emergency Management Plan. The Delta Flood Emergency Management Plan (DWR, 2018) provides strategies for response to Delta levee failures, up to and including earthquake-induced multiple island failures during dry conditions when the volume of flooded islands and salt water intrusion are large, resulting in curtailment of export operations. Under these severe conditions, the plan includes a strategy to establish an emergency freshwater pathway from the central Delta along Middle River and Victoria Canal to the export pumps in the south Delta. The plan includes the prepositioning of emergency construction materials at existing and new stockpile and warehouse sites in the Delta, and development of tactical modeling tools (DWR Emergency Response Tool) to predict levee repair logistics, timelines of levee repair and suitable water quality to restore exports. The Delta Flood Emergency Management Plan has been extensively coordinated with state, federal and local emergency response agencies. DWR, in conjunction with local agencies, the Corps and Cal OES, conduct tabletop and field exercises to test and revise the plan under real time conditions.

DWR and the Corps provide vital Delta region response to flood and earthquake emergencies, complementary to Cal OES operations. These agencies perform under a unified command structure and response and recovery framework. The Northern California Catastrophic Flood Response Plan (Cal OES, 2018) incorporates the DWR Delta Flood Emergency Management Plan. The Delta Emergency Operations Integration Plan (DWR and USACE, 2019) integrates personnel and resources during emergency operations.

Pathway Implementation Timeline. The Delta Flood Emergency Management Plan has found that using pre-positioned stockpiles of rock, sheet pile and other materials, multiple earthquake-generated levee breaches and levee slumping along the freshwater pathway can be repaired in less than six months. A supplemental report (Levee Repair, Channel Barrier and Transfer Facility Concept Analyses to Support Emergency Preparedness Planning, M&N, August 2007) evaluated among other options, the placement of sheet pile to close levee breaches, as a redundant method if availability of rock is limited by possible competing uses. The stockpiling of sheet pile is vital should more extreme emergencies warrant parallel and multiple repair techniques for deep levee breaches. Stockpiles of sheet pile and rock to repair deep breaches and an array of levee slumping restoration materials are stored at DWR and Corps stockpile sites and warehouses in the Delta.

Emergency Stockpile Sites and Materials. DWR has acquired lands at Rio Vista and Stockton as major emergency stockpile sites, which are located and designed for rapid response to levee emergencies. The

sites provide large loading facilities, open storage areas and new and existing warehousing for emergency flood fight materials, which augment existing warehousing facilities throughout the Delta. The Corps maintains large warehousing facilities in the Delta to store materials for levee freeboard restoration, which can be augmented upon request of other stockpiles in the United States. Pre-positioned rock and sheet pile are used for closure of deep levee breaches. Warehoused materials for rapid restoration of slumped levees include muscle (k-rail) walls, super sacks, caged rock containers, sand bags, stakes and plastic tarp. Stockpiles will be augmented as materials are used.

Emergency Response Drills. Earthquake-initiated multiple island failures will mobilize DWR and Corps resources to perform Delta region flood fight activities within an overall Cal OES framework. In these events, DWR and the Corps integrate personnel and resources to execute flood fight plans through the Delta Emergency Operations Integration Plan (DWR and USACE, 2019). DWR, the Corps and local agencies perform emergency exercises focusing on communication readiness and the testing of mobile apps for information collection and dissemination. The exercises train personnel and test the readiness of emergency preparedness and response capabilities under unified command, and provide information to help to revise and improve plans.

Levee Improvements and Prioritization. The DWR Delta Levees Subventions and Special Projects Programs have prioritized, funded and implemented levee improvements along the emergency freshwater pathway and other water supply corridors in the central and south Delta. These efforts are complementary to the Delta Flood Emergency Management Plan, which along with pre-positioned emergency flood fight materials, ensures reasonable seismic performance of levees and timely pathway restoration after a severe earthquake. These programs have been successful in implementing a coordinated strategy of emergency preparedness to the benefit of SWP and CVP export systems.

Significant improvements to the central and south Delta levees systems along Old and Middle Rivers began in 2010 and are continuing to the present time. This complements substantially improved levees at Mandeville and McDonald Islands and portions of Victoria and Union Islands. Levee improvements along the Middle River emergency freshwater pathway and Old River consist of crest raising, crest widening, landside slope fill and toe berms, which improve seismic stability, reduce levee slumping and create a more robust flood-fighting platform. Urban agencies, including Metropolitan, Contra Costa Water District, East Bay Municipal Utility District, and others have participated in levee improvement projects along or near the Old and Middle River corridors.

Attachment 6_Sisk_UWMP_Insert_011721_c1

ACP/WP/Subject to Common Interest Agreement

Insert for 2020 UWMP

B. F. Sisk Dam Raise and San Luis Reservoir Expansion

U. S. Bureau of Reclamation (Reclamation) and San Luis & Delta Mendota Water Authority (SLDMWA) are proposing to raise Sisk Dam and increase storage capacity in San Luis Reservoir. The proposed 10-foot dam raise is in addition to the ongoing 12-foot raise of Sisk Dam to improve dam safety and would expand San Luis Reservoir storage by 130 TAF. The final supplemental EIS/EIR released on December 18, 2020, estimated that the SWP exports could potentially reduce by about 23 TAF per year on average under the preferred alternative. This project is currently undergoing design, environmental planning and permitting. Construction is estimated to complete by 2030 following environmental planning and permitting.

DWR estimates of SWP supply reliability in its 2019 Delivery Capability Report are based on existing facilities, and do not include this project.

[if necessary, additional text for individual participating SWP PWAs]

Attachment 7_SWP_Seismic_Improvements_UWMP_Insert_011721_c1

ACP/WP/Subject to Common Interest Agreement

Insert for 2020 UWMP

SWP Seismic Improvements

DWR's recent SWP seismic resiliency efforts have focused heavily on SWP Dam Safety. The most prominent is the joint USBR/DWR corrective action study of Sisk Dam which will result in a massive seismic stability alteration project, which is expected to begin construction in 2021. Similarly, Perris Dam had a major foundation modification and stability berm added to the downstream face which has resulted in the removal of the DSOD imposed storage restriction. Several analyses have been conducted on SWP dam outlet towers/access bridges which has resulted in seismic upgrades (some completed/some on-going). Updated dam seismic safety evaluations are being performed on the Oroville Dam embankment and the radial gate control structure on the flood control spillway.

In addition to the dam safety elements, DWR has procured and stockpiled spare pipe sections for the South Bay Aqueduct to increase recovery times following seismic induced damage (as part of the 2015 South Bay Aqueduct Reliability Improvement Project). Seismic retrofits have also been completed on 23 SWP bridges located in four Field Divisions with additional retrofits in various development stages. DWR has also updated the earthquake notification procedures and has replaced and expanded instrumentation for the SWP's seismic network.

Attachment 8_SWP_Water_Supply_Estimates_UWMP_Insert_011721_c1

ACP/WP/Subject to Common Interest Agreement

Insert for 2020 UWMP

SWP Water Supply Estimates

DWR prepares a biennial report to assist SWP contractors and local planners in assessing the availability of supplies from the SWP. DWR issued its most recent update, the 2019 DWR State Water Project Delivery Capability Report (DCR), in August 2020. In this update, DWR provides SWP supply estimates for SWP contractors to use in their planning efforts, including for use in their 2020 UWMPs. The 2019 DCR includes DWR's estimates of SWP water supply availability under both existing (2020) and future conditions (2040).

DWR's estimates of SWP deliveries are based on a computer model that simulates monthly operations of the SWP and Central Valley Project systems. Key inputs to the model include the facilities included in the system, hydrologic inflows to the system, regulatory and operational constraints on system operations, and contractor demands for SWP water. In conducting its model studies, DWR must make assumptions regarding each of these key inputs.

In the 2019 DCR for its model study under existing conditions, DWR assumed: existing facilities, hydrologic inflows to the model based on 82 years of historical inflows (1922 through 2003), current regulatory and operational constraints including 2018 COA Amendment, 2019 biological opinions and 2020 Incidental Take Permit, and contractor demands at maximum Table A Amounts. The long-term average allocation reported in the 2019 DCR for the existing conditions study provide appropriate estimate of the SWP water supply availability under current conditions.

To evaluate SWP supply availability under future conditions, the 2019 DCR included a model study representing hydrologic and sea level rise conditions at 2040. The future condition study used all of the same model assumptions as the study under existing conditions, but reflected changes expected to occur from climate change, specifically, projected temperature and precipitation changes centered around 2035 (2020 to 2049) and a 45 cm sea level rise. For the long-term planning purposes of this UWMP, the long-term average allocations reported for the future conditions study from 2019 DCR is the most appropriate estimate of future SWP water supply availability.

[Additional guidance for water supply estimates:

- SWP PWAs can rely on the main contractor tables or alternate tables in DCR. When reporting the final long-term average allocation for the entire SWP ensure to report 58% for the Existing Conditions and 52% for future conditions.
- For supply estimates in the years between 2020 and 2040, PWAs are free to use the approach that suits their need: SWP PWAs can linearly interpolate long-term average allocations between 2020 and 2040, hold them constant (2020 to 2039 use 2020 allocation and for 2040 use 2040 allocation), or use 2040 allocation for 2020 through 2040. Whatever the approach is it is important to describe your assumptions for the selected approach, since these values cannot be ascribed to the DCR.
- For water supply estimates beyond 2040, PWAs should use 2040 allocations.]

Attachment 9_WQCP_VA_UWMP_Insert_012721_c1

ACP/WP/Subject to Common Interest Agreement

Insert for 2020 UWMP

Water Quality Control Plan/Voluntary Agreement

The State Water Board is responsible for adopting and updating the Water Quality Control Plan for the San Francisco Bay/Sacramento–San Joaquin Delta Estuary (Bay-Delta Plan), which establishes water quality control objectives and flow requirements needed to provide reasonable protection of beneficial uses in the watershed. The State Water Board has been engaged for many years in updating the Bay Delta Plan.

The Bay-Delta Plan is being updated through phases. Phase 1 is updating the Bay-Delta Plan objectives for the San Joaquin River and its major tributaries and the southern Delta salinity objectives. Phase 2 is updating the objectives for the Sacramento River and Delta and their major tributaries. (Plan amendments). On December 12, 2018, through State Water Board Resolution No. 2018-0059, the State Water Board adopted the Phase 1 Plan amendments and Final SED establishing the Lower San Joaquin River flow objectives and revised southern Delta salinity objectives. On February 25, 2019, the Office of Administrative Law approved the Plan amendments. This plan requires an adaptive range of 30-50 percent of the unimpaired flow to be maintained from February through June in the Stanislaus, Tuolumne, and Merced Rivers, with a starting point of 40 percent of the unimpaired flow. During this same time period, the flows at Vernalis on the San Joaquin River, as provided by the unimpaired flow objective, are required to be no lower than a base flow of 1,000 cubic feet per second (cfs), with an adaptive range between 800 and 1,200 cfs, inclusive.

The State Water Board is also considering Phase 2 Plan amendments focused on the Sacramento River and its tributaries, Delta eastside tributaries (including the Calaveras, Cosumnes, and Mokelumne rivers), Delta outflows, and interior Delta flows. Staff is recommending an adaptive range of 45-65 percent Unimpaired Flow (UIF) objective with a starting point of 55 percent. Once the State Water Board adopts Phase 2 Plan amendments, the Board will need to conduct hearings to determine, consistent with water rights, water users' responsibilities for meeting the objectives in both Phase 1 and 2. At this time, the potential impacts to the SWP are unknown but this objective would have a large impact on water users in the Phase 2 planning area.

The State and several water users began working on an alternative to the Bay-Delta Plan update in 2018, known as the Voluntary Agreement process. The Voluntary Agreement process offers an alternative to the State Water Board staff's flow only approach. A Voluntary Agreement, if agreed to by the State Water Board, would be a substitute for the UIF approach and would become the Program of Implementation for the Plan amendments. Implementing the Voluntary Agreement would not require a water rights hearing because the parties are agreeing to take the actions. The Voluntary Agreement approach provides flow, and funding for flows, habitat actions, and a robust science program. The Voluntary Agreement approach provides an opportunity to combine flow and habitat actions to protect public trust resources, while providing certainty for water users. It offers a chance to avoid years of hearings and litigation and to instead begin early implementation of Voluntary Agreement actions.

Table A-28. Solano County WA: Existing Conditions

SWP Table A Deliveries for 2019 Study					Probability Curve			
Year	Delivery w/o Article 56 Carryover (TAF)	Article 56 Carryover (TAF)	Total Table A Delivery (TAF)	Percent of Maximum Table A	Year	Total Table A Delivery (TAF)	Exceedance Frequency (%)	Percent of Maximum Table A
1922	22	0	22	47%	1942	48	0%	100%
1923	20	22	42	88%	1943	48	0%	100%
1924	11	20	31	66%	1953	48	0%	100%
1925	20	1	21	43%	1970	48	0%	100%
1926	20	3	23	48%	1971	48	0%	100%
1927	24	3	27	56%	1975	48	0%	100%
1928	22	24	46	96%	1983	48	0%	100%
1929	11	22	34	70%	1984	48	0%	100%
1930	20	1	21	43%	1996	48	0%	100%
1931	11	3	14	30%	1997	48	0%	100%
1932	20	1	21	43%	1998	48	0%	100%
1933	11	3	14	30%	1999	48	0%	100%
1934	11	1	12	25%	1941	46	15%	97%
1935	20	1	21	43%	1952	46	15%	97%
1936	20	20	40	84%	1958	46	15%	97%
1937	20	20	40	84%	1974	46	15%	97%
1938	24	20	44	92%	1928	46	20%	96%
1939	20	24	44	92%	1954	46	20%	96%
1940	22	3	25	53%	1957	46	20%	96%
1941	24	22	46	97%	2000	46	20%	96%
1942	24	24	48	100%	1938	44	25%	92%
1943	24	24	48	100%	1963	44	25%	92%
1944	20	24	44	92%	1967	44	25%	92%
1945	20	3	23	48%	1969	44	25%	92%
1946	20	20	40	84%	1959	44	30%	92%
1947	20	20	40	84%	1966	44	30%	92%
1948	20	3	23	48%	1968	44	30%	92%
1949	20	20	40	84%	1972	44	30%	92%
1950	20	3	23	48%	1939	44	35%	92%
1951	22	20	42	89%	1944	44	35%	92%
1952	24	22	46	97%	1964	44	35%	92%
1953	24	24	48	100%	1985	44	35%	92%
1954	22	24	46	96%	1987	44	35%	92%
1955	20	22	42	88%	1951	42	41%	89%
1956	24	3	27	56%	1973	42	41%	89%
1957	22	24	46	96%	1980	42	41%	89%
1958	24	22	46	97%	1923	42	44%	88%
1959	20	24	44	92%	1979	42	44%	88%
1960	20	20	40	84%	1955	42	47%	88%
1961	20	3	23	48%	1981	42	47%	88%
1962	20	3	23	48%	2001	42	47%	88%
1963	24	20	44	92%	1936	40	51%	84%
1964	20	24	44	92%	1937	40	51%	84%
1965	24	3	27	56%	1946	40	51%	84%

SWP Table A Deliveries for 2019 Study						Probability Curve			
Year	Delivery w/o Article 56 Carryover (TAF)	Article 56 Carryover (TAF)	Total Table A Delivery (TAF)	Percent of Maximum Table A		Year	Total Table A Delivery (TAF)	Exceedance Frequency (%)	Percent of Maximum Table A
1966	20	24	44	92%		1947	40	54%	84%
1967	24	20	44	92%		1949	40	54%	84%
1968	20	24	44	92%		1960	40	54%	84%
1969	24	20	44	92%		1976	35	58%	74%
1970	24	24	48	100%		1929	34	59%	70%
1971	24	24	48	100%		1994	34	59%	70%
1972	20	24	44	92%		1924	31	62%	66%
1973	22	20	42	89%		1927	27	63%	56%
1974	24	22	46	97%		1956	27	63%	56%
1975	24	24	48	100%		1965	27	63%	56%
1976	11	24	35	74%		1982	27	63%	56%
1977	11	1	12	25%		1986	27	63%	56%
1978	22	1	23	48%		2003	26	69%	54%
1979	20	22	42	88%		1940	25	70%	53%
1980	22	20	42	89%		1995	24	72%	51%
1981	20	22	42	88%		1945	23	73%	48%
1982	24	3	27	56%		1948	23	73%	48%
1983	24	24	48	100%		1950	23	73%	48%
1984	24	24	48	100%		1962	23	73%	48%
1985	20	24	44	92%		1961	23	78%	48%
1986	24	3	27	56%		1926	23	78%	48%
1987	20	24	44	92%		2002	23	78%	48%
1988	11	3	14	30%		1978	23	81%	48%
1989	20	1	21	43%		1993	23	81%	48%
1990	11	3	14	30%		1922	22	84%	47%
1991	11	1	12	25%		1935	21	85%	43%
1992	11	1	12	25%		1925	21	86%	43%
1993	22	1	23	48%		1930	21	86%	43%
1994	11	22	34	70%		1932	21	86%	43%
1995	24	1	24	51%		1989	21	86%	43%
1996	24	24	48	100%		1931	14	91%	30%
1997	24	24	48	100%		1933	14	91%	30%
1998	24	24	48	100%		1988	14	91%	30%
1999	24	24	48	100%		1990	14	91%	30%
2000	22	24	46	96%		1992	12	96%	25%
2001	20	22	42	88%		1934	12	96%	25%
2002	20	3	23	48%		1977	12	96%	25%
2003	23	3	26	54%		1991	12	96%	25%
Average	**20**	**15**	**35**	**73%**			**35**		**73%**
Maximum	**24**	**24**	**48**	**100%**			**48**		**100%**
Minimum	**11**	**0**	**12**	**25%**			**12**		**25%**

Table B-30. Solano County WA: Future Conditions

SWP Table A Deliveries for 2019 Study					Probability Curve			
Year	Delivery w/o Article 56 Carryover (TAF)	Article 56 Carryover (TAF)	Total Table A Delivery (TAF)	Percent of Maximum Table A	Year	Total Table A Delivery (TAF)	Exceedance Frequency (%)	Percent of Maximum Table A
1922	22	0	22	47%	1942	48	0%	100%
1923	20	22	42	88%	1943	48	0%	100%
1924	11	20	31	66%	1952	48	0%	100%
1925	20	1	21	43%	1953	48	0%	100%
1926	20	3	23	48%	1970	48	0%	100%
1927	24	3	27	56%	1971	48	0%	100%
1928	22	24	46	96%	1975	48	0%	100%
1929	11	22	34	70%	1983	48	0%	100%
1930	20	1	21	43%	1984	48	0%	100%
1931	11	3	14	30%	1996	48	0%	100%
1932	20	1	21	43%	1997	48	0%	100%
1933	11	3	14	30%	1998	48	0%	100%
1934	11	1	12	25%	1999	48	0%	100%
1935	20	1	21	43%	1941	46	16%	97%
1936	20	20	40	84%	1974	46	16%	97%
1937	20	20	40	84%	1928	46	19%	96%
1938	24	20	44	92%	1954	46	19%	96%
1939	20	24	44	92%	2000	46	19%	96%
1940	22	3	25	53%	1938	44	22%	92%
1941	24	22	46	97%	1951	44	22%	92%
1942	24	24	48	100%	1958	44	22%	92%
1943	24	24	48	100%	1963	44	22%	92%
1944	20	24	44	92%	1967	44	22%	92%
1945	20	3	23	48%	1969	44	22%	92%
1946	20	20	40	84%	1957	44	30%	92%
1947	20	20	40	84%	1959	44	30%	92%
1948	20	3	23	48%	1966	44	30%	92%
1949	20	20	40	84%	1968	44	30%	92%
1950	20	3	23	48%	1972	44	30%	92%
1951	24	20	44	92%	1939	44	36%	92%
1952	24	24	48	100%	1944	44	36%	92%
1953	24	24	48	100%	1964	44	36%	92%
1954	22	24	46	96%	1985	44	36%	92%
1955	20	22	42	88%	1987	44	36%	92%
1956	24	3	27	56%	1973	42	42%	89%
1957	20	24	44	92%	1980	42	42%	89%
1958	24	20	44	92%	1923	42	44%	88%
1959	20	24	44	92%	1979	42	44%	88%
1960	20	20	40	84%	1955	42	47%	88%
1961	20	3	23	48%	1981	42	47%	88%
1962	20	3	23	48%	2001	42	47%	88%
1963	24	20	44	92%	1936	40	51%	84%
1964	20	24	44	92%	1937	40	51%	84%
1965	24	3	27	56%	1946	40	51%	84%

SWP Table A Deliveries for 2019 Study						Probability Curve			
Year	Delivery w/o Article 56 Carryover (TAF)	Article 56 Carryover (TAF)	Total Table A Delivery (TAF)	Percent of Maximum Table A		Year	Total Table A Delivery (TAF)	Exceedance Frequency (%)	Percent of Maximum Table A
1966	20	24	44	92%		1947	40	54%	84%
1967	24	20	44	92%		1949	40	54%	84%
1968	20	24	44	92%		1960	40	54%	84%
1969	24	20	44	92%		1976	35	58%	74%
1970	24	24	48	100%		1929	34	59%	70%
1971	24	24	48	100%		1994	34	59%	70%
1972	20	24	44	92%		1924	31	62%	66%
1973	22	20	42	89%		1927	27	63%	56%
1974	24	22	46	97%		1956	27	63%	56%
1975	24	24	48	100%		1965	27	63%	56%
1976	11	24	35	74%		1982	27	63%	56%
1977	11	1	12	25%		1986	27	63%	56%
1978	22	1	23	48%		2003	26	69%	54%
1979	20	22	42	88%		1940	25	70%	53%
1980	22	20	42	89%		1995	24	72%	51%
1981	20	22	42	88%		1945	23	73%	48%
1982	24	3	27	56%		1948	23	73%	48%
1983	24	24	48	100%		1950	23	73%	48%
1984	24	24	48	100%		1962	23	73%	48%
1985	20	24	44	92%		1926	23	78%	48%
1986	24	3	27	56%		1961	23	78%	48%
1987	20	24	44	92%		2002	23	78%	48%
1988	11	3	14	30%		1978	23	81%	48%
1989	20	1	21	43%		1993	23	81%	48%
1990	11	3	14	30%		1922	22	84%	47%
1991	11	1	12	25%		1935	21	85%	43%
1992	11	1	12	25%		1925	21	86%	43%
1993	22	1	23	48%		1930	21	86%	43%
1994	11	22	34	70%		1932	21	86%	43%
1995	24	1	24	51%		1989	21	86%	43%
1996	24	24	48	100%		1931	14	91%	30%
1997	24	24	48	100%		1933	14	91%	30%
1998	24	24	48	100%		1988	14	91%	30%
1999	24	24	48	100%		1990	14	91%	30%
2000	22	24	46	96%		1992	12	96%	25%
2001	20	22	42	88%		1934	12	96%	25%
2002	20	3	23	48%		1977	12	96%	25%
2003	23	3	26	54%		1991	12	96%	25%
Average	**20**	**15**	**35**	**73%**			**35**		**73%**
Maximum	**24**	**24**	**48**	**100%**			**48**		**100%**
Minimum	**11**	**0**	**12**	**25%**			**12**		**25%**

Appendix A Solano Project Reliability

Ultimate level of development-of Lake Berryessa watershed @ 30,000 AF/yr - 2009 Study

Lake Berryessa Index

Value	Year Type
W	Wet
N	Below Normal
N	Above Normal
D	Dry
D	Critically Dry

Year	Index Value	% Full Alloc	% Full Alloc for Normal Year (N)	% Full Alloc for Single Dry Year (D) *	% Full Alloc for Multiple Dry Years (3 or more Dry years)
1906	W	100%	-	-	-
1907	W	100%	-	-	-
1908	D	100%	-	100%	-
1909	W	100%	-	-	-
1910	N	100%	100%	-	-
1911	W	100%	-	-	-
1912	D	100%	-	100%	-
1913	D	100%	-	-	-
1914	W	100%	-	-	-
1915	W	100%	-	-	-
1916	W	100%	-	-	-
1917	N	100%	100%	-	-
1918	D	100%	-	100%	-
1919	N	100%	100%	-	-
1920	D	100%	-	100%	-
1921	N	100%	100%	-	-
1922	N	100%	100%	-	-
1923	N	100%	100%	-	-
1924	D	95%	-	95%	-
1925	N	95%	95%	-	-
1926	N	95%	95%	-	-
1927	W	95%	-	-	-
1928	N	100%	100%	-	-
1929	D	95%	-	95%	-
1930	N	95%	95%	-	-
1931	D	100%	-	100%	100%
1932	D	100%	-	-	100%
1933	D	45%	-	-	45%
1934	D	45%	-	-	45%
1935	N	100%	100%	-	-
1936	N	100%	100%	-	-
1937	N	100%	100%	-	-
1938	W	100%	-	-	-
1939	D	95%	-	95%	-

1940	W	100%	-	-	-
1941	W	100%	-	-	-
1942	W	100%	-	-	-
1943	N	100%	100%	-	-
1944	D	100%	-	100%	-
1945	N	100%	100%	-	-
1946	N	100%	100%	-	-
1947	D	100%	-	100%	100%
1948	D	95%	-	-	95%
1949	D	95%	-	-	95%
1950	D	95%	-	-	95%
1951	N	95%	95%		-
1952	W	100%	-	-	-
1953	N	100%	100%	-	-
1954	N	100%	100%	-	-
1955	D	95%	-	95%	-
1956	W	100%	-	-	-
1957	D	100%	-	100%	-
1958	W	100%	-	-	-
1959	D	100%		100%	-
1960	N	100%	100%	-	-
1961	D	100%	-	100%	-
1962	N	100%	100%	-	-
1963	W	100%	-	-	-
1964	D	100%	-	100%	-
1965	W	100%	-	-	-
1966	N	100%	100%	-	-
1967	W	100%	-	-	-
1968	N	100%	100%	-	-
1969	W	100%	-	-	-
1970	W	100%	-	-	-
1971	N	100%	100%	-	-
1972	D	100%	-	100%	-
1973	W	100%	-	-	-
1974	W	100%	-	-	-
1975	N	100%	100%	-	-
1976	D	100%	-	100%	-
1977	D	100%	-	-	-
1978	W	100%	-	-	-
1979	N	100%	100%	-	-
1980	W	100%	-	-	-
1981	D	100%		100%	-
1982	W	100%	-	-	-
1983	W	100%	-	-	-
1984	N	100%	100%	-	-
1985	D	100%	-	100%	-
1986	W	100%	-	-	-
1987	D	100%	-	100%	100%
1988	D	100%	-	-	100%
1989	D	100%	-	-	100%
1990	D	95%	-	-	95%
1991	N	95%	95%	-	-

1992	D	90%	-	90%	-
1993	W	95%	-	-	-
1994	D	95%	-	95%	-
1995	W	100%	-	-	-
1996	W	100%	-	-	-
1997	W	100%	-	-	-
1998	W	100%	-	-	-
1999	N	100%	100%	-	-
2000	N	100%	100%	-	-
2001	D	100%	-	100%	-
2002	N	100%	100%	-	-
2003	N	100%	100%	-	-
2003	W	100%	-	-	-
2004	N	100%	100%	-	-
2005	N	100%	100%	-	-
2006	W	100%	-	-	-
2007	D	100%	-	100%	100%
2008	D	100%	-	-	100%
2009	D	100%	-	-	100%
2010	N	100%	100%	-	-
2011	W	100%	-	-	-
2012	N	100%	100%	-	-
2013	D	100%	-	100%	100%
2014	D	100%	-	-	100%
2015	D	100%	-	-	100%
2016	N	100%	100%	-	-
2017	W	100%	-	-	-
2018	N	100%	100%	-	-
2019	W	100%	-	-	-
2020	N	100%	100%	-	-
2021					
	Average	98.3%	99.4%	98.5%	92.8%

*Includes first year of consecutive dry years