June 2021

2020 Urban Water Management Plan for Tuolumne Utilities District

Final Report

Kennedy Jenks

Kennedy Jenks

2882 Prospect Park Drive, Suite 240
Rancho Cordova, CA 95670
916-858-2700

2020 Urban Water Management Plan

28 June 2021

REGISTERED PROFESSIONAL ENGINEER
JENNIFER L. LARSEN
No. C81220
Exp. 09/30/21
CIVIL
STATE OF CALIFORNIA

Prepared for

Tuolumne Utilities District
18885 Nugget Blvd.
Sonora, CA 95370

KJ Project No. 2070008.00

Table of Contents

Table of Contents (cont'd)

Table of Contents (cont'd)

Table of Contents (cont'd)

List of Tables

Table of Contents (cont'd)

List of Figures

List of Appendices

List of Abbreviations and Acronyms

AF	acre-feet
AFY	acre-feet per year
Act	Urban Water Management Planning Act
AWWA	American Water Works Association
cf	cubic feet
CII	commercial, industrial, institutional
CIMIS	California Irrigation Management Information System
COG	Council of Governments
County	Tuolumne County
CUWCC	California Urban Water Conservation Council
DBP	disinfection by-product
DMM	demand management measure
District (or TUD)	Tuolumne Utilities District
DWR	California Department of Water Resources
DWR Guidebook	DWR 2020 UWMPs Guidebook for Urban Water Suppliers
E.coli	*Escherichia coli*
ERP	emergency response plan
ESFR	equivalent single family residences
ETo	evapotranspiration
gpm	U.S. gallons per minute
GPCD	gallons per capita per day
GIS	geographic information system
HCD	State Department of Housing and Community Development
IRWM	integrated regional water management
JSD	Jamestown Sanitary District
LLC	Limited Liability Corporation

LHMP	Local Hazard Mitigation Plan
MG	million gallons
MGD	million gallons per day
MOU	Memorandum of Understanding Regarding Water Conservation in California
N/A	not available, not applicable
NPDES	National Pollutant Discharge Elimination System
No.	Number
PG&E	Pacific Gas and Electric Company
Plan (or UWMP)	Urban Water Management Plan
RHNA	Regional Housing Needs Assessment
RWQCB	Regional Water Quality Control Board
RWWTP	Regional Wastewater Treatment Plant
SBX7-7	Senate Bill X7-7, The Water Conservation Act of 2009
SEMS	standardized emergency management system
State	State of California
THCSD	Twain Harte Community Services District
TCMG	Tuolumne County Master Gardeners
TCRCD	Tuolumne County Resource Conservation District
TUD (or District)	Tuolumne Utilities District
TWSOP	Treated Water System Optimization Plan
UCCE	University of California Agriculture and Natural Resources Cooperative Extension
ULFT	ultra low flush toilet
UWMP (or Plan)	Urban Water Management Plan
WTP	water treatment plant
WWTP	wastewater treatment plant

Definitions

Chapter 2, Part 2.6, Division 6 of the California Water Code provides definitions for the preparation of the Urban Water Management Plans.

CWC 10611. *Unless the context otherwise requires, the definitions of this chapter govern the construction of this part.*

CWC 10611.3*. "Customer" means a purchaser of water from a water supplier who uses the water for municipal purposes, including residential, commercial, governmental, and industrial uses.*

CWC 10611.5*. "Demand management" means those water conservation measures, programs, and incentives that prevent the waste of water and promote the reasonable and efficient use and reuse of available supplies.*

CWC 10612. *"Drought risk assessment" means a method that examines water shortage risks based on the driest five-year historic sequence for the agency's water supply, as described in subdivision (b) of Section 10635.*

CWC 10613. *"Efficient use" means those management measures that result in the most effective use of water so as to prevent its waste or unreasonable use or unreasonable method of use.*

CWC 10614*. "Person" means any individual, firm, association, organization, partnership, business, trust, corporation, company, public agency, or any agency of such an entity.*

CWC 10615. *"Plan" means an urban water management plan prepared pursuant to this part. A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, and reclamation and demand management activities. The components of the plan may vary according to an individual community or area's characteristics and its capabilities to efficiently use and conserve water. The plan shall address measures for residential, commercial, governmental, and industrial water demand management as set forth in Article 2 (commencing with Section 10630) of Chapter 3. In addition, a strategy and time schedule for implementation shall be included in the plan.*

CWC 10616. *"Public agency" means any board, commission, county, city and county, city, regional agency, district, or other public entity.*

CWC 10616.5. *"Recycled water" means the reclamation and reuse of wastewater for beneficial use.*

CWC 10617. *"Urban water supplier" means 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 subject to Chapter 4 (commencing with Section 116275) of Part 12 of Division 104 of the Health and Safety Code.*

CWC 10617.5. *"Water shortage contingency plan" means a document that incorporates the provisions detailed in subdivision (a) of Section 10632 and is subsequently adopted by an urban water supplier pursuant to this article.*

CWC 10618. *"Water supply and demand assessment" means a method that looks at current year and one or more dry year supplies and demands for determining water shortage risks, as described in Section 10632.1.*

Executive Summary

Tuolumne Utilities District (TUD, District) provides water and wastewater services to various geographies throughout Tuolumne County, including the communities of Jamestown, Sonora, Columbia, and Tuolumne City. The mission of TUD is to provide responsible water and wastewater services for their customers with great customer service in a socially, financially, and environmentally responsive manner at a fair value.

The District's 2020 Urban Water Management Plan (UWMP) has been prepared in compliance with Sections 10610 through 10656 of the Urban Water Management Planning Act (Act), which were added by Statute 1983, Section 1009, and became effective on January 1, 1984. The Act, as amended, requires development of an UWMP every 5 years. The UWMP is intended to serve as a general, flexible, and open-ended document that periodically can be updated to reflect changes in the regional water supply trends, and conservation and water use efficiency policies. The District's 2020 UWMP revises the 2015 UWMP, and incorporates changes enacted by legislation since that time.

Coordination

This UWMP was prepared in consultation with along with the Twain Harte Community Services District and other mutual and private water companies, land use jurisdictions such as Tuolumne County Community Resources Agency, and other water users in the region. The 2020 UWMP was made available from the District's website for public inspection prior to the public hearing, so that comments could be received and discussed by the District's Board of Directors prior to the UWMP adoption. UWMP adoption took place on June 22, 2021 at the regular meeting of the Board of Directors.

Water Demands

The UWMP evaluates many of the factors influencing water demands, including population, land use, social and demographic factors, climate, and water customer type. Sections 2 and 6 of this UWMP provides projections of water demands from 2025 to 2045 assuming a normal/average water year, a single-dry year and a multiple-dry period lasting five years.

Section 2 also evaluates long term trends in water use in the TUD treated water service area, including water use in gallons per capita per day. The evaluation found the District's water use in gallons per capita per day has not rebounded to levels prior to the 2014/205 drought and determined that the District is in compliance with the Water Conservation Bill of 2009 which targeted a decrease in municipal water use of 20% by year 2020.

Water Resources

This UWMP evaluates the water supplies, including surface water, groundwater, and recycled water available to the District over the period 2025 to 2045. Section 3 specifically looks at the availability of the source, potential limitations on the source (water quality, hydrology, climate) and evaluates future water supplies in an average year, single-dry year, and a multiple-dry period lasting five years. Section 4 also provides specifics on the District's wastewater system the anticipated supply from recycled water for beneficial use.

Water Service Reliability

The UWMP, in Section 6, evaluates the ability to meet water demands with anticipated supplies in a normal/average, single-dry, and multiple-dry years. As documented in Section 6, with planned supplies, the District has adequate supplies to meet demands during an average year, single-dry year, and multiple dry years.

Demand Management

Section 7 of the UWMP provides a summary of the various demand management measures that the District has undertaken, and plans to undertake, to insure efficient water use.

Contingency Planning

TUD has prepared a separate Water Shortage Contingency Plan. This plan is provided in Appendix N. The Water Shortage Contingency Plan reviews the actions the District will take to monitor supplies and demands, evaluate the potential for a shortage, and then the actions that will be taken to augment supply and/or decrease demand.

Fundamental Findings of this UWMP

The analysis in this Plan documents that in a normal year, single-dry year, and multiple-dry year TUD has adequate supplies for customers.

Section 1: Introduction

CWC 10630.5

Each plan shall include a simple lay description of how much water the agency has on a reliable basis, how much it needs for the foreseeable future, what the agency's strategy is for meeting its water needs, the challenges facing the agency, and any other information necessary to provide a general understanding of the agency's plan.

1.1 Overview

This Urban Water Management Plan (UWMP or Plan) has been prepared for Tuolumne Utilities District (TUD or District) in compliance with Division 6, Part 2.6, of the California Water Code, Sections 10608 through 10657. The original bill requiring preparation of an UWMP was enacted in 1983. SBX7-7, which became law in November 2009, requires increased emphasis on water demand management and requires the State of California (State) to achieve a 20 percent reduction in urban per capita water use by 31 December 2020. The legislation mandated each urban retail supplier develop and report an interim 2015 water use target, their baseline daily per capita use and 2020 compliance daily per capita use, along with the basis for determining those estimates. This UWMP reports on the District's final progress in meeting the SBX7-7 targets.

Urban water suppliers having more than 3,000 service connections or supplying more than 3,000 acre-feet per year (AFY) for retail or wholesale uses are required to submit a UWMP every five years to the California Department of Water Resources (DWR). In 2020, TUD served over 8,000 AF of potable and raw water, however only about 700 AF was delivered to wholesale customers. Therefore, TUD is considered an urban retail water supplier only. This 2020 UWMP is an update to the 2015 plan prepared by TUD.

This UWMP addresses all subjects required by Section 10631 of the Act as defined by Section 10630 of the Act, which permits "levels of water management planning commensurate with the numbers of customers served and the volume of water supplied." All applicable sections of the Act are discussed in this UWMP. A completed copy of the 2020 Urban Water Management Plan Checklist organized by subject is included in Appendix A, with sections of the UWMP and DWR Guidebook cross-referenced against the corresponding provision of the Act.

1.2 Purpose

An UWMP is a planning tool that generally guides the actions of water management agencies. It provides managers and the public with a broad perspective on a number of water supply issues. It is not a substitute for project-specific planning documents, nor was it intended to be when mandated by the State Legislature. For example, the Legislature mandated that a plan include a section which "describes the opportunities for exchanges or water transfers on a short-term or long-term basis." (California Urban Water Management Planning Act, Article 2, Section 10630(d).) The identification of such opportunities, and the inclusion of those opportunities in a general water service reliability analysis, neither commits a water management agency to pursue a particular water exchange/transfer opportunity, nor preclude a water management agency from exploring exchange/transfer opportunities not identified in the plan. When specific projects are chosen to be implemented, detailed project plans are developed, environmental analysis, if required, is prepared, and financial and operational plans are detailed.

In short, this Plan is a management tool, providing a framework for action, but not functioning as a detailed project development or action. It is important that this Plan be viewed as a long-term, general planning document, rather than as an exact blueprint for supply and demand management. Water management in California is not a matter of certainty, and planning projections may change in response to a number of factors.

From this perspective, it is appropriate to look at the Plan as a general planning framework, not a specific action plan. It is an effort to generally answer a series of planning questions including:

- What are the potential sources of supply and what is the reasonable probable yield from them?
- What is the probable demand, given a reasonable set of assumptions about growth and implementation of good water management practices?
- How well do supply and demand figures match up, assuming that the various probable supplies will be pursued by the implementing agency?

Using these “framework” questions and resulting answers, the implementing agency will pursue feasible and cost-effective options and opportunities to meet demands. Specific planning efforts will be undertaken in regard to each option, involving detailed evaluations of how each option would fit into the overall supply/demand framework, how each option may have the potential to impact the environment, and how each option could affect customers. The objective of these more detailed evaluations would be to find the optimum mix of conservation and supply programs that ensure that the needs of the District’s existing and future customers are met. In short, the Plan answers the question: *Will there be enough water for the area served by the District in future years, and what mix of programs should be explored for making this water available?*

For purposes of this Plan, it is the stated goal of TUD to provide a sufficient and dependable water supply for its existing and future customers in a safe, efficient, and cost effective manner. Based on conservative water supply and demand assumptions over the next 25 years in combination with the implementation of conservation during certain dry years, the Plan is projected to successfully achieve this goal.

The primary requirements for the UWMP include:

- A description of the water service area.
- A description of the existing and planned supply sources.
- Estimates of past, present, and projected water use.
- SBX7-7 (20x2020) analysis and target compliance.

- An assessment of water supply reliability.
- A description of the conservation program and demand management measures.
- A description of plan adoption, submittal, and implementation.

This UWMP will serve as a source of information for potential water supply assessments and written verification of water supply. This UWMP also serves as:

- A long-range planning document for water supply,
- Source data for development of a regional water plan,
- A component in Integrated Regional Water Management planning, and
- An informational source for cities and counties as they prepare their General Plans.

The 2020 UWMP must submit data in specific tables to the DWR, which has provided these tables, and this UWMP utilizes the provided tables without changes to format or organization. The TUD 2020 UWMP presents each required element per the DWR 2020 Urban Water Management Plan Guidelines.

The portion of The Urban Water Management Planning Act (Act) that describes the purpose and intent of the UWMP states the following:

> ***CWC 10610.2***
>
> *(a) The Legislature finds and declares all of the following:*
>
> *(1) The waters of the state are a limited and renewable resource subject to ever-increasing demands.*
>
> *(2) The conservation and efficient use of urban water supplies are of statewide concern; however, the planning for that use and the implementation of those plans can best be accomplished at the local level.*
>
> *(3) A long-term, reliable supply of water is essential to protect the productivity of California's businesses and economic climate, and increasing long-term water conservation among Californians, improving water use efficiency within the state's communities and agricultural production, and strengthening local and regional drought planning are critical to California's resilience to drought and climate change.*
>
> *(4) As part of its long-range planning activities, every urban water supplier should make every effort to ensure the appropriate level of reliability in its water service sufficient to meet the needs of its various categories of customers during normal, dry, and multiple dry water years now and into the foreseeable future, and every urban water supplier should collaborate closely with local land-use authorities to ensure water demand forecasts are consistent with current land-use planning.*
>
> *(5) Public health issues have been raised over a number of contaminants that have been identified in certain local and imported water supplies.*
>
> *(6) Implementing effective water management strategies, including groundwater storage projects and recycled water projects, may require specific water quality and salinity targets for meeting groundwater basins water quality objectives and promoting beneficial use of recycled water.*
>
> *(7) Water quality regulations are becoming an increasingly important factor in water agencies' selection of raw water sources, treatment alternatives, and modifications to existing treatment facilities.*
>
> *(8) Changes in drinking water quality standards may also impact the usefulness of water supplies and may ultimately impact supply reliability.*

> (9) *The quality of source supplies can have a significant impact on water management strategies and supply reliability.*
>
> (b) *This part is intended to provide assistance to water agencies in carrying out their long-term resource planning responsibilities to ensure adequate water supplies to meet existing and future demands for water.*
>
> ***CWC 10610.4***
>
> *The Legislature finds and declares that it is the policy of the state as follows:*
>
> (a) *The management of urban water demands and efficient use of water shall be actively pursued to protect both the people of the state and their water resources.*
>
> (b) *The management of urban water demands and efficient use of urban water supplies shall be a guiding criterion in public decisions.*
>
> (c) *Urban water suppliers shall be required to develop water management plans to achieve the efficient use of available supplies and strengthen local drought planning.*

1.3 Urban Water Management Planning and the California Water Code

1.3.1 Urban Water Management Planning Act of 1983

The Act became part of the California Water Code (CWC) with the passage of Assembly Bill 797 during the 1983–1984 regular session of the California legislature. Subsequently, assembly bills between 1990 and 2014 amended the Act to include additional data and reporting requirements. The Act describes the contents of the UWMP as well as how urban water suppliers should adopt and implement the UWMP and was updated most recently by SB 1420 and AB 2067.

This UWMP addresses all subjects required by Section 10631 of the Act, which permits “levels of water management planning commensurate with the numbers of customers served and the volume of water supplied.” All applicable sections of the Act are discussed in this UWMP, with sections of the UWMP and DWR Guidebook Checklist cross-referenced against the corresponding provision of the Act. Additionally, a completed copy of the 2020 UWMP Checklist organized by subject is included as Appendix A.

1.3.2 Applicable Changes to the Water Code Since 2015 UWMPs

Since 2015, legislative bills [(Assembly Bill 1668 and Senate Bill 606 in May 2018 (Making Conservation and California Way of Life); Assembly Bill 1739, Senate Bill 1168, and Senate Bill 1319 in 2018 (Sustainable Groundwater Management Act); and Senate Bill 664 in 2016 (Seismic Risk Assessment)] have made changes to the Water Code affecting requirements and guidance for UWMP development. A summary list of the changes is provided below:

- Mandatory Reporting of Energy Intensity, CWC Section 10631.2(a) and (b)
- Report compliance with SBx7-7 2020 Target
- Report compliance with Water Loss Standard, CWC Section 10608.34 and 10608.35(a)

- Conduct a Drought Risk Assessment over a five-year duration (previously a three-year duration), CWC Section 10635(b)
- Prepare and adopt a Water Shortage Contingency Plan as part of the Urban Water Management Plan, CWC Section 10632(a)
- Conduct an Annual Water Supply and Demand Assessment on or before July 1 of each year starting in 2022, CWC 10632(a)(2)
- Conduct a Water System Seismic Risk Assessment and Mitigation Plan, CWC Section 10632.5(a)
- Consistency with Groundwater Sustainability Plan for basins underlying the urban water supplier’s service area, CWC Section 10631(4)(A)

1.3.3 Water Conservation Act of 2009 (SBX7-7)

Senate Bill No. 7 (SBX7-7), which became law in November 2009, requires increased emphasis on water demand management and requires the state to achieve a 20 percent reduction in urban per capita water use by December 31, 2020. Retail urban water suppliers are required to report their Baseline Daily Per Capita Water Use (Baseline GPCD), 2020 Urban Water Use Target, Compliance Daily per Capita Water Use, and the SBX7-7 verification form. The Baseline GPCD, Targets, and methodologies are presented in Section 2.5.

If the supplier has not met the per capita reductions required, the urban retail water supplier can be eligible for a water grant or loan by submitting a schedule, financing plan, and budget to DWR for achieving the per capita reductions. The supplier may request grant or loan funds to achieve the per capita reductions to the extent the request is consistent with the eligibility requirements applicable to the water funds.

1.4 Relationship to Other Planning Efforts

TUD is in continuous dialogue with the Tuolumne County Community Development Department (TCCDD) and the City of Sonora regarding current and proposed development projects within the District’s service area. The TCCDD and the City routinely send letters to the District on discretionary projects such as Requests for Rezone, Conditional Use Permits and Tentative Parcel and Subdivision Maps. TUD responses provide the County with information regarding its existing water and sewer facilities and this information often becomes conditions of approval for the permit.

TUD also provides information to the County to assist in large scale planning activities such as the recent General Plan Update adopted in 2019. The District provided the County information on the location and capacity of existing water and sewer facilities as well as future plans for expanding and extending these facilities.

1.5 Relationship to Water Shortage Contingency Plan

Concurrent with the 2020 UWMP update, the District is also updating its Water Shortage Contingency Plan (WSCP) consistent with CWC Section 10632 and Section 10635. The WSCP outlines the District's action plan for a drought or catastrophic water supply shortage and specifies opportunities to reduce demand and augment supplies under such conditions. The WSCP has been adopted as a stand-alone document for the 2020 update and is referenced in this Plan and is also included as an attachment in Appendix N.

1.6 Structure and Organization of the Plan

Pursuant to the Act, TUD previously prepared an UWMP in 2010 and 2015, which were received by the California Department of Water Resources (DWR) on June 23, 2011 and January 30, 2016. The 2020 UWMP serves as an update to the 2015 UWMP and draws extensively from that report; however, this plan has been restructured in response to legislative changes discussed above and new requirements presented in the 2020 UWMP Guidebook for Urban Water Suppliers (Guidebook) developed by DWR (DWR 2021).

TUD has organized its 2020 UWMP following DWR's recommended outline from the 2020 UWMP Guidebook. TUD has also elected to present data in this UWMP using the required DWR Tables as presented in the Guidebook. Additional tables are used to provide further clarification. The plan is organized as follows:

- Introduction
- Water Use
- Water Resources
- Recycled Water
- Water Quality
- Reliability Planning
- Demand Management Measures

1.7 Plan Implementation

1.7.1 Joint Preparation of the Plan

The 2020 UWMP requirements for agency coordination and public participation include specific timetables and requirements as presented in this section.

Table 1-1 lists the agencies with which coordination occurred while preparing this 2020 UWMP. Table 1-1 also includes a checklist of agencies that have been provided the notifications and access to the documents. Notifications to Tuolumne County, City of Sonora, and a diverse social, cultural, and economic cross-section of agencies to which TUD supplies treated water were provided at least 60 days' notice in advance of the public hearing as required by California

Water Code Section 10642. In addition, Notices of Intent to Adopt were sent to the County and City of Sonora. Notices were sent by registered mail and by e-mail; proof of such notification is provided in Appendix B. The County and the City of Sonora are the only two land use planning agencies that have such responsibilities within TUD's Treated Water Service Area.

Table 1-1: Coordination with Agencies

Agency	Contacted for Assistance	Commented on the Draft	Attended Public Meetings	Received Copy of the Draft UWMP	Sent Notice of Intent to Adopt UMWP
Tuolumne County (Community Resources Agency)	✓	✓		✓	✓
City of Sonora (Community Development)	✓			✓	✓
Twain Harte Community Services District	✓	✓			✓
Tuolumne County Chamber of Commerce	✓				✓
Tuolumne County Association of Realtors	✓				✓
Tuolumne County Sierra Club	✓				
TuCare	✓				✓
Chicken Ranch Rancheria					✓
Tuolumne Band of Me-Wuk Indians					✓
Tuolumne County Innovation and Business Assistance					✓
Central Sierra Environmental Resource Center (CSERC)					✓
Last Chance Water Company					✓
Oakview Mobile Home Park, LLC					✓
Pulpit Rock Water Company					✓
Muller Mutual Water					✓
Sawmill Flat Water Association					✓
Sonora Meadows					✓
Sleepy Hollow Water Association Inc					✓
Springfield Ranch Road Mutual Association					✓

Agency	Contacted for Assistance	Commented on the Draft	Attended Public Meetings	Received Copy of the Draft UWMP	Sent Notice of Intent to Adopt UMWP
Sonora Water Company					✓
Oneto Est Water Association					✓
Mi-Wuk Village Water					✓

1.8 Plan Adoption, Submittal, and Implementation

This section describes the District's actions to meet the requirements of the Act pertaining to public review and availability. TUD must provide at least 60-day notice prior to changing or adopting the plan, must conduct a public hearing prior to adoption, must properly notice the public hearing, must make the UWMP document available for public review, and make the final adopted plan available to the public, cities and counties, and DWR within 30-days of adoption. Further, the adopted plan must be submitted to DWR, cities and counties, and State Library within 30-days of adoption.

1.8.1 Inclusion of All 2020 Data

TUD is reporting on a calendar year basis and has included all water use and planning data for the entire 2020 calendar year. TUD's Distribution System Water Audit was based on calendar year 2020 data and information, followed the AWWA M36 methodology, and used the AWWA Water Audit Software (version 5.0) to conduct the water audit in accordance with 2020 UWMP requirements.

1.8.2 Notice of Public Hearing

TUD held a Public Hearing prior to adopting its 2020 UWMP to provide the public with an opportunity to review and comment on TUD's 2020 UWMP. The main audiences to be noticed are local water agencies, cities, counties, and the public. The efforts to properly notice its Public Hearing are described below.

1.8.2.1 Notice to Cities and Counties

> ***CWC*** 10621
>
> *(b)* Every urban water supplier required to prepare a plan pursuant to this part shall, at least 60 days before the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan.
>
> ***CWC*** 10642
>
> *Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of both the plan and the water shortage contingency plan….The urban water supplier shall provide notice of the time and place of a hearing to any city or county within which the supplier provides water supplies…*

Notifications indicating preparation of the 2020 UWMP were provided to cities and counties within which TUD provides water at least 60 days in advance of the Public Hearing as required by the Act. Copies of the draft plan were available to the public for review at TUD’s Administration Office located at 18885 Nugget Blvd., Sonora CA. Appendix B through E contain the following:

- Copy of the public hearing notice from the local newspaper,
- Notifications and follow-up correspondence provided to cities and counties, and
- A copy of the Board resolution adopting the 2020 UWMP.
- The following cities and counties were notified as indicated in Table 1-2 below:

Table 1-2: Notification to Cities and Counties

Submittal Table 10-1 Retail: Notification to Cities and Counties		
City Name	60 Day Notice	Notice of Public Hearing
Add additional rows as needed		
Sonora	Yes	Yes
County Name *Drop Down List*	60 Day Notice	Notice of Public Hearing
Add additional rows as needed		
Tuolumne County	Yes	Yes
NOTES:		

1.8.2.2 Notice to the Public

CWC 10642

…Prior to any of these hearings, notice of the time and place of the hearing shall be published within the jurisdiction of the publicly owned water supplier pursuant to Section 6066 of the Government Code.

Government Code 6066

Publication of notice pursuant to this section shall be once a week for two successive weeks. Two publications in a newspaper published once a week or oftener, with at least five days intervening between the respective publication dates not counting such publication dates, are sufficient. The period of notice commences upon the first day of publication and terminates at the end of the fourteenth day, including therein the first day.

TUD conducted a Public Hearing and adopted the 2020 UWMP on June 22, 2021. The District filed two legal public notices in the Union Democrat (local newspaper), including time and place, to inform the public of the upcoming Public Hearing and to make the 2020 UWMP available for public review and comment. The first notice was published on June 9, 2021 and the second notice was published on June 17, 2021. A copy of the public notice filed in the Union Democrat is included in Appendix C.

1.8.3 Public Hearing and Adoption

CWC 10642

Prior to adopting either, the urban water supplier shall make both the plan and the water shortage contingency plan available for public inspection and shall hold a public hearing or hearings thereon.

CWC 10608.26

(a) *In complying with this part, an urban retail water supplier shall conduct at least one public hearing to accomplish all of the following:*

- ***(1)*** *Allow community input regarding the urban retail water supplier's implementation plan for complying with this part.*
- ***(2)*** *Consider the economic impacts of the urban retail water supplier's implementation plan for complying with this part.*
- ***(3)*** *Adopt a method, pursuant to subdivision (b) of Section 10608.20 for determining its urban water use target.*

TUD conducted a regular board meeting, held virtually, on June 8, 2021, prior to adopting its 2020 UWMP. The purpose of the regular board meeting was to allow community input regarding the adoption, implementation, and economic impacts of the District’s water use targets.

1.8.3.1 Adoption

CWC 10642

... After the hearing or hearings, the plan or water shortage contingency plan shall be adopted as prepared or as modified after the hearing or hearings.

TUD conducted a Public Hearing and adopted the 2020 UWMP on June 22, 2021. The Public Hearing was opened and closed, with public comments documented and considered for inclusion into the Final 2020 UWMP. A copy of the Board resolution adopting the 2020 UWMP is included in Appendix E.

TUD is committed to implementing the projects, and plans provided within this document. However, it is important to note that execution of the plan is contingent upon the regulatory limitations and approval of state agencies and local approval of annual budgets supporting implementation efforts. TUD shall not be responsible for changed or unforeseen conditions affecting any of the above factors after adoption of the plan.

1.8.4 Plan Submittal

CWC 10621

(f) *Each urban water supplier shall update and submit its 2020 plan to the department by July 1, 2021.*

CWC 10644

(a)(1) *An urban water supplier shall submit to the department, the California State Library, and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption.*

CWC 10635

(c) *The urban water supplier shall provide that portion of its urban water management plan prepared pursuant to this article to any city or county within which it provides water supplies no later than 60 days after the submission of its urban water management plan.*

A copy of TUD's Final 2020 UWMP shall be submitted to DWR, the California State Library, and any city or county within the supplier's service area within 30 days of adoption.

1.8.4.1 Submitting an UWMP to DWR

TUD will submit the adopted 2020 UWMP to DWR through the DWR online submittal process, including completed DWR Tables within 30-days of when the 2020 UWMP was adopted by the TUD Board. The DWR Tables not used within the body of this Plan can be found in Appendix I.

1.8.4.2 Electronic Data Submittal

TUD will submit completed DWR Tables included in its adopted 2020 UWMP through the DWR online submittal process established by DWR to receive all UWMP submittals.

1.8.4.3 Submitting a UWMP to the California State Library

TUD will submit a copy of its adopted 2020 UWMP to the California State Library within 30 days of adopting its 2020 UWMP.

1.8.4.4 Submitting a UWMP to Cities and Counties

TUD will submit a copy of its adopted 2020 UWMP to the City of Sonora and Tuolumne County within 30 days of adopting its 2020 UWMP.

1.8.5 Public Availability

CWC 10645

(a) Not later than 30 days after filing a copy of its plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.

(b) Not later than 30 days after filing a copy of its water shortage contingency plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.

TUD's adopted Final 2020 UWMP will be made available to the public in hard copy at the District's Administration Office located at 18885 Nugget Blvd., Sonora CA. This plan includes all information necessary to meet the applicable requirements of California Water Code. Appendix C includes copies of the transmittals included with the adopted plan as supporting documentation.

1.8.6 Amending an Adopted UWMP

CWC 10621

(d) *The amendments to, or changes in, the plan shall be adopted and filed in the manner set forth in Article 3 (commencing with Section 10640).*

CWC 10644

(a)(1) … *Copies of amendments or changes to the plans shall be submitted to the department, the California State Library, and any city or county within which the supplier provides water supplies within 30 days after adoption.*

Significant changes or amendments to TUD's adopted 2020 UWMP will require the steps for notification, public hearing, adoption, and submittal to DWR, the California State Library, and any city or county within which the supplier provides water supplies within 30 days after adoption by TUD.

1.8.7 Implementation

> ***CWC 10643***
>
> *An urban water supplier shall implement its plan adopted pursuant to this chapter in accordance with the schedule set forth in its plan.*

TUD is committed to the implementation of this UWMP concurrent with the scheduled activities identified herein as required by Section 10643 of the Act. TUD is able to properly plan and implement the actions identified in this document and other key planning efforts to proactively address water supply reliability challenges.

TUD is committed to the implementation of its 2020 UWMP as indicated with a proven commitment to funding and implementing Demand Management Measure (DMM) programs to improve long-term water use efficiency and manage its limited resources. TUD will continue to support the planning and implementation of its DMM programs.

TUD is committed to implementation of the projects, plans, and discussions provided within this document. Importantly the execution of the plan is contingent upon the approval of annual budgets, level of DMM program participation, impact of regional collaborative efforts, availability of outside funding sources, and policy and regulatory factors that may influence DMM implementation over time. This document presents the water supply, reliability, DMM, and water shortage planning programs known to be in effect at the time of plan adoption.

TUD will also be considering SBX7-7 water use targets, emerging water conservation technologies, new requirements (e.g., SB 555), baseline studies to determine DMM effectiveness, and better defining the role of DMM programs in managing water supplies during normal and dry year conditions. TUD will continue to be engaged in regional water planning processes, promote the efficient use of water supplies, and support steps to procure local reliable resources wherever feasible and cost-effective to maintain long-term supply reliability.

TUD will be evaluating existing DMM programs and refining future efforts when necessary to improve DMM program cost effectiveness and savings reliability. TUD will consider regional participation in DMM programs through partnerships with other water suppliers, energy utilities, and other agencies in the region that support DMM programs.

1.8.8 Resources Maximization

Section 10620 (f) of the Act asks urban water suppliers to evaluate water management tools and options to maximize water resources and minimize the need for imported water from other regions. TUD understands the limited nature of water supply in California and is committed to optimizing its available water resources. This commitment is demonstrated through TUD's use of water supplied from local sources. TUD is a regular participant in regional water resources planning efforts and led the development of Tuolumne-Stanislaus Integrated Regional Water Management (IRWM) Group which adopted the Tuolumne-Stanislaus IRWM Region's first IRWM Plan on August 19, 2013.

TUD prepared this UWMP with the assistance of its consultant, Kennedy/Jenks Consultants, as permitted by the following section of the Act:

> ***CWC 10620***
>
> *(e) The urban water supplier may prepare the plan with its own staff, by contract, or in cooperation with other governmental agencies.*

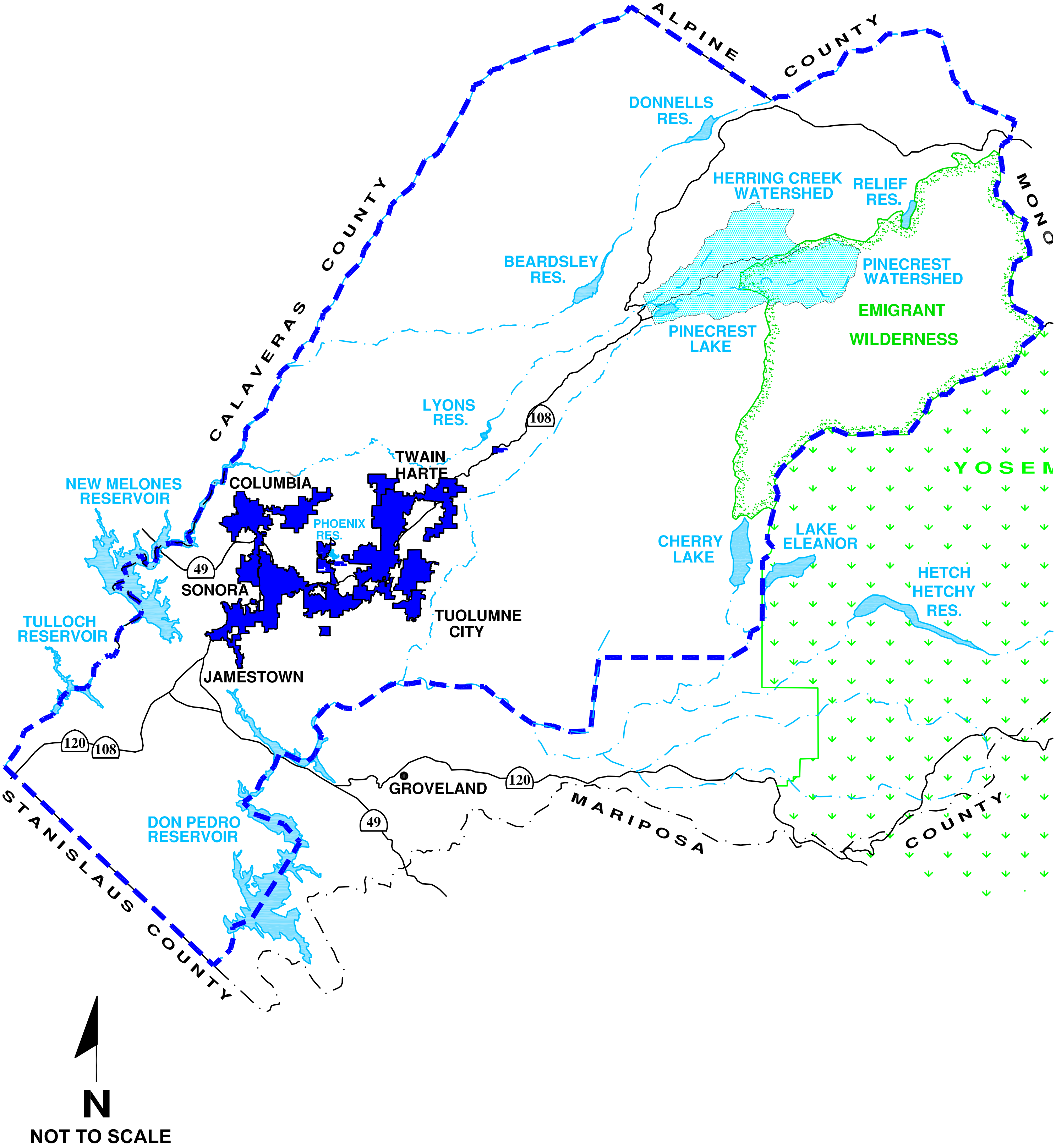
During the preparation of the UWMP, documents that have been previously prepared by TUD and other entities were reviewed and information from those documents incorporated, as applicable, into this UWMP. Some of these documents have been included in the appendices and a list of references is provided at the end of the document.

1.9 Tuolumne Utilities District Background

The water system description requirements are detailed in the following section of the Act:

> ***CWC 10631***
>
> *(a) Describe the service area of the supplier, including current and projected population, climate, and other social, economic, and demographic factors affecting the supplier's water management planning. The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available. The description shall include the current and projected land uses within the existing or anticipated service area affecting the supplier's water management planning. Urban water suppliers shall coordinate with local or regional land use authorities to determine the most appropriate land use information, including, where appropriate, land use information obtained from local or regional land use authorities, as developed pursuant to Article 5 (commencing with Section 65300) of Chapter 3 of Division 1 of Title 7 of the Government Code.*

TUD is a county water district organized and existing under Division 12 (Sections 30000 - 32554) of the California Water Code. The District occupies approximately the northerly two-thirds of Tuolumne County (County). As shown on Figure 1-1, TUD is bounded on the west by the North Fork and Main Stem of the Stanislaus River along the Tuolumne County and Calaveras County boundary, on the north by Alpine County, on the east by Mono County and Yosemite National Park, on the south by the Tuolumne River, and on the southwest by Stanislaus County. The total area within the TUD boundary is approximately 1,376 acres.



TUOLUMNE UTILITIES DISTRICT
2020 UWMP

DISTRICT BOUNDARY

March 2021

FIGURE 1-1

TUD was organized on July 1, 1992, in response to a voter initiative requiring the consolidation of two local public water systems, the Tuolumne Regional Water District (previously known as Tuolumne County Water District No. 2) and the Tuolumne Water System. As were most of the original ditch systems in the California Mother Lode, the ditches and flumes of the present TUD were constructed to provide water for miners working during the California gold rush. The majority of the early system was constructed in the 1850s to supply water to the placer mines, especially to the Columbia basin district. Many of these ditches were purchased and consolidated by the Tuolumne Hydraulic Mining Company in 1872 and sold to Tuolumne County Water Company in 1876. Thereafter, the ditch systems were bundled and transferred to the Tuolumne Water and Electric Power Company in 1898, the Tuolumne Water Power Company in 1907, reformed as the Sierra and San Francisco Power Company in 1909, and Pacific Gas & Electric (PG&E) Company in 1927 (Stantec 2012). PG&E owned and operated the Tuolumne Water System, including the treated and raw water conveyance (todays TUD ditch system), until 1983 when the system was transferred to Tuolumne County and the water supply contract was established.

The TUD Treated Water Service Area constitutes about three percent of the total geographic area within the District's boundary as shown on Figure 1-1. This is due to the fact that not all the lands and residences within the District's boundary are served by TUD's 17 retail municipal water systems. Some areas, although inside the District boundary, are served by other small public or private water systems, or individual landowner wells as shown on Figure 1-2.

The TUD Treated Water Service Area shown on Figure 1-2 is primarily characterized by residential land use, with some commercial and industrial land use. As discussed in more detail below, TUD Treated Water System currently serves a population of approximately 30,900 persons and maintains over 13,000 active treated water service accounts, 11 surface water treatment plants (WTPs), 25 active groundwater wells and approximately 320 miles of distribution pipeline.

TUD owns and operates treated water, wastewater, reclaimed water and raw water systems within the District boundary. Each of these various systems has a distinct service area as described below. For the purposes of this UWMP, the service area is defined as the Treated Water Service Area: the population and geographical area served by the TUD water distribution systems.

1.9.1 TUD Treated Water System

The TUD Treated Water System, also referred to as the "water distribution systems" are defined by TUD's 11 surface WTPs, 25 water wells, and the treated water customer service meters. The TUD water distribution systems do not follow census tract boundaries, political boundaries, watersheds, or community boundaries. Rather the boundaries of the water distribution systems are irregular and represent those specific geographic areas which are served by one or more TUD municipal water supply treated water sources.

As shown on Figure 1-2, TUD operates and maintains 11 separate distribution systems which together form the Treated Water System. The 11 distribution systems and the respective water supply sources are summarized in Table 1-3. Figure 1-3 displays the layout of TUD's Treated Water System supply and storage facilities.

TUD's Treated Water System Optimization Plan (TWSOP) is a foundational document that will guide the District's efforts toward consolidating its numerous water facilities and prepare it for the potential acquisition, as necessary, of some of the County's numerous private water companies. As part of the TWSOP, TUD consolidated 17 treated water systems to 11 between 2015 and 2016.

Table 1-3: TUD Distribution Systems and Potable Water Supply Sources

TUD Distribution System	Potable Water Supply Source	
	Surface Water	Groundwater
Apply Valley	None	Apple Valley Well #1 and WTP, Apple Valley Well #2 and Apple Valley Well #3
Cedar Ridge	Cedar Ridge WTP	Cedar Ridge Springs Well and WTP
Columbia	Columbia WTP Big Hill WTP	Marble Quarry WTP
Upper Basin	Crystal Falls WTP Brentwood WTP Monte Grande WTP Upper Basin WTP	Brentwood Well(1), Crystal Falls Plant Well(1), Comstock Well, Confidence Well #1 and Confidence Well #2, Oakridge Ranch Well, Cuesta Center Well, and Lambert Well and WTP, and Crystal Falls Business Park (standby)
Sonora Jamestown	Sonora WTP Greenley WTP	Mono Village Well #2 and #7 and WTP
Peaceful Pines	None	Peaceful Pines Well
Phoenix Lake Park	None	Phoenix Lake Park Well and WTP
Ponderosa Hills	Ponderosa WTP	None
Scenic View	Scenic View WTP	Scenic View Well(1)
Tuolumne City	Tuolumne WTP	None
Wards Ferry Ranches	None	Wards Ferry Ranch Well #1, Ward Ferry Ranch Well #2 and Ward Ferry Ranch Well #4(2)

Notes:

1. Well blended at surface WTP.
2. Well owned by developer and operated by TUD.

1.9.2 TUD Raw Water System

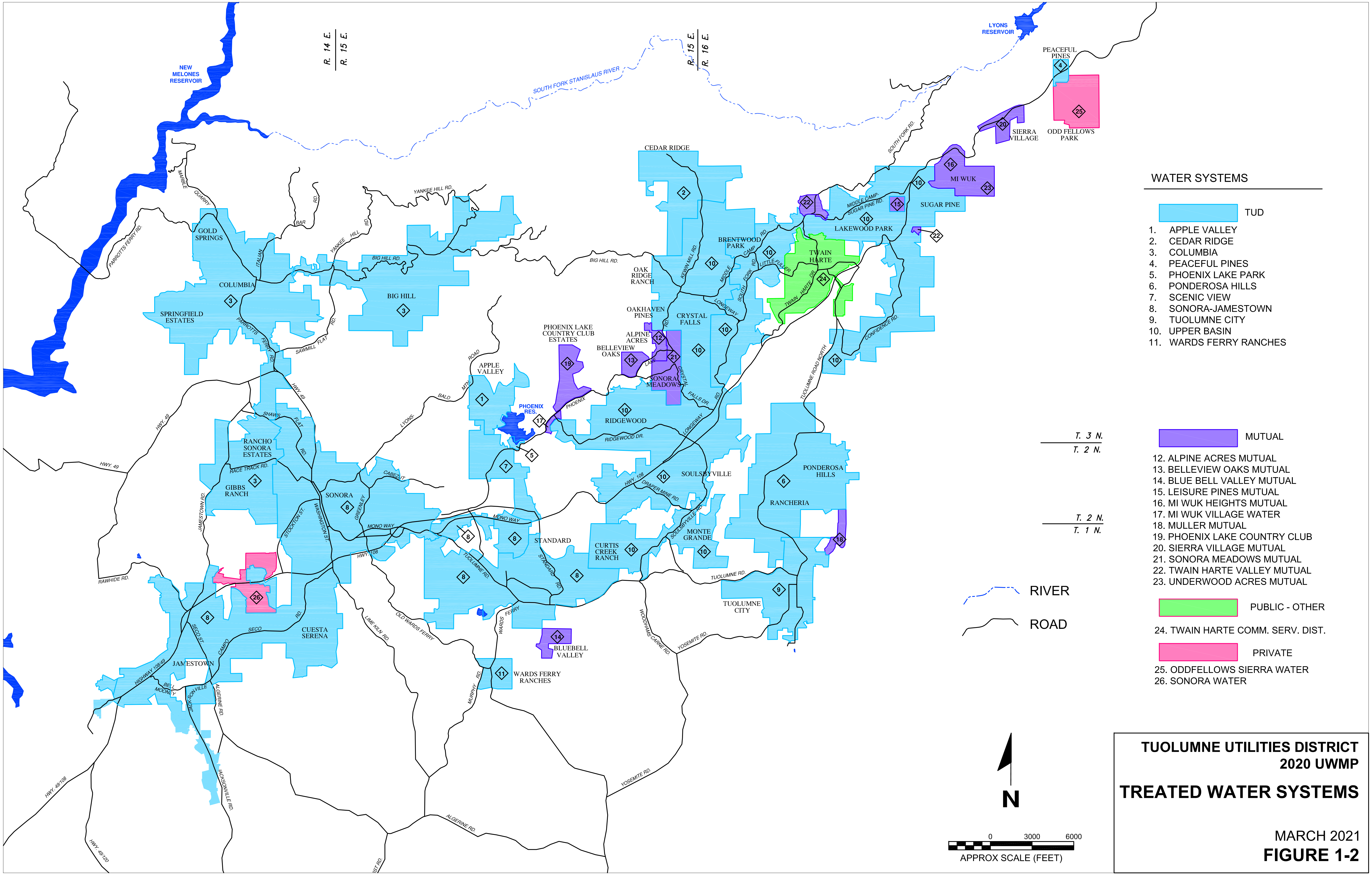
The TUD Raw Water System provides water to agriculture irrigation, wholesale customers, and TUD's WTPs. Raw water is conveyed to the WTPs through a series of open channel ditches. Raw water originates at three distinct diversion points: one point along the Pacific Gas and Electric Company (PG&E) Main Tuolumne Canal located above Twain Harte, one point located at the PG&E Phoenix Powerhouse forebay and one point after the PG&E Phoenix Powerhouse. The system typically conveys between about 1 and 4 cubic feet per second in each ditch depending seasonal and water supply factors. The PG&E Main Tuolumne Canal originates at Lyons Dam located on the South Fork of the Stanislaus River. Figure 1-3 illustrates the proximity of the TUD Treated Water Facilities to the Raw Water System. Figure 1-4 illustrates the locations and routing of the TUD Raw Water System and proximity of the TUD ditches to the PG&E Main Tuolumne Canal. Figure 1-6 illustrates TUD's raw water system along the South Fork of the Stanislaus River and includes details such as reservoir capacities and locations of various water gauges.

Studies were performed in 2012 for the TUD ditches that in part consisted of cultural resources investigations, National Register of Historic Places (NRHP) evaluations of thirteen ditches within the TUD system preparation of a Historic Resource Evaluation Report (HRER), preparation of Historic Properties Management Plan (HPMP) and to provide guidance on the operations and maintenance consistent with the cultural and environmental elements that are present. The findings of these studies show that many of the resources along the ditch system are eligible for the NRHP. More recently, the District conducted a California Environmental Quality Act (CEQA)analysis of its ditch maintenance program and adopted a Ditch CEQA Initial Study / Mitigated Negative Declaration ("IS/MND"). The MND assessed all types of maintenance activities to be employed and addressed all manner of direct and cumulative impacts including biological, cultural, aesthetic, and hydrology. Significantly, the IS/MND addresses cumulative impacts to the cultural integrity of the ditch system and wildlife access to "open water" including establishing limitations on lining of ditch segments that pass-through Valley Oak Woodlands.

- Foothill Resources, Ltd. Francis Heritage, (2012) Tuolumne Utilities District Ditch Sustainability Project Historic Resources Evaluation Report.
- Stantec Consulting Services, Inc. (2012) Ditch System Sustainability Project Operation and Maintenance Strategies for Reduction Non-Consumptive Use Water
- Augustine Planning Associates, Inc. (2017) Initial Study and Mitigated Negative Declaration Tuolumne Utilities District Ditch Maintenance Activities.

1.9.3 TUD Regional Wastewater and Reclamation Systems

In addition to the Treated Water System, TUD also owns and operates the TUD Regional Wastewater System, which provides sewer collection and treatment to another distinct area within the District's boundary. The TUD Regional Wastewater Reclamation System provides service to a yet another subset area. Both of these systems are further discussed in Section 4. Figure 1-5 illustrates the service area of County's regional wastewater systems and the TUD Regional Wastewater Reclamation System.

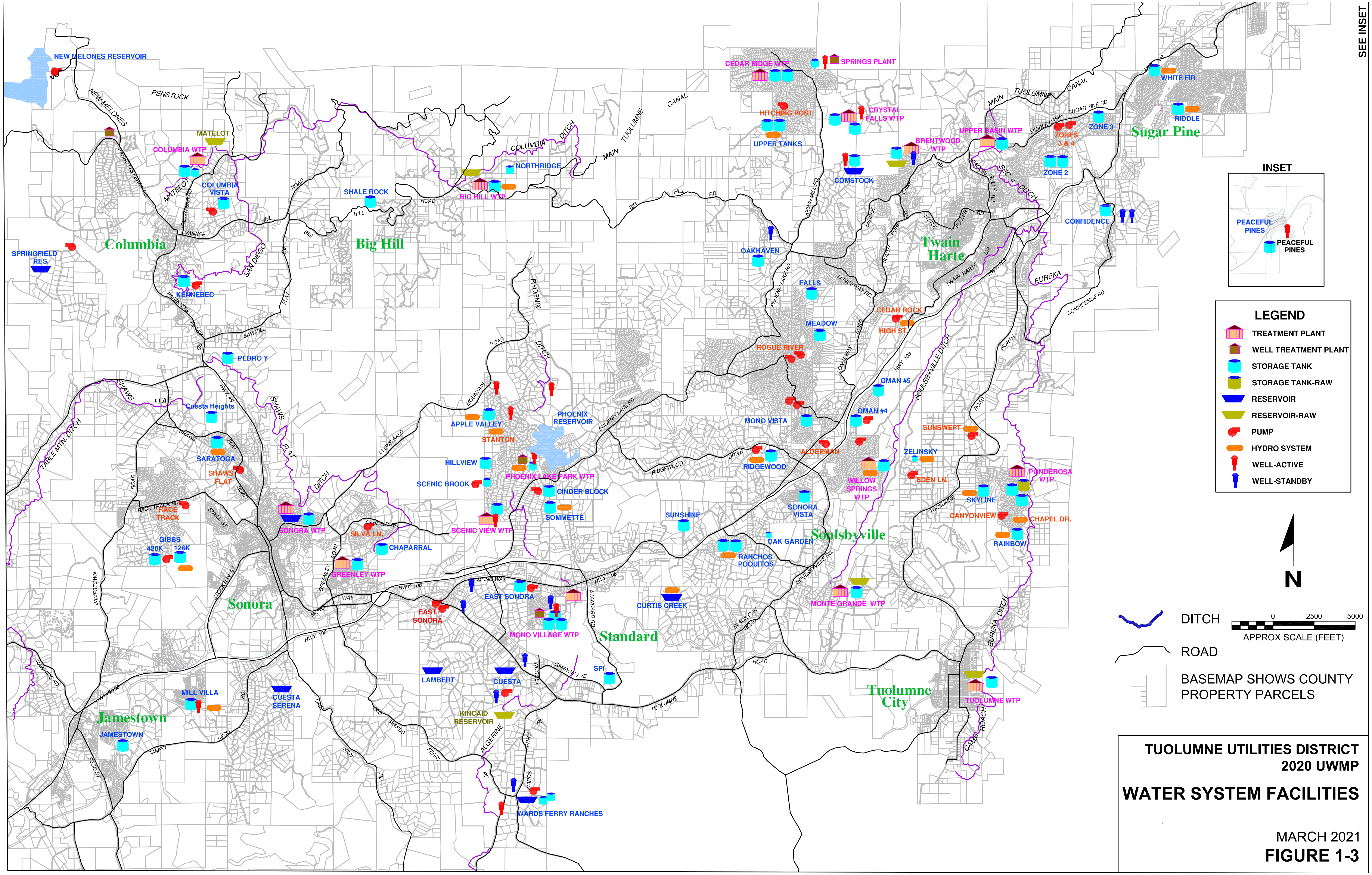


TUOLUMNE UTILITIES DISTRICT
2020 UWMP

TREATED WATER SYSTEMS

MARCH 2021

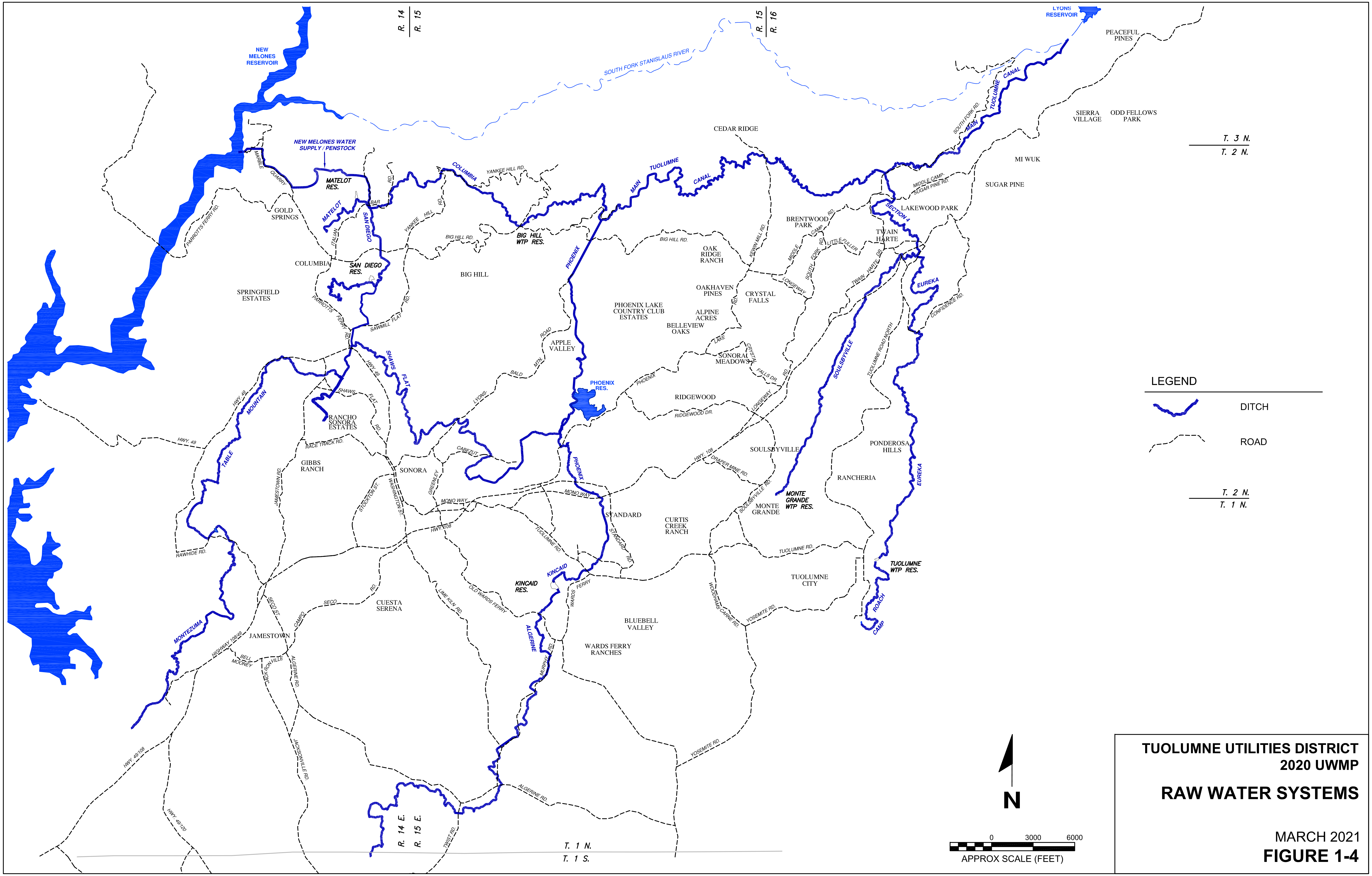
FIGURE 1-2



TUOLUMNE UTILITIES DISTRICT
2020 UWMP

WATER SYSTEM FACILITIES

MARCH 2021
FIGURE 1-3

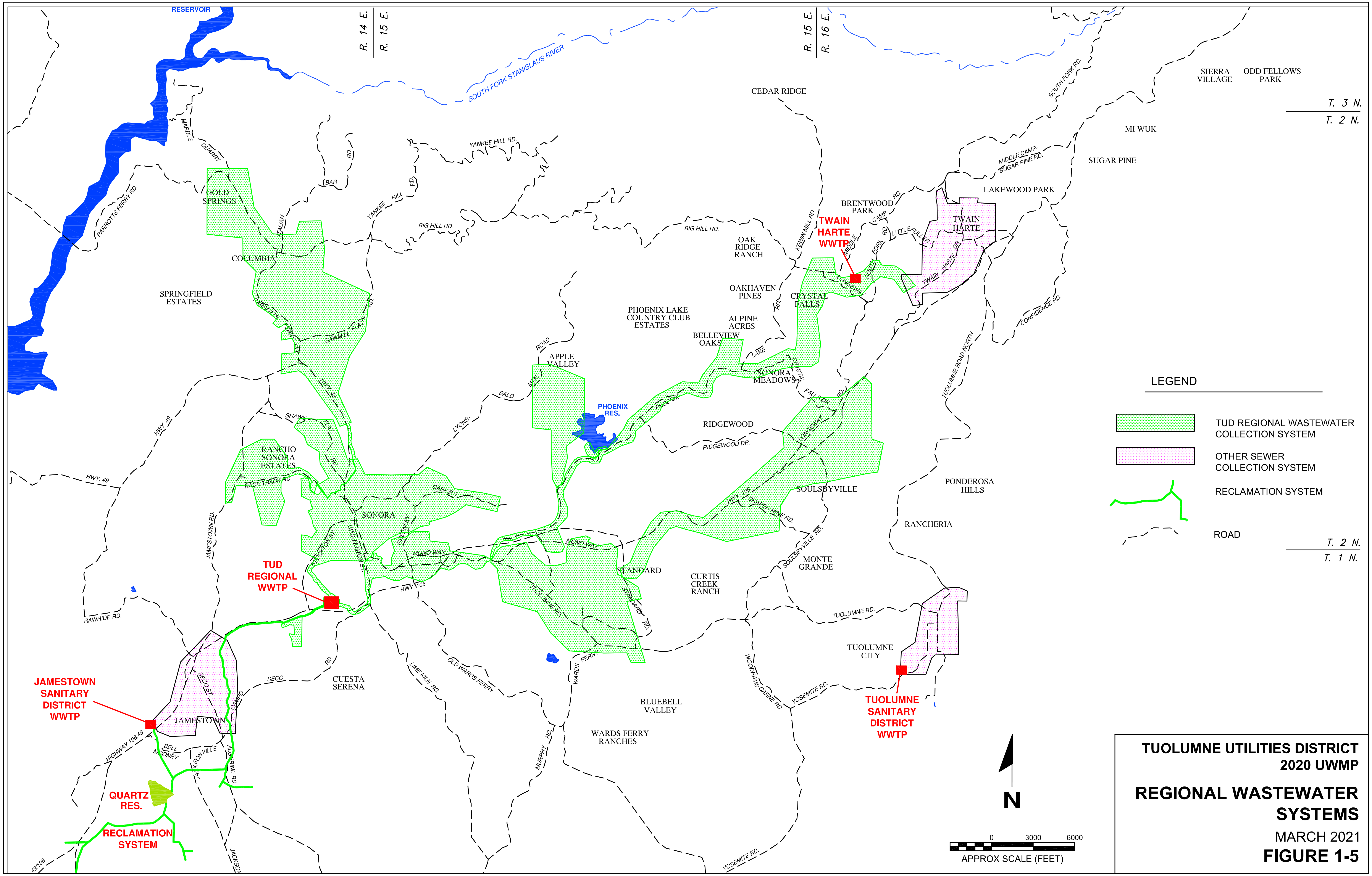


TUOLUMNE UTILITIES DISTRICT
2020 UWMP

RAW WATER SYSTEMS

MARCH 2021

FIGURE 1-4

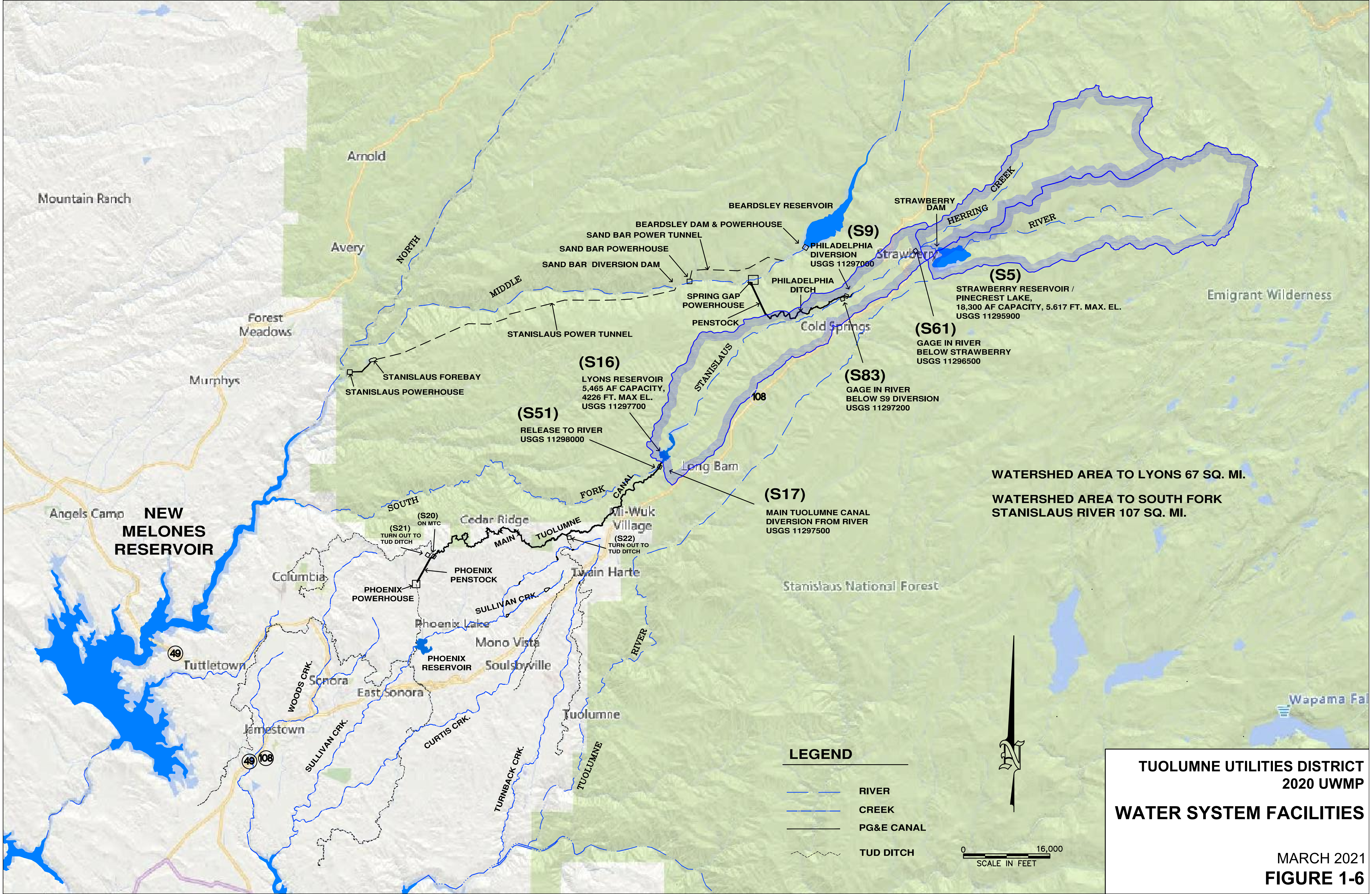


TUOLUMNE UTILITIES DISTRICT
2020 UWMP

REGIONAL WASTEWATER SYSTEMS

MARCH 2021

FIGURE 1-5



TUOLUMNE UTILITIES DISTRICT
2020 UWMP

WATER SYSTEM FACILITIES

MARCH 2021

FIGURE 1-6

1.10 Topography and Land Use

The topography of the County varies greatly from gently rolling terrain at the lower elevations, to steep hilly uplands deeply traversed by streams and tributaries that drain south to the Tuolumne River or north to the Stanislaus River. Two passes with paved roads cross the Sierras and are located within the County: Sonora Pass (9,628-feet) and Tioga Pass (9,941-feet). The high elevation to the east serves as the watershed for the TUD water supply with snowpack during the winter months.

Crop adaptability to the upland areas is largely restricted to irrigated pasture or various deciduous orchards. Both slope and soil-depth directly affect the degree of suitability of lands for irrigation or development, as does public land ownership.

In 1897, the lumber industry realized the commercial value of the trees in the higher elevations and has subsequently become a major industry for the County. Very large segments of irrigable land within TUD are presently forested and subject to forest and range management. This land possesses the slope and soil characteristics to sustain irrigable agriculture lands. However, climate conditions, location, and availability of water are expected to cause the lands to remain under some type of forest or range management program.

Much of the County is owned by the federal government, which will limit the extent of future development. The Stanislaus National Forest of the U.S. Forest Service, Emigrant Wilderness, and most of Yosemite National Park are located in the County.

A large number of TUD’s Treated Water System customers reside in or near the community of Sonora which is situated at about 2,000 feet in elevation. The TUD Treated Water Service Area includes the lower elevation communities of Jamestown, and Columbia which are rural to semi-rural in nature and extends east to include higher elevation communities and semi-rural areas up to elevations of approximately 4,000 feet in the Sierra Nevada. TUD’s Treated Water Service Area comprises predominantly single-family residential housing density levels.

1.11 Climate

The Western Regional Climate Center has maintained historical climate records for the past 100 years for the City of Sonora which is currently available on their website (www.wrcc.dri.edu). This website does not include data for any other community within the TUD service area. Since a large portion of TUD’s customers reside in or near the City of Sonora, the Western Regional Climate Center 100-year data for the City of Sonora has been included in Table 1-4.

Similar to the Western Regional Climate Center, the California Irrigation Management Information System (CIMIS) web site (http://www.cimis.water.ca.gov) tracks and maintains records of evapotranspiration (ETo) for select cities only. ETo statistics used for TUD come from the foothill region as there are no CIMIS stations located in Tuolumne County. It assumed that the foothill region stations (Camino, Shenandoah Valley, Browns Valley, Auburn, Plymouth, and Diamond Springs) will be representative of the TUD distribution area. The average ETo included in Table 1-4 is calculated from the foothill stations, with historical records ranging from 1 to 28 years.

The average monthly rainfall included in Table 1-4 is based on records dating back to as early as 1887. TUD maintains current rainfall data as measured at the TUD Regional Wastewater Treatment Plant (RWWTP). The rainy season in this area is generally from about November to March. Monthly precipitation during the winter months ranges from approximately 3 to 6 inches. Low humidity generally occurs in the summer months from about June to September. The combination of hot and dry weather during the summer months typically results in higher water usage by TUD customers.

Table 1-4: Monthly Average Climate Data Summary

Month	Standard Monthly Average ETo(1) (inches)	Average Total Rainfall(2) (inches)	Average Temperature(3) (degrees Fahrenheit)	
			Max	Min
January	1.6	6.1	54.5	33.4
February	2.2	5.6	58.0	35.5
March	3.1	5.1	62.4	38.0
April	4.5	2.8	68.5	41.7
May	5.9	1.3	77.1	46.7
June	7.2	0.3	86.1	52.7
July	8.1	< 0.1	94.5	58.7
August	7.4	0.1	93.0	57.4
September	5.7	0.4	86.7	52.7
October	3.7	1.6	76.0	45.2
November	2.1	3.5	63.5	38.1
December	1.6	5.4	55.6	33.8
Total	53.0	32.1		

Notes:

1. Evapotranspiration (ETo) based on Central Sierra Nevada Zone (Zone 11) data from http://www.cimis.water.ca.gov/App_Themes/images/etozonemap.jpg.
2. Average total rainfall based on TUD records since 1887.
3. Average temperatures based on City of Sonora 100-year data from www.wrcc.dri.edu.

1.12 Potential Effects of Climate Change

A topic of growing concern for water planners and managers is climate change and the potential impacts it could have on California's future water supplies.

Climate change models have predicted that potential effects from climatic changes will result in increased temperature, early snow melt, and a rise in sea level.

In the 2018 update of the *DWR California Water Plan*, the implications of future climate conditions are evaluated. These changing hydrological conditions could affect future planning efforts, which are typically based on historic conditions. The *California Water Plan* identifies the following probable impacts due to changes in temperature and precipitation:

- More winter runoff and less spring/summer runoff due to warmer temperatures.
- Greater extremes in flooding and droughts.
- Greater water demand for irrigation and landscape water due to increased temperatures and their impacts on plant water needs.
- Increased sea level rise, increased threat of coastal flooding, and salt water intrusion into coastal groundwater aquifers.
- Lack of access to safe, clean water and adequate sanitation for Californians
- Groundwater overdraft and unreliable water supplies in many regions

In the *Final Environmental Impact Report (FEIR) for the 2018 Tuolumne County General Plan Update*, the implications of future climate conditions are evaluated. These changing hydrological conditions could affect future planning efforts, which are typically based on historic conditions. The *Final Environmental Impact Report* identifies the following probable impacts due to changes in water supply, hydrology, air quality, and other variables:

- Increases in both maximum and minimum temperatures and heat extremes.
- More intense precipitation focused during the winter season.
- Increased evapotranspiration.
- Recurring and extended droughts.
- Increase in frequency and intensity of storms
- Extreme events such as flash floods, rain or snow events, coincidental high tide and high runoff events
- Potential for longer wildfire season with more ignitions as population growth continues.
- Reduction in Sierra Nevada snowpack.
- Increase in air pollution due to higher temperatures.
- Sea level rise and coastal flooding

Even without population changes, water demand could increase. Precipitation and temperature influence water demand for outdoor landscaping and irrigated agriculture. It is typical that about half of the water used by residential development is for outdoor use and therefore it is assumed that outdoor water use is a large component of the District's water demands.

1.13 Other Demographic Factors

The County is demographically representative of the TUD service area. According to 2020 U.S. Census data, the median age of County residents is 47.3 years. In addition, the County has an average household size of 2.30 people and a median household income (2010-2014) of approximately $60,108 in 2019 dollars. TUD is the water supplier for various Native American Indian trial communities within the County.

Section 2: Water Use

2.1 Overview

Section 10631 (d) of the Act requires that an evaluation of water use be performed for the TUD Treated Water System. The Act states the following:

> ***CWC 10631***
>
> *(d) (1) For an urban retail water supplier, quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, based upon information developed pursuant to subdivision (a), identifying the uses among water- use sectors including, but not necessarily limited to, all of the following uses:*
>
> *(A) Single-family residential*
>
> *(B) Multi-family*
>
> *(C) Commercial*
>
> *(D) Industrial*
>
> *(E) Institutional and governmental*
>
> *(F) Landscape*
>
> *(G) Sales to other agencies*
>
> *(H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof*
>
> *(I) Agricultural.*
>
> *(J) Distribution system water loss.*
>
> *(2) The water-use projections shall be in the same five-year increments described in subdivision (a).*

In addition, Section 10631 (h) of the Act directs urban water suppliers to provide existing and projected water-use information to wholesale agencies from which water deliveries are obtained. The Act states the following:

> ***CWC 10631***
>
> *(h) An urban water supplier that relies upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (f). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (f).*

In conjunction with projecting total water demand, each urban water retail supplier must develop urban water use targets and an interim urban water use target in accordance with SBX7-7. SBX7-7 amends the Act requiring statewide water savings of 20 percent by the year 2020. The bill sets specific methods for calculating both the baseline water usage and water use targets in gallons per capita day (GPCD).

CWC 10608.20

(e) An urban retail water supplier shall include in its urban water management plan required pursuant to Part 2.6 (commencing with Section 10610) due in 2010 the 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.

This section presents an analysis of urban water use data with the resulting projections for future water needs and water use targets in accordance with SBX7-7 for the TUD service area.

For the purposes of this UWMP, TUD urban water use is defined as treated water use. Total urban water demand is the total quantity of water produced from the WTPs and groundwater wells within the TUD water distribution systems. TUD also provides untreated water to customers for agricultural irrigation and for water supply to other water systems not owned or operated by TUD. The untreated water quantities are not included in TUD's urban water use as these quantities are not a reflection of TUD's residential, commercial, or industrial customer usage. This section, therefore, discusses treated urban water use only.

2.2 Population

The population of the area served by the TUD Treated Water Systems is the defined service area population for this UWMP. Population trends developed by state and federal agencies have historically been unrepresentative of the TUD service area. Therefore, TUD uses its own record connection data; correlated and compared with Tuolumne County Community Resources Agency, as the basis for determining population projections for the service area.

2.2.1 Historical Population Development Methodology

Historical population for the TUD service area was estimated using the directions outlined in Methodology 2: Service Area Population from the "Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use" by DWR. Additional guidance on population methodologies was provided in the DWR Guidebook. TUD's treated water system boundaries do not correspond with a city or census designated place and the rural population density varies significantly throughout the service area. Therefore, the Department of Finance and DWR Population Tool methodologies presented in the DWR Guidebook are not appropriate population methodologies for the TUD service area.

TUD's population methodology uses an approach similar to that of the DWR Population Tool; but instead allocates a percent of Census block group population according to number of households instead of GIS system boundary. TUD's service area population was adjusted to take into consideration Census population changes in Tuolumne County and growth in TUD's number of service connections. For Tuolumne County, which is approximately two thirds of TUD's service area), Census data shows a decrease in total population by approximately 2.86 percent between 2010 and 2015 and an increase in population by approximately 1.61 percent between 2015 and 2019. The 2015 population is adjusted based on the total population trends experienced in Tuolumne County between 2010 and 2015. The population methodology steps are described in further detail in Appendix F.

By this method, the TUD service area population was estimated to be 29,998 in 2015 and 30,910 in 2020.

2.2.2 Growth Rates and Projections

Growth rates and projections presented below are based on TUD's Treated Water System.

2.2.2.1 Treated Water System Growth Rates

TUD has experienced two types of water system connection growth since its inception in 1992 including: 1) non-acquisition growth, which includes specific proposed developments and general growth resulting from population increases and hookups of parcels previously served by wells to the public water system; and 2) acquisition/merger growth, which is associated with the acquisition/merger of discrete private and mutual water companies. Table 2-1 summarizes the water connections added by year.

Table 2-1: TUD Treated Water Service Growth Statistics

Year	Total Number of Active Connections(1)	Non-Acquisition Water Connections Added	System Acquisitions Connections Added	Total Number of New Connections	Percent Increase due to Non-Acquisition Connections	Percent increase due to System Acquisition Connections	Percent Increase due to Total Growth
1993	9,137	73		73	0.81%		0.81%
1994	9,191	54		54	0.59%		0.59%
1995	9,598	58	349	407	0.63%	3.80%	4.43%
1996	10,240	57	585	642	0.59%	6.10%	6.69%
1997	10,321	81		81	0.79%		0.79%
1998	10,961	104	536	640	1.01%	5.19%	6.20%
1999	11,073	112		112	1.02%		1.02%
2000	11,221	148		148	1.34%		1.34%
2001	11,675	149	305	454	1.33%	2.72%	4.05%
2002	11,832	157		157	1.34%		1.34%
2003	12,046	214		214	1.81%		1.81%
2004	12,505	184	275	459	1.53%	2.28%	3.81%
2005	12,672	167		167	1.34%		1.34%
2006	12,971	118	181	299	0.93%	1.43%	2.36%
2007	13,049	78		78	0.60%		0.60%
2008	13,105	56		56	0.43%		0.43%
2009	13,127	22		22	0.17%		0.17%
2010	13,142	15		15	0.11%		0.11%
2011	13,164	22		22	0.17%		0.17%
2012	13,196	32		32	0.24%		0.24%
2013	13,212	16		16	0.12%		0.12%
2014	13,243	31		31	0.23%		0.23%
2015	13,292	49		49	0.37%		0.37%
2016	13,346	54		54	0.41%		0.41%
2017	13,416	70		70	0.52%		0.52%
2018	13,451	35		35	0.26%		0.26%

Year	Total Number of Active Connections[1]	Non-Acquisition Water Connections Added	System Acquisitions Connections Added	Total Number of New Connections	Percent Increase due to Non-Acquisition Connections	Percent increase due to System Acquisition Connections	Percent Increase due to Total Growth
2019	13,482	31		31	0.23%		0.23%
2020	13,502	20		20	0.15%		0.15%
Total		2,207	2,231	4,438			
Average					0.81%	0.82%	1.43%

Notes:

1. Based on calendar year.
2. Wholesale, fire, and inactive connections are not included within the Total Number of Active Connections.

As shown above, TUD added a total of 4,438 active connections to the Treated Water System between 1992 and 2020. Of those, 2,207 (49.7 percent) were categorized as non-acquisition growth and 2,231 (50.3 percent) were associated with acquisition/merger growth. Non-acquisition growth from 1992 to 2020 averaged 0.81 percent annually. Acquisition/merger growth from 1992 to 2020 averaged 0.82 percent annually. The combined connection growth rate from 1992 to 2020 averages 1.43 percent annually.

There are many remaining smaller water systems located in the proximity of the TUD water system boundary. TUD's Treated Water System Optimization Plan Projected 20-Year Growth Rates in Active Water Service Connection by Water Service Area Memo (TWSOP Growth Memo) included in Appendix G provides a detailed summary of these systems. As stated in the TWSOP Growth Memo, based on the aging infrastructure and increasing regulatory demands placed on these smaller water systems, TUD assumes that it will acquire all of these systems by 2040. Based on this assumption, the estimated acquisition growth rate between 2020 and 2040 is projected to be 2 percent for systemwide annual growth, which is slightly higher than the historic acquisition growth rate of 1.58 percent. After 2040, a historic annual connection growth rate of 0.84 percent is anticipated. It should be noted that acquisition of each smaller water system includes not only the infrastructure but also the associated water supply that currently serves the water system.

2.2.2.2 Account Category Growth Rates

TUD provides treated water to single family, multi-family, commercial, industrial, institutional, and landscape customers as shown in Table 2-2. Historic growth rates for each customer category were used to project the number of multi-family, commercial, industrial, institutional, and landscape connections for 2021 to 2045. As stated previously, TUD anticipates that the projected growth rate will increase slightly over the historic growth rate. It is assumed that this increase in growth rate will mainly affect single family connections. Therefore, for this UWMP, single family connections account for the difference between the projected and historical total connection growth to meet the established total active connection combined growth rate of 2.34 percent. Table 2-2 summarizes the growth rates established by account category and total number of historic and projected connections.

Table 2-2: Number of Connections and Growth Rate by Account Category

Year	Account Category						
	Single Family	Multi-family	Commercial	Industrial	Institutional/ Government	Landscape	Total Active Connections
1992	7,977	203	734	9	103	38	9,064
2010	11,550	350	1,025	11	156	50	13,142
2015	11,679	350	1,046	11	156	50	13,292
Historic Growth Rate (1992-2020)	1.42%	1.97%	1.38%	0.72%	1.59%	1.70%	1.43%
2020	11,843	351	1,076	11	160	61	13,502
2025	13,117	387	1,152	11	173	66	14,907
2030	14,527	427	1,234	12	187	72	16,459
2035	16,087	471	1,321	12	203	79	18,172
Projected Growth Rate (2025-2030)	1.61%	1.49%	1.17%	0.54%	1.31%	2.29%	1.58%
2040	17,768	520	1,459	13	216	88	20,063
Projected Growth Rate (2035-2040)	2.05%	1.98%	1.53%	0.67%	1.52%	1.85%	2.00%
2045	18,516	542	1,520	13	233	96	20,920
Projected Growth Rate (2040-2045)	1.74%	1.70%	1.40%	0.66%	1.50%	1.89%	1.71%

Notes:

1. Based on calendar year.
2. Wholesale and fire connections are not considered active connections and are not included in the Total Active Connections numbers.
3. The growth rates in bold were used to project account category connections.

Based on the system and account classification growth rates, residential connections were projected through 2045. The persons-per-connection ratio of 2.51 was established using the 2010 U.S. Census population data (30,524) and the total number of TUD residential connections recorded for 2010 (11,900) and used to estimate the projected service area population shown in Table 2-3. A summary of historic and projected residential connections and population is presented in Table 2-3.

Table 2-3: Historical and Projected Population

Year	Service Area Population	Service Area Household Connections
2010	30,524	11,900
2015	29,998	12,029
2020	30,910	12,194
2025	33,928	13,504
2030	37,570	14,954
2035	41,599	16,558
2040	45,945	18,288
2045	48,787	19,057

Notes:

1. Based on calendar year.
2. Dashed line represents division between historic and projected data.
3. 2015 to 2035 residential connections are based on an annual increase of 2.34 percent in connections, then an increase of 0.87 percent between 2035 and 2040.
4. Service area population is derived from the 2.56 persons per connection ratio established based on 2010 U.S. Census Block Groups for the Tuolumne County.

2.3 Historical Water Use

Historical water use data from 1999 to 2020 were analyzed in order to provide an overview of historical water usage for the TUD Treated Water and Raw Water Systems. Figure 2-1 shows the historical potable use and raw water use from 1999 through 2020.

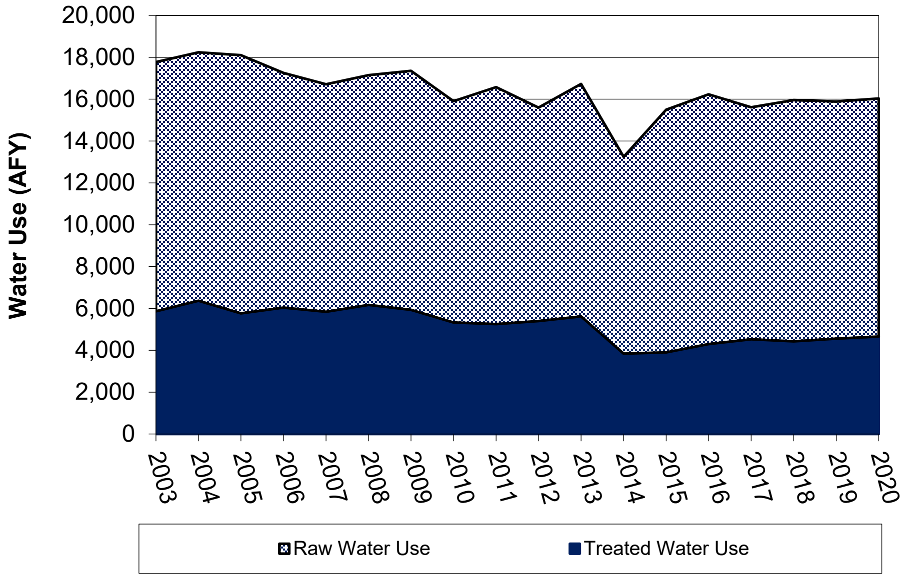


Figure 2-1: Historical Treated and Raw Water Use

Historical water use data from 2003 to 2020 were analyzed to provide an overview of historical water usage for the TUD Treated Water and Raw Water systems. Figure 2-1 shows the historical potable water use and raw water use from 2003 through 2020.

Figure 2-1 shows an overall decline in treated water demand and raw water demand of 25 percent and 11 percent, respectively, from 2003 to 2020. The decline in water use is a result of several factors including: TUD implementing significant water conservation efforts in 2012, 2014 and 2015, including a statewide drought that forced mandatory water reductions and conservation in many areas from 2012-2017. Additionally, significant improvements have been made to improve efficiencies in the TUD treated and raw water systems since 2003. Water use has generally stayed the same over the last four years despite a 1.2 percent increase in connections.

Table 2-4 shows the historical treated water demand by customer type for 2005 through 2020, and Table 2-5 shows the historical raw water demand for 2005 through 2020.

Table 2-4: Treated Water System Historical Water Use by Customer Type (AF)

Year	Treated Water System							
	Single Family	Multifamily	Commercial	Industrial	Institutional	Landscape	Wholesale	Total
2005	3,486	356	347	3	390	80	279	4,941
2006	3,373	358	515	2	351	83	304	4,988
2007	3,430	364	524	2	357	85	260	5,022
2008	3,547	377	542	2	370	88	278	5,202
2009	3,280	348	501	2	342	81	289	4,843
2010	3,106	319	351	3	347	71	208	4,405
2011	2,696	309	390	3	385	83	216	4,082
2012	3,004	307	440	3	430	81	221	4,486
2013	3,120	345	550	3	447	88	235	4,788
2014	2,364	259	483	1	205	45	191	3,548
2015	2,116	245	495	1	193	44	153	3,247
2016	2,562	250	504	1	223	64	180	3,784
2017	2,318	261	401	1	238	76	176	3,471
2018	2,378	266	474	1	253	81	167	3,619
2019	2,279	248	445	0	244	108	182	3,505
2020	2,562	269	440	0	258	83	191	3,804

Note:

1. Based on calendar year.

Table 2-5: Raw Water System Historical Water Use by Customer Type (AF)

Year	Raw Water System		
	Agriculture	Wholesale	Total
2005	2,697	595	3,292
2006	2,848	604	3,452
2007	2,829	591	3,420
2008	2,812	557	3,369
2009	2,695	504	3,199
2010	2,366	501	2,867
2011	2,710	467	3,177
2012	2,734	504	3,238
2013	2,757	517	3,274
2014	2,781	370	3,152
2015	2,806	373	3,178
2016	2,735	400	3,135
2017	2,657	421	3,078
2018	2,670	428	3,098
2019	2,577	450	3,027
2020	2,616	470	3,086

Note:

1. Based on calendar year.

2.4 Distribution System Water Loss

Currently, TUD maintains 11 separate water systems and has prepared a water loss analyses in accordance with the American Water Works Association Methods for each system for the years 2016-2019. The treated water loss reported in this plan is derived based on this methodology and is the total apparent and real losses derived for all 11 water systems maintained by TUD. The total annual system loss is listed below in Table 2-6.

Table 2-6: Estimated Water Losses (2015-2020)

Submittal Table 4-4 Retail: Last Five Years of Water Loss Audit Reporting	
Reporting Period Start Date 01/2015	Volume of Water Loss (AF)
01/2016	955
01/2017	1,031
01/2018	727
01/2019	724
01/2020	700
NOTES:	

At the current time, a water loss standard has not been adopted by the State of California. Future UWMPs prepared by TUD will report on compliance with any State water loss standards.

2.5 Existing and Targeted Per Capita Water Use in TUD Service Area

> ***CWC 10608.36***
>
> *Urban wholesale water suppliers shall include in the urban water management plans… an assessment of their present and proposed future measures, programs, and policies to help achieve the water use reductions required by this part.*

In the 2020 UWMP a water supplier must demonstrate compliance with the target established in the 2015 UWMP. Compliance is done through completion of the DWR SBX7-7 Compliance Form submitted as Appendix H1 of the 2020 UWMP. TUD's 2015 UWMP SBX7-7 Verification Tables are submitted as Appendix H2.

TUD first reported its Base Daily Water Use in its 2010 UWMP. However, at the time the 2010 UWMP was prepared, complete 2010 Census data was not available. TUD is therefore required to recalculate the Base Daily Water Use calculation in this UWMP, utilizing 2010 Census data.

SBX7-7 baselines and target calculations are required for the District's retail Treated Water System only.

2.5.1 Baseline Per Capita Water Use

The first step in the process of determining the water use target is calculation of the baseline per capita water use (baseline GPCD). In order to calculate the baseline GPCD, service area population within the TUD service area was estimated using the methodology described in Section 2.2 and compared to actual water use records. The following baseline GPCD calculations identified in SBX7-7 were evaluated for the TUD Treated Water System:

- 10- to 15-year base period – Average water use over a continuous 10-year period ending no earlier than 31 December 2004 and no later than 31 December 2010. For retailers with at least 10 percent of 2008 demand served by recycled water (either retail or wholesale-provided), this calculation may be extended to include an additional 5 years.

- 5-year base period – Estimate of average gross water use reported in GPCD and calculated over a continuous 5-year period ending no earlier than 31 December 2007 and no later than 31 December 2010.

The baseline periods were evaluated using water supply data for the years ending 31 December 1999 through 31 December 2010. The base water use was calculated for each year commencing with 1999. Table 2-7 below presents the base period ranges, total water deliveries, and the volume of recycled water delivered in 2008; in order to determine the number of years that can be included in the base period range. The TUD Treated Water System currently provides no recycled water; therefore a 10-year base period was utilized. Also shown in Table 2-7 is the actual start and end years for the selected base period range.

Table 2-7: Base Period Ranges

Base Period	Parameter	Value	Units
10-year base period	2008 total water deliveries	6,168	AF
	2008 total volume of delivered recycled water	0	AF
	2008 recycled water as a percent of total deliveries	0	percent
	Number of years in base period	10	Years
	Year beginning base period range	1999	
	Year ending base period range	2008	
5-year base period	Number of years in base period	5	Years
	Year beginning base period range	2003	
	Year ending base period range	2007	

Note:

1. Table format based on DWR SBX7-7 Verification Table 1.

The average annual daily per capita water use in GPCD is provided in Table 2-8.

Table 2-8: Baseline Daily Per Capita Water Use

Baseline Year		Service Area Population	Annual Gross Water Use^1 (AFY)	Daily Per Capita Water Use (GPCD)
10 to 15 Year Baseline GPCD				
Year 1	1999	25,841	5,148	178
Year 2	2000	26,184	5,273	180
Year 3	2001	27,241	5,729	188
Year 4	2002	27,604	5,808	188
Year 5	2003	28,104	5,588	177
Year 6	2004	28,995	6,083	187
Year 7	2005	29,384	5,483	167
Year 8	2006	30,067	5,734	170
Year 9	2007	30,246	5,583	165
Year 10	2008	30,377	5,890	173
10-15 Year Average Baseline GPCD				**177**
5 Year Baseline GPCD				
Year 1	2003	28,104	5,588	177
Year 2	2004	28,995	6,083	187
Year 3	2005	29,384	5,483	167
Year 4	2006	30,067	5,734	170
Year 5	2007	30,246	5,583	165
5 Year Average Baseline GPCD				**173**
2020 Compliance Year GPCD				
2020		30,910	4,432	**128**

Note:

1. Table format based on DWR SBX7-7 Verification Table 1.

2.5.2 Urban Water Use Target Calculation

CWC 10608.22

Notwithstanding the method adopted by an urban retail water supplier pursuant to Section 10608.20, an urban retail water supplier's per capita daily water use reduction shall be no less than 5 percent of base daily per capita water use as defined in paragraph (3) of subdivision (b) of Section 10608.12. This section does not apply to an urban retail water supplier with a base daily per capita water use at or below 100 gallons per capita per day.

Section 10608.24

(a) Each urban retail water supplier shall meet its interim urban water use target by December 31, 2015.

Section 10608.24

(d)(1) When determining compliance daily per capita water use, an urban retail water supplier may consider the following factors:

(A) Differences in evapotranspiration and rainfall in the baseline period compared to the compliance reporting period.

(B) Substantial changes to commercial or industrial water use resulting from increased business output and economic development that have occurred during the reporting period.

(C) Substantial changes to institutional water use resulting from fire suppression services or other extraordinary events, or from new or expanded operations, that have occurred during the reporting period.

(2) If the urban retail water supplier elects to adjust its estimate of compliance daily per capita water use due to one or more of the factors described in paragraph (1), it shall provide the basis for, and data supporting, the adjustment in the report required by Section 10608.40.

Retail suppliers must identify their demand reduction targets by utilizing one of four compliance methods identified in SBX7-7. The four compliance methods are as follows:

- Compliance Method 1 – 80 percent of baseline GPCD water use.
- Compliance Method 2 – The sum of the following performance standards: indoor residential use (provisional standard set at 55 GPCD); plus landscape use, including dedicated and residential meters or connections equivalent to the State Model Landscape Ordinance (70 percent of reference ETo); plus 10 percent reduction in baseline commercial, industrial institutional (CII) water use by 2020.
- Compliance Method 3 – 95 percent of the applicable state hydrologic region target as identified in the 2020 Conservation Plan (DWR 2010).
- Compliance Method 4 – A provisional method identified and developed by DWR through a public process released 16 February 2011, which aims to achieve a cumulative statewide 20 percent reduction. The method assumes water savings will be obtained through metering of unmetered water connections and achieving water conservation measures in three water use categories: (1) indoor residential, (2) landscape, water loss and other unaccounted for water and (3) commercial, industrial and institutional.

Due to the data requirements of Methods 2 and 4, which are not currently available to TUD, the District elected to evaluate Methods 1 and 3 for selecting urban water use targets for the 2020 plan. The following section provides an explanation of the target calculations and a summary of the interim and compliance water use targets.

Compliance Method 1 Calculation Summary

The Method 1 2020 water use target was calculated by multiplying the base daily GPCD by 80 percent. A 20 percent reduction in baseline use would require a reduction of 35 GPCD by 2020 as shown in Table 2-9. The 2015 interim target would be 159 GPCD and water use target of 142 GPCD by 2020. Table 2-9 provides a summary of the reduction requirements.

Table 2-9: 2020 Water Use Target Method 1 Calculation Summary

Description	Units	Baseline	2015 Interim Target	2020 Compliance Target
Per Capita Water Use	**GPCD**	**177**	**159**	**142**
Percent Reduction	%	n/a	10	20

Compliance Method 3 Calculation Summary

The Method 3 2020 water use target was calculated by multiplying the respective hydrologic region target by 95 percent. TUD is located in the San Joaquin River hydrologic region (Region 4), which has a hydrologic region target of 174 GPCD. Ninety-five (95) percent of the hydrologic region target results in a 2020 compliance target of 165 GPCD. Table 2-10 presents the results of the Method 3 calculation:

Table 2-10: 2020 Water Use Target Method 3 Calculation Summary

Description	Units	10-year Baseline	2015 Interim Target	2020 Compliance Target
Per Capita Water Use	**GPCD**	**177**	**171**	**165**
Percent Reduction	%	n/a	3	7

Minimum Compliance Reduction Target

Systems with a baseline per capita water use of greater than 100 GPCD must calculate a minimum water use reduction, which the 2020 water use target cannot exceed. The minimum water use reduction compliance target is 95 percent of the 5-year rolling average base daily per capita water use (ending no earlier than 31 December 2007 and no later than 31 December 2010). By this method, the minimum 2020 reduction compliance target for TUD is 165 GPCD, as presented in Table 2-11 below:

Table 2-11: Minimum Water Use Reduction

Description	Units	5-year Baseline	2020 Compliance Target
Minimum Allowable 2020 Target	**GPCD**	**173**	**165**
Percent Reduction	%	n/a	5

Interim and Compliance Water Use Targets

The interim and compliance water use targets are provided per Section 10608.20(e) of the Act. Since both the Method 1 and 3 compliance targets are at or below the minimum reduction; Compliance Method 3 was selected by TUD. As a result, Table 2-12 shows the 2020 SBX7-7 compliance target for the TUD Treated Water System is 165 GPCD and the 2015 interim water use target is 171 GPCD. The implementation plan for achieving these targets is described in Section 7, Conservation Programs and Demand Management Measures.

Table 2-12: SBX7-7 Water Use Reduction Targets (GPCD)

Baseline	2015 Interim Target	2020 Compliance Target
177	171	165

In 2020, TUD's Treated Water System demand was 128 GPCD; therefore, TUD has met the 2015 Interim Target of 171 GPCD and the 2020 Compliance Target of 165 GPCD. The District will not adjust its compliance GPCD for weather normalization, economic adjustment, or extraordinary events. The District plans to continue to implement DMMs to maintain compliance, as discussed in Section 7.

2.5.3 Achievement of Target

As shown in Table 2-13, TUD is in compliance with the 2020 Target, with an actual 2020 GPCD of 128. DWR has allowed for optional adjustments to the 2020 GPCD, including extraordinary events, economic adjustments, and weather normalization. TUD made no such adjustments to the 2020 GPCD, as compliance was achieved without these factors.

Table 2-13: SBX7-7 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)*		
128	0	128	165	YES

**All cells in this table should be populated manually from the supplier's SBX7-7 2020 Compliance Form and reported in Gallons per Capita per Day (GPCD)*

NOTES:

The SBX7-7 water use for TUD in 2020 is 128 GPCD and the 2020 compliance target goal is 165 GPCD. TUD plans on continuing water conservation methodology to continue to achieve the target compliance goals set forth by SBX7-7. TUD has been able to achieve compliance by enforcing a strong commitment to customers, mitigating water loss through water monitoring, continuous water system auditing to pinpoint areas that require attention and provide infrastructure improvements to maintain efficiency within District.

2.6 Projected Water Use

Growth projections for the number of service connections and volume of water use were calculated for the years 2020 through 2045, in 5-year increments. Future water demands were estimated based on the Treated Water System historical-trend growth rates and water use records.

2.6.1 Water Use Data Collection

Historical water use records from 2005 through 2020 were analyzed to generate estimates of future water demands. The treated water sales data were sorted by customer type using the assigned North American Industry Classification System codes. The sorted water sales data were then further grouped into the following six categories: single family, multifamily, industrial, commercial, institutional/government, and landscape.

2.6.2 Demand Forecast Methodology

A water use factor was calculated for each Treated Water System customer category in order to quantify the average water used per metered connection. For a given customer type, the unit water use factor is calculated as the total treated water sales for the category divided by the number of active service connections for that category. The unit water use factors for each customer type were averaged over the data range in order to obtain a representative water use factor that can be used for determining water demand projections by customer type.

For the District’s average treated water use factors, the period from 2000 through 2013 was considered representative of average retail water demand. Years 2014-2015 water use was considered atypical due to mandatory conservation imposed by the Governor’s drought emergency declarations so were not included in the calculation. Table 2-14 presents the treated water use factors, in units of AFY per connection, calculated for each customer category.

Table 2-14: Average Treated Water Use Factors (AFY Per Connection)

	Account Category					
	Single Family	Multi-family	Commercial	Industrial	Institutional	Landscape
Treated Water Use Factor (1)	0.246	0.876	0.446	0.161	2.023	1.498

Note:

1. Based on an average of customer treated water use data from calendar years 2005 through 2013.

Treated water use projections are based on the historical number of metered service connections by account category. The average growth rates established in the population growth analysis in Section 2.2.2 were applied to the number of connections in each customer category to project the future number of service connections. Projected treated water use was then estimated by multiplying the number of projected active service connections for each customer category with the corresponding customer average water use factor from Table 2-14. The methodology and the derivation of all applicable growth rates used for service connection projections were discussed in detail in Section 2.2.2.

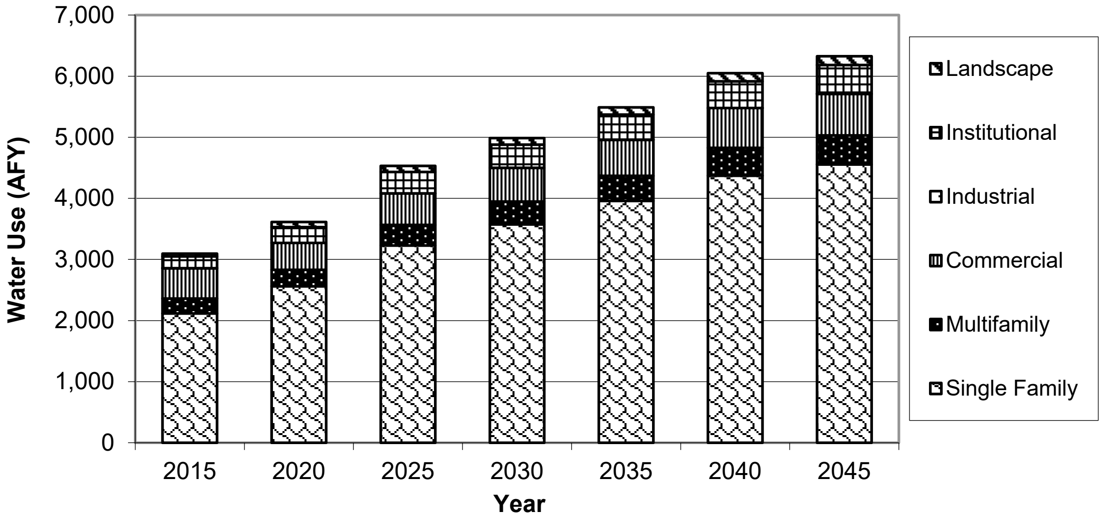


Figure 2-2: Historical and Projected Treated Water Use by Customer Type

The projections of the number of service connections, and the resulting treated water demand, are provided in Table 2-17.

Table 2-15: Historical and Projected Number of Active Treated Water Service Connections and Treated Water Use

Year [2]	Projection Type	Account Category						
		Single Family	Multi-family	Commercial	Industrial	Institutional	Landscape	Total
2015	No. of Accounts	11,144	334	989	11	146	48	12,672
	Water Use (AF)	3,486	356	347	3	390	80	4,662
2020	No. of Accounts	11,550	350	1,025	11	156	50	13,142
	Water Use (AF)	3,106	319	351	3	347	71	4,197
2025	No. of Accounts	11,679	350	1,046	11	156	50	13,292
	Water Use (AF)	2,116	245	495	1	193	44	3,094
2030	No. of Accounts	11,843	351	1,076	11	160	61	13,502
	Water Use (AF)	2,562	269	440	0	258	83	3,612
2035	No. of Accounts	13,117	387	1,152	11	173	66	14,907
	Water Use (AF)	3,227	339	514	2	350	99	4,531
2040	No. of Accounts	14,527	427	1,234	12	187	72	16,459
	Water Use (AF)	3,574	374	550	2	379	108	4,987
2045	No. of Accounts	16,087	471	1,321	12	203	79	18,172
	Water Use (AF)	3,957	412	589	2	410	118	5,488

Notes:

1. Based on calendar year.
2. All connections are metered.

Raw water use projections are based on the average non-acquisition growth rates established by historical trends for treated water sales. The resulting raw water projection is shown in Table 2-16.

Table 2-16: Historical and Projected Raw Water Use (AF)

Water Use	2010	2015	2020	2025	2030	2035	2040	2045
Raw Water	2,366	2,806	2,616	2,631	2,630	2,633	2,549	2,658

Note:

1. Based on calendar year.

2.6.3 Sales to Other Agencies

TUD sells treated water to five (5) water companies within the County: Sonora Water Company, Sonora Meadows Mutual Water Company, Muller Mutual Water Company, Leisure Pines Mutual Water Company, Tamarron Mobile Home Park, and Sleepy Hollow Water Association. TUD also sells raw water to eight (8) water companies within the County: Twain Harte Community Services District (THCSD), Twain Harte Valley (TH Valley), Peppermint Creek, Mi Wuk Village, Oneto Esta Water, Sawmill Flat Water, and Last Chance Water. It is expected that these wholesale companies combined will experience approximately the same annual growth rate of 0.87 percent that TUD has identified for non-acquisition growth in Section 2.2. The historic and projected volume of water delivered to these other agencies is summarized in Table 2-17.

Table 2-17: Historical and Projected Wholesale Water Use

Water Distributed	2005	2010	2015	2020	2025	2030	2035	2040	2045
Treated Water									
Sonora Water Company	145	111	81	116	87	58	28	0	0
Sonora Meadows Mutual Water Company	116	81	59	63	47	31	16	0	0
Muller Mutual Water Company	17	16	12	11	8	6	3	0	0
Leisure Pines Mutual Water Company(1)	0	0	0	0	0	0	0	0	0
Tamarron Mobile Home Park(1)	0	1	1	1	1	1	1	1	1
Subtotal	279	208	153	191	143	96	48	0	0
Raw Water									
THCSD	333	289	186	240	250	261	272	284	296
TH Valley	36	37	27	40	42	43	45	47	49
Cedar Rock Water(2)	9	9	8	8	9	9	9	10	10
Peppermint Creek	67	71	67	79	82	86	89	93	97
Mi Wuk Village	98	61	53	64	67	69	72	75	79
Oneto Esta Water	9	9	8	10	10	11	11	12	12

Water Distributed	2005	2010	2015	2020	2025	2030	2035	2040	2045
Sawmill Flat Water	35	17	16	19	20	21	22	23	24
Lastchance Water	8	9	8	10	10	11	11	12	12
Subtotal	595	501	373	470	490	327	163	0	0
TUD Wholesale Total	873	709	526	661	633	422	211	0	0

Notes:

1. Based on calendar year
2. Leisure Pines Mutual Water Company and Tamarron Mobile Home Park use TUD connections for emergency purposes only.

SBX7-7 defines a wholesale urban water supplier as an urban water supplier which supplies more than 3,000 acre-feet (AF) annually for wholesale potable municipal use. As shown in Table 2-17, TUD does not meet this definition and therefore is not considered a wholesale urban water supplier.

2.6.4 Other Water Uses and Unaccounted-for Water

> ***CWC 10631***
>
> ***(d)(1)*** *For an urban retail water supplier, quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, based upon information developed pursuant to subdivision (a), identifying the uses among water use sectors, including, but not limited to, all of the following:*
>
> **(J)** *Distribution system water loss.*
>
> **(2)** *The water use projections shall be in the same five-year increments described in subdivision (a).*
>
> **(3)(A)** *The distribution system water loss shall be quantified for each of the five years preceding the plan update, in accordance with rules adopted pursuant to Section 10608.34.*
>
> **(3)(B)** *The distribution system water loss quantification shall be reported in accordance with a worksheet approved or developed by the department through a public process. The water loss quantification worksheet shall be based on the water system balance methodology developed by the American Water Works Association.*

Table 2-18 provides a summary of projected other water uses and unaccounted-for water in the TUD Treated and Raw Water System.

In order to estimate total water demand, other water uses must be added to the customer demands. State regulation requires water suppliers to quantify any additional water uses not included as a part of water use by customer type. TUD estimates other water uses as: fire department fire hydrant testing, distribution flushing, and use of hydrants for County. These other water uses total approximately 3% annually and are projected to increase with the projected population growth through 2045.

Unaccounted-for water must also be incorporated when projecting total water demand. Unaccounted-for water is defined as the difference between annual production and supply and annual sales. Included in the unaccounted-for treated water are system losses due to leaks, mainline breaks, inaccurate meters, and water used in operations. In 2005 and 2010, unaccounted-for treated water averaged approximately 16 percent of the total production, and unaccounted-for raw water is estimated to average about 55 percent of the total supply. Unaccounted for treated water will be reduced as treatment and distribution system improvements are implemented, estimated as 12 percent of total production beginning in 2025. Unaccounted for raw water is estimated to remain flat or decline as improvements are made to the raw water conveyance systems. Table 2-18 provides a summary of the projected unaccounted-for water within TUD Treated and Raw Water Systems.

Table 2-18: Historical and Projected Additional Water Uses and Losses (AFY)

Water-Use Type	2020	2025	2030	2035	2040	2045
Treated Water						
Other Water Uses	120	141	155	171	188	197
Unaccounted-for System Losses (2)	700	652	718	790	870	910
Raw Water						
Other Uses and Unaccounted-for System Losses (3)	8,461	8,210	7,966	7,730	7,501	7,279
Total	**9,281**	**9,003**	**8,839**	**8,691**	**8,559**	**8,386**

Notes:

1. Based on calendar year.
2. Unaccounted-for treated water includes system losses due to leaks, reservoir/tank overflows, inaccurate meters, unauthorized connections, line breaks, as well as water used in operations. The values presented in this table for 2020 were analyzed using the AWWA Water Audit Software for the year 2020. Projected treated water losses were estimated using an estimated loss of 12 percent of demand, beginning in 2025.
3. Much of the unaccounted-for volume falls outside of TUD jurisdiction and control and is associated with the year-round conveyance and operation of the Main Tuolumne Canal, natural losses due to flow in Power Creek, natural losses that support the aquatic habitat and ground water recharge at Phoenix Lake, including environmental flows on Sullivan Creek. Additionally, the annual unaccounted-for volume associated with the TUD raw water conveyance system depends upon many factors including time of year, temperature, and length of ditch. The year-round conveyance losses include ecological functions for the local terrestrial and aquatic habitat and species, supporting recreational uses and supporting the historic properties of the ditch system all that derive benefits from which there is significant community value as outlined in the various studies listed in Section 1.9.2.

Since the 2015, new legislation requires the UWMP analysis to include the reporting of retailer distribution system water loss for the most recent 12-month period available. This was summarized in Table 2-18 for the District’s treated water system, and the complete reports are provided in Appendix J. For future UWMP updates (i.e., 2020, 2025, etc.) the distribution system water loss shall be quantified for each of the five years preceding the plan update. As of January 1, 2017, legislation requires that retailers conduct and report distribution treated water loss on an annual basis. The data from these audits will be reported in UWMP cycles.

2.6.4.1 Low Income Projected Water Demands

> ***CWC 10631.1***
>
> *(a) Include projected water use for single-family and multi-family residential housing needed for lower income households, as identified in the housing element of any city, county, or city and county in the service area of the supplier.*

Senate Bill 1087 requires that water use projections of a UWMP include the projected water use for single family and multi-family residential housing for lower income households as identified in the housing element of any city, county, or other applicable general plan.

Housing elements rely on the Regional Housing Needs Assessment (RHNA) generated by the State Department of Housing and Community Development (HCD) to allocate the regional need for housing to the regional COG (or HCD for cities and counties not covered by a COG) for incorporation into housing element updates. Before the housing element is due, the HCD determines the total regional housing need for the next planning period for each region in the state and allocates that need. The COGs then allocate to each local jurisdiction its “fair share” of the RHNA, broken down by income categories; very low, low, moderate, and above moderate, over the housing element’s planning period.

The County last updated Chapter 3, Housing Element, of the Tuolumne County General Plan in 2014. The County’s Housing Element identifies the target number of low income households from 2014 to 2019 as 16 percent of the population and very low income as 23 percent. The County is assumed to be demographically representative of the TUD service area. Therefore, water use projections for single and multi-family households based on the low and very-low income categories (39 percent), classification percentage, and calculated treated water demand projections are shown in Table 2-19 below.

Table 2-19: Lower Income Treated Water Demand Projections (AFY)

	2020	2025	2030	2035	2040	2045
Single Family	1,002	1,262	1,398	1,548	1,710	1,782
Multi-family	105	133	146	161	178	186
Total	1,107	1,395	1,544	1,709	1,888	1,967

Notes:

1. Based on calendar year.
2. Calculations based on 2014 Adopted Tuolumne County General Plan Chapter 3, Housing Element allocation for very low income (23 percent) and low income (16 percent) for a total lower income population percentage of 39 percent.

Lower Income Preference Policy

Pursuant to Government Code Section 65589.7, it is TUD's policy to grant a priority to proposed developments seeking water or sewer service that includes housing units affordable to lower income households. To further this policy, TUD adopted the following procedures:

TUD will not deny or condition the approval of an application for services to, or reduce the amount of service by, a proposed development that includes housing units affordable to lower income households unless TUD makes a specific written finding that the denial, condition, or reduction is necessary due to the existence of one or more of the following:

1. TUD does not have "sufficient water supply" as defined in paragraph (2) of subdivision (a) of Government Code Section 66473.7, or is operating under a water shortage emergency as defined in Section 350 of the California Water Code, or does not have sufficient water treatment or distribution capacity, to serve the needs of the proposed development, as demonstrated by a written engineering analysis and report.

2. TUD is subject to a compliance order issued by the State Department of Health Services that prohibits new water connections.

3. The proposed development is seeking sewer service, and TUD does not have sufficient collection, treatment, or reclamation capacity, as demonstrated by a written engineering analysis and report on the condition of the collection, treatment, or reclamation works, to serve the needs of the proposed development.

4. The proposed development is seeking sewer service, and TUD is under an order issued by a Regional Water Quality Control Board (RWQCB) that prohibits new sewer connections.

5. The applicant failed to agree to reasonable terms and conditions relating to the provision of service generally applicable to development projects seeking service from TUD, including but not limited to the requirements of local, state, or federal laws, and regulations or payment of a fee or charge.

2.6.5 Effects of Codes, Standards, and Ordinances

The earliest codes and standards for water fixtures and appliances came from the Federal Energy Policy Act of 1992 (taking effect in 1994). Besides Department of Energy (DOE) regulations, the codes and standards affecting water use in California are contained primarily in the CALGreen Building Code, the California Plumbing Code, California Water Code, and California Appliance Efficiency Standards.

The 2010 California Green Building Standards Code (CALGreen) set new standards for the flow rates of plumbing fixtures in new construction. The 2010 CalGreen Code went into effect on January 1, 2011 and its purpose was to reduce indoor water use in California buildings by 20 percent. The code also required that for buildings over 50,000 sq ft separate water meters be provided (e.g., required that multifamily dwellings have individual rather than master meters). The 2010 CalGreen Building code did have some provisions for outdoor water use including a requirement for automatic irrigation systems utilizing weather and/or soil moisture-based irrigation controllers and a requirement that new landscapes of a given size conform to water budgets of either local ordinance or the State Model Water Efficient Landscape.

Updates to the CALGreen code in 2012 expanded the scope of CALGreen to include not just new construction but additions and alterations to buildings.

During the 2015-2016 drought, CALGreen was amended to require that new landscapes of a given size conform to water budgets of either local ordinance or the State Model Water Efficient Landscape, whichever is more stringent. In addition, the Code was amended to further reduce the allowable flow rate of faucets and urinals. Subsequently the CALGreen Code was revised to reduce the maximum flow rate of showerheads to align with Appliance Efficiency Regulations. This included a requirement that for all newly constructed residential developments, including hotels and motels, where disinfected tertiary recycled water was available from a municipal source, include provisions for potable water supply and a recycled water supply.

Starting January 1, 2017, California regulation required that upon sale all single-family, multifamily, and commercial real property disclose all noncompliant plumbing fixtures. Effectively, as a condition of sale all residential and commercial properties built prior to January 1, 1994, will need to replace all noncompliant plumbing fixtures with water conserving plumbing fixtures including toilets, shower heads, and faucets.

Unlike showerheads, faucets, and toilets, clothes washers are not covered by the California Plumbing Code, but rather regulated by the DOE. The current standards for residential clothes washers took effect in 2018. The standards, which were based on a consensus agreement between manufacturers and efficiency advocates, specify minimum energy and water efficiency levels. The metric for water efficiency is the integrated water factor (IWF), which is expressed in terms of gallons of water consumed per cubic foot of washer capacity. A lower IWF indicates better water efficiency. The standards specify an IWF of 6.5 for top-loading machines and 4.7 for front loading machines. Standard residential clothes washers have a capacity of approximately 4 cubic feet. There is limited water savings potential in new California homes; existing homes, particularly those built prior to 1980 represent a huge source of potential water savings. Conversely, the age of the housing stock is an indication of the affect that codes and standards likely have on water demands. If the majority of the housing stock is older, the effect of the codes and standards is limited. If the growth rate of the service area is slow, the effect of codes and standards is also limited.

Since 2016, TUD has completed many projects to improve its infrastructure. Infrastructure improvements consist of dam rehabilitation, ditch maintenance, treated water pipe replacements, tank replacements, pump stations and more. These improvements were implemented due in-part to recent legislation passed by the State but primarily due to general necessity to upgrade and replace aging infrastructure. Recent Legislation assisted TUD to streamline projects to comply with codes, standards, and ordinances. These improvements have also assisted TUD with analyzing where water loss occurs. TUD has been conducting water loss audits and distribution meter and customer meter calibrations. Meter data is being analyzed periodically to maintain the District in compliance with the State’s Water Code.

2.6.6 Effects of Climate Change on Water Use

Climate change can increase the evaporation and seepage rates that occur in the storage reservoirs (Lyons Reservoir and Pinecrest Lake), the South Fork Stanislaus River, and along the raw water conveyance systems including the PG&E Main Tuolumne Canal, Power Creek, Phoenix Lake, TUD open raw water ditches, raw water storage ponds, and natural creeks used to convey water. Additionally, due to hotter temperatures and longer duration of hotter temperatures, it is naturally expected that water use by customers will increase to compensate for increased water demand on landscape, gardens, evaporative coolers (swamp coolers) and water uses such as pools. The District is continually updating its capital improvement plan to reduce water loss in its infrastructure and to encourage customers to use water in compliance with new state regulations including Senate Bill 555 and Senate Bill 606.

2.6.7 Characteristic Five-Year Water Use

A new requirement for the 2020 UWMP cycle is the preparation of a five-year Drought Risk Assessment (DRA), in which water suppliers compare available water supplies with projected water use for the drought period. The first step in preparing the DRA is estimating expected gross water use (unconstrained demands) for the next five years (2021 to 2025) without drought conditions, i.e., without accounting for short-term demand reduction actions or other drought effects.

Table 2-20 presents estimated normal year water use over the next five years, based on factors anticipated to impact water use over the planning period, as described above. As noted above, baseline water demands take into account ongoing water conservation programs and permanent water conservation measures implemented by the District. These demands represent unconstrained demands.

Table 2-20: Projected Five-Year Water Use (2021-2025)

Use Type	2020	2021	2022	2023	2024	2025
Single Family	2,562	2,874	3,225	3,618	4,060	4,555
Multifamily	269	301	338	378	424	475
Commercial	440	480	523	570	622	678
Industrial	0					2
Institutional	258	291	329	371	418	472
Landscape	83	93	104	116	130	145
Total	**3,612**	**4,040**	**4,518**	**5,054**	**5,654**	**6,327**

2.7 Total Water Demand

TUD provides municipal treated water and raw water to customers for agriculture irrigation and wholesale water customers which were not quantified in urban treated water demand.
Table 2-21 summarizes the water demands and additional uses to calculate the projected water demand total for TUD.

The demand projections below do not include water use reductions due to additional implementation of Demand Management Measures (DMM) or other conservation activities discussed in Section 7.

Table 2-21: Projected Treated and Raw Water Sales, Additional Water Uses and Losses, and total Water Demand (AFY)

Year	Treated Water			Raw and Recycled Water				Water Demand Total
	Retail Treated Water Sales	Add. Treated Water Uses & Losses	Sales to Other Agencies	Agriculture Irrigation as Raw Water	Ag Irrigation as Recycled Water	Wholesale Deliveries	Add. Raw Water Uses and Losses	
2020	3,613	820	191	2,616	1,592	470	8,461	17,762
2025	4,531	793	143	2,631	1,640	390	8,210	18,338
2030	4,987	873	96	2,630	1,690	290	7,966	18,533
2035	5,488	961	48	2,633	1,743	190	7,730	18,793
2040	6,048	1,058	0	2,549	1,796	0	7,501	18,952
2045	6,327	1,107	0	2,658	1,852	0	7,279	19,222

Note:

1. Based on calendar year.

TUD's projected retail treated water demand results in per capita demands which are less than the required interim 2015 and 2020 SBX7-7 targets. Figure 2-3 shows the projected treated water demand through 2045 compared to the total water demand required by SBX7-7 with conservation. TUD plans to continue implementation of DMMs, as further discussed in Section 7, to maintain compliance with SBX7-7 water use targets.

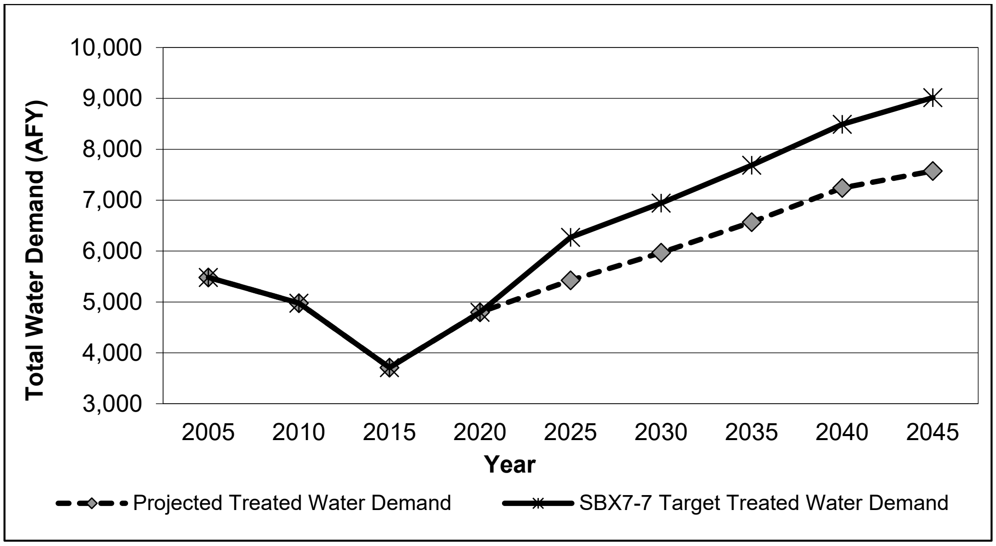


Figure 2-3: Total Water Demand

Section 3: Water Resources

3.1 Overview

A detailed evaluation of water supply is required by the Act.

CWC 10631

(b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a), providing supporting and related information, including all of the following:

(1) A detailed discussion of anticipated supply availability under a normal water year, single dry year, and droughts lasting at least five years, as well as more frequent and severe periods of drought, as described in the drought risk assessment. For each source of water supply, consider any information pertinent to the reliability analysis conducted pursuant to Section 10635, including changes in supply due to climate change.

(2) When multiple sources of water supply are identified, a description of the management of each supply in correlation with the other identified supplies.

(3) For any planned sources of water supply, a description of the measures that are being undertaken to acquire and develop those water supplies.

(4) If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information

(A) The current version of any groundwater sustainability plan or alternative adopted pursuant to Part 2.74 (commencing with Section 10720), any groundwater management plan adopted by the urban water supplier, including plans adopted pursuant to Part 2.75 (commencing with Section 10750), or any other specific authorization for groundwater management for basins underlying the urban water supplier's service area.

(B) A description of any groundwater basin or basins from which the urban water supplier pumps groundwater. For those basins for which a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the urban water supplier has the legal right to pump under the order or decree. For a basin that has not been adjudicated, information as to whether the department has identified the basin as a high- or medium-priority basin in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to coordinate with groundwater sustainability agencies or groundwater management agencies listed in subdivision (c) of Section 10723 to maintain or achieve sustainable groundwater conditions in accordance with a groundwater sustainability plan or alternative adopted pursuant to Part 2.74 (commencing with Section 10720).

(C) A detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(D) A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the urban water supplier. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(c) Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.

> (h) *Include a description of all water supply projects and water supply programs that may be undertaken by the urban water supplier to meet the total projected water use, as established pursuant to subdivision (a) of Section 10635. The urban water supplier shall include a detailed description of expected future projects and programs that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in normal and single-dry water years and for a period of drought lasting five consecutive water years. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program.*

This section addresses the TUD water supply sources and provides details in response to those requirements of this portion of the Act.

3.2 Local Water Supplies

TUD currently obtains its water supply from two primary sources: surface water from the South Fork of the Stanislaus River under TUD's Agreement with PG&E, and TUD operated groundwater wells. TUD also uses disinfected secondary treated recycled wastewater for irrigation to agriculture lands. The recycled water supply does not replace treated water but supplements a portion of the raw water supply to agricultural customers. Recycled water is discussed in Section 4.

The surface water supply from the South Fork of the Stanislaus River accounts for approximately 97 percent of the supply available for potable use. Groundwater in the County is limited due to the hard, impermeable bedrock that covers most of the County. The current and planned water from PG&E is based on the minimum available water supply as calculated during critical dry years. A more detailed description of how this minimum volume is calculated is provided in Section 6 and the Safe Yield analysis (hydrologic modelling) performed by Western Hydrologics (Appendix M). The minimum water supply from PG&E is calculated to be 20,100 AF as summarized in Table 3-1. A third component of TUD's water supplies, as shown in Table 3-1, is from recycled water in the form of disinfected secondary treated wastewater to customers for agriculture irrigation uses. This recycled water displaces a small portion of raw water that would otherwise be supplied for agriculture irrigation purposes. While recycled water is included in the total water supply, TUD recognizes that the recycled water supply can never exceed the agriculture irrigation use demands.

Table 3-1: Current and Planned Water Supplies (AFY)

Source	2015	2020	2025	2030	2035	2040	2045
Water planned from PG&E	24,500	20,100	20,100	20,100	20,100	20,100	20,100
Groundwater	1,465	1,465	1,465	1,465	1,465	1,465	1,465
Recycled water	1,627	1,592	1,640	1,690	1,743	1,796	1,852
Total	27,593	23,157	23,205	23,256	23,308	23,362	23,417

Note:

1. Based on calendar year.

3.2.1 Surface Water

Surface water is supplied to TUD from the South Fork of the Stanislaus River (SFSR) under a 1983 Agreement with PG&E (1983 Agreement). Under the 1983 Agreement, PG&E transferred ownership of the Tuolumne Water System to the County. The water system and the PG&E water supply Agreement was transferred from the County to TUD in 1992. The 1983 Agreement provides that PG&E will continue to provide, in perpetuity, a water supply to the TUD Water System under PG&E's water rights in the South Fork of the Stanislaus River, including PG&E's Lyons Reservoir and Pinecrest Lake (also known as Strawberry Reservoir), and delivered through PG&E's Main Tuolumne Canal. The Main Tuolumne Canal is used to deliver water to the Phoenix Powerhouse where TUD then takes delivery of water for the Sonora and Jamestown areas.

The 1983 Agreement states that PG&E will provide a "base supply" delivered to diversion points along the Main Tuolumne Canal prior to the headworks of the Phoenix Penstock to supply the higher elevation regions of the TUD Water System. The agreement provides that a “supplemental supply" volume of water be delivered through Lyons Reservoir from Pinecrest Lake storage typically occurring after Labor Day and through the end of the calendar year of each year. The volume of water under the Agreement each year are not quantified, but are formula-determined, based on the amount of natural flow of the South Fork of the Stanislaus River for a given year and what can be made available to the TUD water system each year from PG&E's facilities on the SFSR. Additional water is available for purchase depending on timing of runoff in each year. A copy of the 1983 Agreement with PG&E is available at the District office.

TUD receives water supply from two Hydropower systems located on the SFSR; the Phoenix and the Spring Gap Stanislaus Hydroelectric Projects. Pacific Gas and Electric Company (PG&E) owns and operates the Phoenix Hydroelectric Project consisting of Lyons Reservoir located on the SFSR, the 15.4-mile-long Main Tuolumne Canal (MTC) that delivers water from the SFSR at Lyons Reservoir to the PG&E forebay, the penstock that discharges ultimately to the Phoenix powerhouse located in Sonora. TUD receives water supply from the MTC at points before and after the powerhouse as listed below and as shown on Figure 1-6:

- Section IV turnout in Twain Harte adjacent to the Districts Sierra Pines property.
- Head of the Columbia Ditch or Phoenix Forebay located at the end of the MTC near the intersection of Old Oak Ranch Road and Northridge Road in Big Hill.
- Phoenix Reservoir which is fed by tail water that exits the powerhouse and is conveyed via Power Creek.
- The Districts’ Cedar Ridge and Crystal Falls water treatment plants
- In addition, TUD customers draft directly from the MTC between Twain Harte and the Phoenix Forebay.

PG&E operates the Phoenix system primarily for consumptive use for the TUD system. PG&E has been engaged in relicensing the Phoenix project with the Federal Energy Regulatory Commission (FERC) since 2017[1]. PG&E also owns and operates Pinecrest Lake on the SFSR, the Philadelphia Diversion on the SFSR and the Spring Gap powerhouse located on the Middle

---

[1] The Phoenix Project is described in more detail in Sections 3 and 4 of the Phoenix Hydroelectric Project (FERC Project No. 1061) Pre-Application Document (PAD), August 2017, Pacific Gas and Electric Company.

Fork of the Stanislaus River (MFSR) as part of the Spring Gap-Stanislaus Hydroelectric Project (SGS)[2]. The Philadelphia diversion for the SGS project diverts water from the SFSR to the Spring Gap Powerhouse on the MFSR and uses both the natural flow of the SFSR and water stored in Pinecrest Lake for power generation at the SGS powerhouse. Both PG&E and TUD monitor the SGS diversions to the MFSR to ensure that TUD water supply can be met in each year. Reservoir storage capacities, annual unimpaired flow and TUD demand are provided for perspective and in Figure 1-6.

- Lyons Reservoir Capacity: 5,465 AF (1,500 AF minimum storage for water quality)
- Pinecrest Lake Capacity: 18,300 AF (3,500 AF minimum storage end of year regulation)
- Average annual unimpaired flow of the SFSR: 120,000 acre-feet (1976-2020)
- Unimpaired Dry Year (2014): 35,000 AF
- Unimpaired Wet Year (2017): 221,000 AF
- Unimpaired Critically Dry Year (1977): 25,000 AF
- Average Annual TUD Demand (gage S17): 16,000 AF
- Minimum Instream Flows (gage S51): Varies, 5 CFS dry years, 10 CFS wet years

TUD receives an annual allotment of water from the MTC via the 1983 TUD - PG&E contract that cycles first from the natural flow of the SFSR, second from the storage collected in Lyons Reservoir and third from the storage collected in Pinecrest Lake. The annual flow of the river and cycle of the reservoirs fill each year and normally satisfy all beneficial uses including domestic supply, environmental flows, recreation, and energy generation. However, historically dry conditions and diversions of water for power generation at the Philadelphia diversion and regulations on the PG&E hydroelectric systems have impacted water supply at two notable “pinch points” in the cycle.

1. Labor Day Pinecrest Lake Elevation State and Federal requirements: TUD demand and Minimum Instream Flows (MIF) are met with water from Pinecrest Lake starting at the end of the summer around Labor Day. Historically, under dry conditions, prior to Labor Day, water from Pinecrest Lake was used to fulfill the MIF and demand; however, State and Federal regulations were placed on Pinecrest Lake (requiring the operators to target 5,610 feet elevation at Labor Day, where in dry years Pinecrest Lake may fall below this elevation). This regulation requires TUD to obtain approval from regulatory authorities to receive water from Pinecrest Lake prior to Labor Day[3].

2. Limited reservoir capacity: Both reservoirs are relatively small and are drawn down each year to provide water supply for TUD, MIF and discretionary diversions to the SGS for hydropower generation leaving relatively little carry-over storage at the end of the calendar year. Although the area historically receives sufficient precipitation each year, low storage levels, low snowpack and extended dry weather can create uncertainty in the amount of surface water

---

[2] For additional details, see the Final Environmental Impact Statement for the Spring Gap-Stanislaus Hydrologic Project – FERC Project No. 2130 Hydropower License.

[3] Under the Water Quality Certification Program, the State Water Quality Control Board placed an elevation requirement in 2009 for Pinecrest Lake for 5,608 feet elevation for Labor Day with little flexibility for dry years. An amendment to this condition was released in February of 2020 allowing more flexibility based on a naturally occurring end of spill. Conditions placed by the USDA Forest Service in 2009 requires approval of the Pinecrest Draw Down Curve and Pinecrest Lake water Level for Labor Day in each year.

available to TUD each year. It is not uncommon for weather patterns to take until February or March for enough snow to accumulate demonstrating, with certainty, the reservoirs will fill. Unusually low reservoir levels, low snow accumulations and dry forecasts may prompt water conservation at this point in the cycle until enough snow has accumulated to fill both reservoirs.

The minimum Safe Yield for the surface water supply from PG&E is found to be 20,100 acre-feet based on a study performed by Western Hydrologics, February 2021 using hydrology records for the South Fork Stanislaus River for all years spanning 1922 to 2017. The 20,100 acre-feet is based on the most critically dry year, 1977 followed by 1924. A more detailed description of critical dry year volume is provided in Section 6.

3.2.2 Groundwater

Groundwater from TUD wells provides approximately three (3) percent of the domestic water supplied annually to TUD customers. The majority of available groundwater is transient and found in fractured rock. The County is located within the foothills and higher elevations of the Sierra Nevada where the subsurface material consists primarily of impermeable granitic and greenstone bedrock which can result in a low groundwater yield. DWR's Bulletin 118 provides a detailed description of groundwater basins in California, which are generally alluvial; the DWR Bulletin does not identify or describe any groundwater basins underlying the District as there are no alluvial basins.

Currently, the non-critical year capacity of TUD wells is approximately 1,465 AFY. Table 3-2 shows TUD's wells and their estimated potential annual yield.

Table 3-2: Estimate Groundwater Well Capacity

TUD Groundwater Well Name	Estimated Well Capacity (AFY)
Apple Valley #1	73.0
Apple Valley #2	128.0
Apple Valley #3	181.3
Brentwood	29.0
Caylor	0.0
Cedar Ridge Springs	120.0
Comstock	15.0
Confidence #1	12.0
Confidence #2	8.0
Crystal Falls Business Park	29.0
Crystal Falls Plant	95.0
Cuesta Center	10.0
Lambert	10.0
Marble Quarry	0.0
Mono Village #2	80.0
Mono Village #7	72.0
Oakridge Ranch	26.0
Peaceful Pines	19.0
Phoenix Lake	62.0
Rybar #1	20.0
Rybar #2	20.0

TUD Groundwater Well Name	Estimated Well Capacity (AFY)
Scenic Brook #1	0.0
Scenic View	30.0
Wards Ferry #1	150.0
Wards Ferry #2	25.0
Wards Ferry #4	20.0
Mill Villa	181.0
Springfield #5	50.0
Maximum Production	**1,465**

TUD will continue to use the limited groundwater supply available from its wells as needed each year. Table 3-3 provides a summary of TUD's groundwater pumping history from the calendar years 2010 through 2020 and the percent of groundwater relative to the total water supply. TUD has not adopted a groundwater management plan under Part 2.75 (commencing with Section 10750) of the California Water Code nor has the groundwater supply in the District been subject to any adjudication.

Table 3-3: Groundwater Pumping History by TUD (AF)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Metered Pumping	163	170	136	141	143	93	93	108	127	122	140
Percent of Total Water Supply	0.6%	0.6%	0.5%	0.5%	0.5%	0.3%	0.4%	0.5%	0.6%	0.5%	0.6%

Note:

1. Based on calendar year.

TUD groundwater usage has declined from a high of about 280 AF in 2003 to approximately 140 AF in 2020. It has been the general objective for TUD to reduce reliance on ground water wells while preserving the ability to utilize groundwater under surface water shortages or emergency conditions. TUD projects that well usage from 2020 will increase at approximately the same rate as the overall population growth rate described in Section 2. It is assumed that communities dependent on groundwater wells will continue to be dependent on these sources as growth occurs in these areas. As small systems are acquired, it is assumed that wells associated with those systems will also be acquired; however, this additional groundwater supply is not included in this UWMP. The projected groundwater pumping volumes through 2045 as summarized in Table 3-4 are well below the potential annual yield listed in Table 3-3 above.

Table 3-4: Projected Groundwater Pumping Amounts by TUD System (AF)

	2025	2030	2035	2040	2045
Metered Pumping	146	152	158	165	172
Percent of Total Water Supply	0.6%	0.7%	0.7%	0.7%	0.7%

Note:

1. Based on calendar year.

3.3 Transfers and Exchanges

TUD is not pursuing water transfers or exchanges at this time. The current terms of the 1983 Agreement with PG&E appear to provide sufficient water for TUD's current and projected needs through 2045. TUD would consider any future opportunities for short-term water transfers and/or exchanges with others if TUD would benefit from such an agreement.

3.4 Wholesale Agency Supply Data

There are no direct deliveries of imported water supply to the TUD Water System.

3.5 Development of Desalination

Section 10631 (g) of the Act requires an evaluation of desalination opportunities. The Act states the following:

> ***CWC 10631***
>
> *(g) Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply.*

Per requirements of 10631(g) of the Act, this section presents opportunities to use desalinated water as a future water supply source for TUD.

Water sources available for development in the County are groundwater, surface water and related recycled water. None of those sources have quality limitations due to salinity levels. Groundwater wells in this area that yield water that is either unfit for consumption or laden with naturally occurring minerals, such as arsenic, are not in use. Surface water is diverted from the South Fork of the Stanislaus River and is treated to municipal standards through conventional methods. All recycled water is used for permitted uses on agriculture irrigation fields. There are no opportunities for development of desalinated water within the service area.

3.6 Embedded Energy Current Supply Portfolio

TUD maintains an accounting of the electric energy use separated by treated water and wastewater systems. TUD has records to sort this energy use by Distribution and Treatment as noted in the table below. The energy intensity for all combined categories is estimated as the total energy used for water systems divided by the total treated water produced for all 11 combined TUD treated water systems. This energy is further sorted by Distribution and Treatment. The energy intensity for the TUD wastewater system is the total energy used divided by the total volume of recycled water produced. TUD also maintains many backup generators that operate during power outages to provide energy to critical pumps and systems. These generators are fueled by both diesel and propane. The energy used in these backup systems are not included in the energy analysis.

Appendix O contains the energy use calculations for TUD's water system for the years 2016 to 2020. As shown in Table 3-5 and Table 3-6, In 2020, the estimated energy intensity for retail potable water deliveries and wastewater and recycled water was 471.3 kWh/AF and 99.3 kWh/AF, respectively.

Table 3-5: Estimated Energy Use in 2020 – Retail Potable Deliveries

Table O-1A: Recommended Energy Reporting - Water Supply Process Approach

Enter Start Date for Reporting Period	1/1/2020	**Urban Water Supplier Operational Control**							
End Date	12/30/2020								
☐ Is upstream embedded in the values reported?		**Water Management Process**						**Non-Consequential Hydropower (if applicable)**	
Water Volume Units Used		Extract and Divert	Place into Storage	Conveyance	Treatment	Distribution	Total Utility	Hydropower	Net Utility
Volume of Water Entering Process	AF	*431.8*	*671.7*	*143.9*	*4,798.2*	*4,482.56*	*4,482.56*	*0*	*4,482.56*
Energy Consumed (kWh)	*N/A*	*130,587*	*197,643*	*38,114*	*1,028,072*	*718,019*	*2,112,435*	*0*	*2,112,435*
Energy Intensity (kWh/vol.)	*N/A*	*302.4*	*294.2*	*264.9*	*214.3*	*160.2*	*471.3*	*0.0*	*471.3*

Quantity of Self-Generated Renewable Energy

0 kWh

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

Metered Data

Data Quality Narrative:

Energy consumption is metered data from PG&E billing. Volume of water entering process: treatment, is derived from the sum of monthly treated water production data in 2020. Conveyance, Place into Storage, Extract and Divert figures are calculated as a percent of overall consumption of energy to treat water. The percent is then multiplied by the total production of water. This figure is the amount of water that passed through each task. Distribution: Energy consumption is metered data from PG&E. Distribution: Volume of water entering process is derived from the sum of monthly treated water distribution data in 2020.

Narrative:

All water management processes are only utilizing electrical energy and do not produce electrical energy during the water treatment process.

Table 3-6: Estimated Energy Use in 2020 – Wastewater & Recycled Water

Table O-2: Recommended Energy Reporting - Wastewater & Recycled Water

Enter Start Date for Reporting Period	1/1/2020	**Urban Water Supplier Operational Control**			
End Date	12/30/2020				
		Water Management Process			
☐ Is upstream embedded in the values reported?		Collection / Conveyance	Treatment	Discharge / Distribution	Total
Volume of Water Units Used	AF				
Volume of Wastewater Entering Process (volume units selected above)		*312.8*	*1413*	*0*	*1,413*
Wastewater Energy Consumed (kWh)		*188,262*	*769,888*	*0*	*958,150*
Wastewater Energy Intensity (kWh/volume)		*601.9*	*544.9*	*0.0*	*678.1*
Volume of Recycled Water Entering Process (volume units selected above)		*0*	*0*	*1,592*	*1,592*
Recycled Water Energy Consumed (kWh)		*0*	*0*	*158,150*	*158,150*
Recycled Water Energy Intensity (kWh/volume)		*0.0*	*0.0*	*99.3*	*99.3*

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

0 kWh

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

Metered Data

Data Quality Narrative:

Vol. of wastewater entering management process data is a total of TUD wastewater and THCSD wastewater. Collection/conveyance are calculated by the percent of consumption of the total wastewater energy consumed. Multiplied by the total treated wastewater. The data for Vol. of recycled water entering process is the sum of TUD, JSD, and THCSD

Narrative:

All wastewater management processes are only utilizing electrical energy and do not produce electrical energy during the water treatment process.

3.7 Planned Water Supply Projects and Programs

TUD is pursuing a Central Valley Project (CVP) Water Supply Contract through the United States Bureau of Reclamation (USBR) to access water from New Melones Reservoir as an element of a long-term water supply portfolio for the District. TUD already owns pumping facilities located at the reservoir that could be used to pump the water from New Melones Reservoir into the TUD Water System at the Columbia water treatment plant. The timeline for this effort is unknown due to the nature of this process.

Additionally, TUD is in negotiations with PG&E to acquire the Phoenix Project (Federal Energy Regulatory Commission, (FERC No. 1061 and Strawberry Dam (Pinecrest Lake).

Although TUD manages many significant on-going projects, notable major water projects included in the recent District's Five-Year Capital Improvement Plan are:

- The Phoenix Lake Preservation and Restoration Plan to restore as much as 300 acre-feet of usable capacity to the Reservoir and to improve water quality is nearly complete in 2021.

- The Cuesta Heights project to consolidate storage in three existing tanks into one new tank was completed in 2021. The project eliminated two pump stations.

- The Sierra Pines WTP project is a multi-year multi-phase project that will eventually result in a regional water treatment facility being constructed on District owned land at Sierra Pines, near Twain Harte. The objective of the project is to consolidate, in phases, up to four other water treatment facilities (Cedar Ridge WTP, Crystal Falls WTP, Lakewood WTP, and Ponderosa Hills WTP). The District has completed several phases of planning, engineering, environmental analysis, and review.

- The Columbia WTP Improvements project includes upgrade to plant controls, a complete rehabilitation of a clearwell. Other recoating and improvements are scheduled for completion in 2021.

- A new wastewater treatment plant is currently in the design and planning phases and is currently slated to produce Tertiary treated water.

3.8 Anticipated Water Supply Resources in Normal, Single Dry, and 5-Year Droughts

As described further in Section 6, the water delivered to TUD originates from three different water supply formats depending on the time of year:

1. Direct diversions from the SFSR during spill conditions

2. Diversions from water storage from Lyons Reservoir in the summer.

3. Diversions from water storage from Pinecrest Lake after Labor Day until the end of the year.

The two reservoirs store 23,500 acre-feet of water and are normally drawn down to about 20 percent of this capacity in each year and are replenished each year even in the driest year on record, 1977. The system has limited carry-over storage which means that in each year, a minimum amount of precipitation occurs to ensure that that the reservoirs do fill in each year. Although TUD must manage for a 1 percent chance that a such a critically dry year (like 1977) will occur in the next year, which is further described in Section 3.2.1, any multi-year analysis will demonstrate that the system resets in each given year. That is, there is no accumulation of water shortage year to year. If there is a shortage in one year, the following year resets by filling and spilling the reservoirs. Therefore, the multi-year water supply analysis tables will show the same water supply available in each year.

Multiple dry years have negligible impact on water supply as this source does not rely on carry-over storage. If there is a dry year, the next year may see higher soil absorption and evaporation rates but will ultimately reset and fill the reservoirs effectively eliminating any deficit from the previous year. Although, a second dry year would impact other agencies in the state, the overall water use may require a larger regional water use reduction.

Section 4: Recycled Water

4.1 Overview

This section covers Section 10633 of the Act which details the requirements to provide information on recycled water and its potential use as a water source. The Act states the following:

> ***CWC 10633***
>
> *The plan shall provide, to the extent available,* information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area and shall include all of the following:
>
> (a) *A description of the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the* methods of wastewater disposal.
>
> (b) *A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.*
>
> (c) *A description and quantification of the potential uses of* recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.
>
> (d) *The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected* pursuant to this subdivision.
>
> (e) *A description of actions, including financial incentives, 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.*
>
> (f) *A plan for optimizing the use of recycled water in the supplier's 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.*

All of the wastewater collected by TUD is treated through TUD's Regional Wastewater System and Water Reclamation System. The Regional Wastewater System agency coordination, current operating system, future use and potential optimization of recycled water use are described below. The recycled water supply does not replace treated water, but replaces raw water supplied to agricultural customers.

4.1.1 Agency Coordination

Table 4-1 summarizes the role of the agencies that participated in the development of recycled water plans that affect the TUD Regional Wastewater System and Water Reclamation System.

Table 4-1: Role of Participating Agencies in the Development of Recycled Water Plans

Participating Agencies	Role in Plan Development
Water Agencies	TUD is responsible for planning recycled water distribution for their service area in coordination with Twain Harte Community Services District (THCSD) and Jamestown Sanitary District (JSD).
Wastewater Agencies	THCSD is responsible for collecting and conveying their community's wastewater to TUD and coordinating with TUD for disposal. TUD and JSD are responsible for obtaining Title 22 permits to meet recycled water quality standards.
Groundwater Agencies	TUD operates groundwater wells as part of the Treated Water System
Planning Agencies	None

4.2 Description of Wastewater and Wastewater Reclamation Systems

TUD owns and operates the RWWTP in Sonora and an associated wastewater collection and disposal system which is described below.

Regional Wastewater System

The RWWTP has a design capacity of 2.6 million gallons per day (MGD) or about 2,900 AFY. The RWWTP is a secondary level WWTP that utilizes screening, grit removal, primary clarification, trickling filtration, secondary clarification, effluent ponds, and disinfection. The RWWTP receives flow from both the TUD and THCSD wastewater collection systems.

Regional Wastewater Reclamation System

TUD's existing Regional Wastewater Reclamation System provides the conveyance of treated wastewater from the RWWTP and Jamestown Sanitary District (JSD) WWTP to private landowners for irrigation of approximately 735 acres of farm and pastureland.

The JSD WWTP is a secondary level WWTP with a design capacity of 0.42 MGD or about 470 AFY. The JSD WWTP serves the community of Jamestown. JSD has no facilities for effluent disposal and has contracted with TUD for its effluent disposal for beneficial reuse. The JSD WWTP effluent is conveyed by a TUD pump station to the Quartz Reservoir where the flow mixes with the RWWTP effluent before disposal through the Regional Wastewater Reclamation System to land. Operation of the Regional Wastewater Reclamation System and discharges to land are currently regulated under RWQCB Order No. R5-2002-0202.

TUD's existing Regional Wastewater Reclamation System consists of the following primary elements: approximately 9 miles of interceptor and collector pipelines, from 6- to 24-inch diameter; Quartz Reservoir which contains approximately 1,616 AF of usable storage; and a 60-horsepower pumping plant located at the JSD WWTP.

During the winter months, all the WWTP effluent is stored in Quartz Reservoir. During the irrigation season, the Regional Wastewater Reclamation System discharges through irrigation turnouts to 16 customers along the Upper and Lower Pipeline route. Recycled water irrigation outlets have metering equipment and control valves operated by TUD's Regional Wastewater Reclamation System personnel.

4.3 Wastewater Reclamation System Flows

The RWWTP and JSD WWTP treat wastewater for a separate population than resides within the TUD Treated Water System. Therefore, the population and flow rates presented below are based on TUD's October 2009 Updated Draft Small Community Wastewater Grant TUD Regional WWTP and Disposal System Feasibility Report (Wastewater Feasibility Report).

Prior to 2015, the Wastewater Feasibility Report assumed a 0.96 percent population growth rate and determined wastewater flow projections based on equivalent single-family residences (ESFR) however, the Tuolumne County General Plan Update (Public Review Draft) now reflects that an annual growth rate of 0.61 percent assumed between now and 2045. Table 4-2 summarizes the estimates of existing and projected volumes of wastewater collected and treated in the TUD, JSD and THCSD wastewater service areas based on this 0.61 percent growth rate. Amounts of wastewater collected each year will vary based on Infiltration and Inflow (I&I) in any given year. Amounts reflected below are estimated for normal I&I years.

Table 4-2: Estimates of Existing and Projected WW Flow from the TUD RWWTP and the JSD WWTP

	2020	2025	2030	2035	2040	2045
Projected population in service areas	22,582	23,279	23,997	24,738	25,502	26,289
Projected ESFR in service areas	12,232	12,610	12,999	13,400	13,814	14,241
Wastewater collected & treated in service areas (acre-feet)	1,592	1,640	1,690	1,743	1,796	1,852
Quantity that meets recycled water standard (acre-feet)	1,592	1,640	1,690	1,743	1,796	1,852

Notes:

1. Based on calendar year.
2. 2015 flows are based on actual flows.
3. Projected (2025-2045) values within this table are based on analysis developed for the Wastewater Feasibility Report.

4.4 Recycled Water Demand and Disposal

As shown in Table 4-3, all of the wastewater collected is treated to meet recycled water standard suitable for agricultural irrigation. Historically the volume of recycled water produced has been greater than the agricultural irrigation demand for recycled water, and excess recycled water was disposed of through dry land application (or Dry Land banking); however, the actual recycled water used in 2020 was 100 percent of the available recycled water due in part to a drought conservation and the corresponding reduction in wastewater generation. Table 4-3 lists the 2020 recycled water use by TUD customers.

Table 4-3: Existing Recycled Water Use in the TUD System

Type of Use	Treatment Level	2020 Use (AFY)
Land Application for Agriculture	Disinfected Secondary	1,592

The predominant method of effluent disposal is for irrigation of agricultural lands regulated by Waste Discharge Requirements (WDR) and Master Reclamation Permit Order R5-2002-0202. However, due to a lack of storage capacity in Quartz Reservoir prior to 2014 during high precipitation years, excess water from Quartz Reservoir may have been discharged seasonally (1 December through 15 May) to Woods Creek in accordance with WDR Order R5-2008-0162 (NPDES Permit) and Time Schedule Order R5-2010-0908 (TSO).

The TSO was issued by the Central Valley Regional Water Quality Control Board requiring compliance with the NPDES Permit. In 2009, TUD completed a study in which the preferred compliance project was to expand storage capacity at Quartz Reservoir and expand irrigation areas to transition to a 100 percent land disposal system, ceasing the need to discharge to Woods Creek. Since 2016, TUD has approximately 53 acres of irrigation area including sprinkler improvements on ranch property in the reclamation area. In addition, improvements have been completed on Quartz Reservoir to increase the storage capacity by 175 AF. On 13 September 2013, TUD submitted an updated water balance demonstrating its effluent storage and disposal system is capable of containing all wastewater on land in compliance with WDR R5-2002-0202. Therefore, the NPDES Permit, and TSO are no longer necessary. Waste Discharge Requirements Order R5-2008-0162 (NPDES No. CA0084727) and Time Schedule Order R5-2010-0908 were rescinded on February 6, 2014 by Order R5-2014-0008.

4.4.1 Planned Improvements and Expansions

Recycled water generated in excess of what is applied to agricultural irrigation is disposed of by dry land application. TUD currently has plans to increase the land disposal area including by as much as 200 acres as the need arises. In addition, TUD has implemented the planning and design phases to upgrade the Sonora Regional Wastewater Treatment Plant (SRWWTP) at the existing site that will treat the wastewater to a tertiary level of water quality.

The upgrades to the SRWWTP will be capable of treating 5.0 MGD of Max Day Flows (MDF) at a loading of 14,600 pounds of BOD per day and will have a capacity for Peak Hour Flows (PHF) of 10.0 MGD. All wastewater flows to the proposed SRWWTP process will be treated by a new headworks with primary screening and grit removal, new dual-train extended aeration activated sludge (EAAS) basins, new secondary clarifiers, a new chlorine disinfection system, and a new sludge dewatering facility. The proposed treatment upgrades will replace the existing polishing ponds with the improvements described above and will also include a new administration and electrical building, a new headworks and sludge dewatering building and a renovated digestion building where the existing anaerobic digesters will be repurposed into aerobic digesters for solids processing.

The existing secondary treatment process will be converted into an Extended Aeration Activated Sludge (EAAS) Process. The EAAS treatment method is an activated sludge process that uses a long solids retention time (SRT) of approximately 30 days to create a stabilized biological mechanism for wastewater treatment. The EAAS treatment process is characterized by the use of swinging aeration chains equipped with fine bubble diffusers to provide simultaneous mixing and aeration. The aeration chains can be individually controlled to create alternating oxic and anoxic zones within the basin, thus providing simultaneous nitrification and denitrification. The mixed liquor from the process will be clarified using typical circular secondary clarifiers. A small portion of the settled sludge will be wasted from the clarifiers, while the rest of the settled sludge from the clarifiers is recycled back to the EAAS process. This type of EAAS process has been installed at over 800 facilities across the United States and is a proven wastewater treatment system that can produce high quality effluent for disinfected secondary-23 recycled water.

Table 4-4 summarizes the anticipated uses of recycled water.

Table 4-4: Potential Future Recycled Water Uses (AFY)

Type of Use	Treatment Level	Description	Feasibility	2025	2030	2035	2040	2045
Agricultural irrigation	Secondary	Increase storage and land disposal of existing system	High	1,640	1,690	1,743	1,796	1,852
Land Application for Agriculture	Tertiary	Increase the overall treated design flow capacity of Sonora WWTP and improve the effluent quality	High	560	560	560	560	560

Note:

1. Based on calendar year

Table 4-5 provides a comparison of recycled water uses projected for 2020 in the TUD 2015 UWMP to actual 2020 recycled water uses. The 2015 UWMP projected that 100 percent of the available recycled water would be used in 2020. The actual recycled water used in 2020 was also 100 percent of the available recycled water with actual flow being significantly less (approximately 30 percent) than the projected flow, with the State drought declaration and mandated water use reduction playing a significant part in that reduction.

Table 4-5: Comparison of Recycled Water Uses—Year 2015 Projections versus 2020 Actual

Type of Use	2015 Projection for 2020	2020 Actual Use
Agricultural Irrigation (AFY)	1.9	1.6
Percent of Available Recycled Water	100	100

Notes:

4.4.2 Methods to Encourage Recycled Water Use

Contracts are currently in place between TUD and local ranchers downstream of Quartz Reservoir to provide recycled water for general agricultural irrigation use. The contracts state that TUD will, in brief, provide supply to the recycled water distribution systems of individual agricultural properties, to irrigate fields and to grow live-stock feed. TUD staff optimizes system distribution by constant field and pressure checks. TUD is highly involved with the property owners to continuously encourage recycled water use. The property owners repay the capital costs of the irrigation system over the course of the contract, through water use credits, until such time that the District's initial investment has been completely recovered.

The results of these actions and incentives are quantified by the growth of the recycled water use. In 2020 all the recycled water produced by the RWWTP and JSD WWTP was used beneficially in the method stated above. Agriculture is a significant source of revenue for the County, as noted in the Tuolumne County General Plan, a firm supply of irrigation water to those users is a positive community benefit. It is forecast that all future treated wastewater will be recycled using this method. Therefore, the resulting projected recycled water use in Table 4-6 is the same as the projected amounts listed in Table 4-4.

Table 4-6: Methods to Encourage Recycled Water Use and the Resulting Projected Use (AFY)

Actions	2025	2030	2035	2040	2045
Water Use Credits	1,640	1,690	1,743	1,796	1,852

Notes:

1. Based on calendar year
2. Assumes that 100 percent of the recycled water generated will be used for agricultural irrigation.

Section 5: Water Quality

5.1 Overview

This section describes the water quality of TUD's Treated Water System, surface water and groundwater supplies, and the effects of water quality on the reliability of those supplies as required by Section 10634 of the Act. The Act states the following:

> ***CWC 10634***
>
> *The plan shall include information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments as described in subdivision (a) of Section 10631 and the manner in which water quality affects water management strategies and supply reliability.*

TUD's Consumer Confidence Report for 2020, entitled Annual Quality Report, shows TUD's 2010-2014 sampling results met state standards with the exception of secondary standards for iron and manganese in a few groundwater wells. Based on TUD's ability to provide surface water treatment and groundwater treatment where necessary and current projects designed to address existing water quality concerns, TUD does not expect water quality to impact its ability to provide treated water to its customers during the UWMP 25-year projection period between 2020 and 2045.

5.2 Surface Water Quality

TUD's water supply originates from rainfall and run off from the Sierra Nevada Mountain snowpack which travels through the watershed of the South Fork of the Stanislaus River to Pinecrest Lake and Lyons Reservoir. From Lyons Reservoir, water is conveyed through a series of open ditches, flumes and reservoirs prior to reaching the 11 surface WTPs. The largest raw water reservoir that feeds TUD's Treated Water System is Phoenix Lake. The open ditch/flume conveyance infrastructure and Phoenix Lake have the potential to degrade the quality of any water it carries simply due to the runoff of contaminates and sediment into the ditch/flume system.

The supply is characterized as having good quality for water treatment plants receiving water near the Tuolumne Main Canal in the upper elevation reaches of the TUD ditch system. However, the water supply quality of the ditch water degrades significantly for those water treatment plants that receive ditch water having been conveyed in the longer reaches of open ditches. The open ditches frequently experience spikes in turbidity and bacteriological contaminants due exposure to domestic and wild animals, human caused contaminates, storm water and general disturbances in the flowing ditch water.

As shown in Table 5-1, currently surface water can be treated to meet all drinking water standards using conventional or alternative treatment processes. *Cryptosporidium*, *Giardia lamblia* and *E.coli* which has been detected through Long Term 2 Enhanced Surface Water Treatment Rule (LT2) sampling. TUD is no longer required to provide increased performance of their SWTP based on the LT2ESWTR Bin classification and has returned to the 95th percentile performance standard of 0.3 NTU as of January 1, 2020.

Table 5-1: Summary of Surface Water Quality Assessment

Surface Water Treatment Plant	Capacity (gpm)	Certification Grade	Water Quality Issue/Concern	Existing Treatment	Recommendation
Big Hill	350	2	None	Alternative Technology	Continue or upgrade/replace treatment as necessary
Brentwood (1)	60	2	None	Conventional with Upflow Clarifier	Continue or upgrade/replace treatment as necessary
Cedar Ridge	145	2	None	Conventional with Upflow Clarifier	Continue or upgrade/replace treatment as necessary
Columbia	1050	3	None	Alternative Technology	Continue or upgrade/replace treatment as necessary
Crystal Falls	960	3	None	Conventional with Upflow Clarifier	Continue or upgrade/replace treatment as necessary
Greenley (2)	700	3	None	Alternative Technology	Continue or upgrade/replace treatment as necessary
Mono Village (2)	N/A	N/A	N/A	N/A	N/A
Monte Grande	700	2	None	Alternative Technology	Continue or upgrade/replace treatment as necessary
Ponderosa	300	2	None	Conventional with Tube Settlers	Continue or upgrade/replace treatment as necessary
Scenic View	150	2	None	Conventional with Sedimentation Basin	Continue or upgrade/replace treatment as necessary
Sonora	2800	3	None	Conventional with Sedimentation Basin	Continue or upgrade/replace treatment as necessary
Tuolumne	1300	3	None	Conventional with Sedimentation Basin	Continue or upgrade/replace treatment as necessary

Surface Water Treatment Plant	Capacity (gpm)	Certification Grade	Water Quality Issue/Concern	Existing Treatment	Recommendation
Upper Basin	660	3	None	Conventional with Upflow Clarifier	Continue or upgrade/replace treatment as necessary
Willow Springs (2)	N/A	N/A	N/A	N/A	N/A

Notes:

1. WTP is used only during a ditch outage.
2. Mono Village is Inactive and needs to be destroyed. Willow Springs facility is still in use as a Hydro Pump Station.

In addition to TUD's plans to upgrade the three (3) WTPs to address LT2 issues, TUD is a regular participant in regional water resources planning efforts and has led the development of Tuolumne-Stanislaus IRWM Group. The Tuolumne-Stanislaus Integrated Regional Water Management Plan was adopted by the IRWM Group on August 19, 2013. This plan has been used to develop projects and policies that are focused on regional management of water resources which will include a focus on sustaining and improving water quality within the upper Tuolumne River and Stanislaus River watersheds.

The Phoenix Lake Preservation and Restoration Project was funded in part by the IRWM funding and included sediment removal and wetland enhancement, sediment reuse and disposal, and tributary improvements. Most of the sediment removed from the lake was placed at a local Apple Ranch near the lake. Sediment was also be placed in strategic locations within the lake to improve water circulation and manage sedimentation. The Project involved sedimentation and flood protection improvements along tributaries lower Chicken Creek and construction of a crossing over Power Creek. Implementation of the Project increased the water supply reliability and improve water quality of Phoenix Lake.

Based on TUD's ability to provide surface water treatment and current projects designed to address existing surface water quality concerns, TUD does not expect water quality to impact its ability to provide treated water to its customers.

5.3 Groundwater Quality

Groundwater from TUD’s 23 wells provides approximately three (3) percent of the domestic water supplied annually to TUD customers. The majority of available groundwater is transient and found in fractured rock. The TUD Treated Water System and its well supplies are located within the foothills and higher elevations of the Sierra Nevada where the subsurface material consists primarily of impermeable granitic and greenstone bedrock. The quality of the groundwater has generally been good. As shown in Table 5-2 some of the wells require only chlorination while others require additional treatment due to naturally occurring constituents in the groundwater such as iron and manganese.

Table 5-2: Summary of Ground Water Quality Assessment

Groundwater Well	Estimated Well Capacity (AFY)	Status	Water Quality Issue/Concern	Existing Treatment(3)	Recommendations
Apple Valley #1	45	Active	None	Orthopolyphosphate	None
Apple Valley #2	50	Active	None	Orthopolyphosphate	None
Apple Valley #3	130	Active	None	Orthopolyphosphate	None
Brentwood	29	Standby(1)	Iron	Blended at Brentwood WTP	Continue blending
Cedar Ridge Springs	60	Active	Iron and Manganese	Blended at Cedar Ridge WTP	Continue blending
Comstock	30	Active	Iron and Manganese	Blended at Comstock Tank	Continue blending
Confidence #1	15	Standby(1)	None	None	None
Confidence #2	10	Standby(1)	None	None	None
Crystal Falls Plant	50	Active(1)	Iron and Manganese	Treated at Crystal Falls WTP	Continue treatment
Cuesta Center	10	Standby	Low pH	Orthopolyphosphate	Adjust pH as necessary
Lambert	10	Standby	Low pH	Orthopolyphosphate	Adjust pH as necessary
Mill Villa	180	Active	None	Filter	None
Mono Village #2	80	Standby	Iron and Manganese	Filter	Continue treatment
Mono Village #7	45	Active	Iron and Manganese	Filter	Continue treatment

Groundwater Well	Estimated Well Capacity (AFY)	Status	Water Quality Issue/Concern	Existing Treatment[3]	Recommendations
Oakridge Ranch	26	Standby(1)	Iron and Manganese	Sodium Hexametaphosphate	Continue treatment
Peaceful Pines	35	Active	None	None	None
Phoenix Lake Park	50	Active	Iron and Manganese	Filter	Continue treatment
Rybar #1	20	Standby	None	None	None
Rybar #2	20	Standby	Perchloroethylene	Filter with Granular activated carbon media	None
Scenic View	45	Active	Groundwater under the influence of surface water	Treated at Scenic View WTP	Continue treatment
Wards Ferry #1	105	Active	None	None	None
Wards Ferry #2	25	Standby	Bacteriological Contaminants	None	Monitor closely for contaminants and install treatment or contaminant source control as necessary

Notes:

1. Well is used only during a ditch outage.
2. All wells have chlorine disinfection.

TUD will continue to install treatment as required to address water quality concerns at each of the groundwater wells as necessary. TUD does not expect groundwater quality to impact its ability to provide treated water to its customers.

5.4 Distribution Systems Water Quality

Water distribution system monitoring is performed for several water quality parameters within the TUD water distribution systems, including general physical properties, presence of coliform bacteria, disinfectants, and disinfection by-product (DBP) levels. All monitoring parameters and levels currently meet drinking water standards.

Bacteriological sampling and analysis are performed monthly and DBP sampling and analysis is performed quarterly in accordance with TUD's sampling plan and State water quality testing guidelines. Each distribution system is unique and may differ in terms of the number and locations of samples analyzed.

TUD maintains a comprehensive cross-connection control program to reduce the hazards associated with backflow and back-siphonage. These programs are required to comply with DDW regulations on Waterworks Standards and Cross Connection Control.

TUD does not expect distribution system water quality to impact their ability to provide treated water to their customers.

5.5 Water Quality Impacts on Reliability

Impacts to the water supplies due to water quality issues are not expected based on known and proposed drinking water regulations. No change in the quantity of delivered treated surface water is projected due to water quality issues. In addition, groundwater sources do not appear to be impacted by known or proposed drinking water regulations as they relate to water quality issues. Therefore, the sources of water supply to the TUD Treated Water System are not expected to change in either quality or supply in the future, as summarized in Table 5-3.

Table 5-3: Summary of Projected Water Supply Changes Due to Water Quality Issues

Water Source	Description of Condition	2025	2030	2035	2040	2045
Treated Surface Water Projected Change (percent)	None	0	0	0	0	0
Treated Groundwater (total of 23 wells) Projected Change (percent)	None	0	0	0	0	0

Note:

1. Based on calendar year.

Section 6: Reliability Planning

6.1 Overview

Sections 10631 and 10635 of the Act require that an assessment of water service reliability for various climatic conditions be undertaken. The Act states:

> ***CWC 10620***
>
> *(f) An urban water supplier shall describe in the plan water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions.*
>
> ***Section 10635***
>
> *(a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the long-term total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and a drought lasting five consecutive water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.*
>
> *(a) Every urban water supplier shall include, as part of its urban water management plan, a drought risk assessment for its water service to its customers as part of information considered in developing the demand management measures and water supply projects and programs to be included in the urban water management plan. The urban water supplier may conduct an interim update or updates to this drought risk assessment within the five-year cycle of its urban water management plan update. The drought risk assessment shall include each of the following:*
>
> *(1) 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 five consecutive water years, starting from the year following when the assessment is conducted.*
>
> *(2) A determination of the reliability of each source of supply under a variety of water shortage conditions. This may include a determination that a particular source of water supply is fully reliable under most, if not all, conditions.*
>
> *(3) A comparison of the total water supply sources available to the water supplier with the total projected water use for the drought period.*
>
> *(4) 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.*

This section provides a water supply and demand assessment for TUD for a normal year, a single-dry year, and multiple-dry years. The following is a summary of the water supply reliability of the TUD Treated Water System sources: PG&E surface water and groundwater.

6.2 Reliability of Water Supply

As introduced in Section 3, TUD receives water for the Treated Water System from two (2) primary sources: surface water through the Agreement with PG&E and groundwater.

The surface water supply from the South Fork of the Stanislaus River accounts for approximately 89 percent of the total available water supply and approximately 97 percent of the supply available for potable use. In general, TUD’s supply is expected to be 100 percent reliable through 2045 in normal years. This reliability is a result of the historic reliability and availability of the South Fork of the Stanislaus River, groundwater supply, and recycled water for agricultural irrigation. The reliability and vulnerability of the water supply to TUD are discussed below in terms of seasonal and climatic shortages and regulatory impacts.

6.2.1 Surface Water Supply Reliability

TUD has historically used 24,500 AFY as the minimum volume of available surface water from the South Fork of the Stanislaus River. Recently, a new Safe Yield analysis (hydrologic modelling) was performed by Western Hydrologics, Water and Hydropower Consulting to confirm and update this figure. The Safe Yield was determined to be 20,100 AFY in 2020. This analysis is presented in Appendix M. The difference between the two figures is based on regulatory conditions that have been placed on the Spring Gap-Stanislaus Hydroelectric project (new minimum instream flows and Pinecrest Lake elevation requirements) since the old study was performed. The Safe Yield of 20,100 AFY will be used in this UWMP update as the minimum available surface water volume. The Western Hydrologics modelling assumes a minimum Pinecrest Lake Elevation of 5,603 feet at Labor Day and that the local Forest Service would approve this Pinecrest Lake elevation under such unusually dry conditions. The model assumes a minimum storage level at Lyons Reservoir of 1,200 acre-feet and minimum of 3,500 acre-feet for Pinecrest at the end of the calendar year (see Appendix K).

<u>Hydrologic Records and Modeling</u>

The Safe Yield analysis uses historic Stanislaus River hydrologic data from 1922 to 2017 and concluded that the annual safe yield available to TUD is 20,100 acre-feet. This figure is based on the rare 1976–1977-year sequence and becomes the primary driver for the water supply reliability and planning for TUD for the potential return of a dry year like 1977. The hydrology of 1977 has approximately 30 percent less runoff than the next driest year, 2014. Further discussion is provided in in this section that presents how a dry year similar to 1977 could apply to pinch points in the annual hydrologic cycles that may impact water supply for TUD.

To help illustrate the relative context and occurrences of multiple dry years, Table 6-1 was developed to show the annual unimpaired flow for the Stanislaus River into New Melones Reservoir, the annual unimpaired flow at the SFSR, the Peak snow water equivalent (SWE) for the watershed to Pinecrest Lake and the annual Sonora rainfall for Dry and Critically Dry water years.

Table 6-1: Summary Historic Full Natural Flow – Stanislaus River

Year	Unimpaired Runoff Stanislaus River Inflow to New Melones (AF)[1]	Unimpaired Runoff South Fork Stanislaus River Inflow at Lyons Reservoir (AF)[2]	Lower Relief Valley, April 1st Snow Water Equivalent (SWE)[3]	Annual Sonora Rainfall (Inches)[4]	Water Year Type[5]
Average (2000-2020)	1,103,000	110,000	22	22	N/A
1976	371,000	49,000	11	15	Critical-Dry
1977	155,000	25,000	9	16	Critical-Dry
1978	1,590,000	154,000	58	43	Normal-Wet
2012	624,000	56,000	18	20	Dry
2013	627,000	64,000	28	23	Normal-Dry
2014	370,000	36,000	20	17	Dry
2015	326,000	38,000	2	17	Critical-Dry
2016	1,081,000	105,000	42	33	Normal-Wet
2018	965,000	105,000	26	24	Normal-Dry

Notes:

1. Compiled from the unimpaired runoff for the Stanislaus River below Goodwin Reservoir (aka inflow to New Melones) for each year, https://cdec.water.ca.gov/
2. Compiled from reservoir and flow data obtained from United States Geological Survey (USGS) National Water Information System: Web Interface, USGS Water Resources. https://waterdata.usgs.gov/
3. Lower Relief Valley Snow Station, REL, https://cdec.water.ca.gov/
4. Sonora Rainfall, Station ID: SOR, https://cdec.water.ca.gov/dynamicapp/QueryWY
5. Water Year Types as described in the PG&E Spring Gap Stanislaus Hydrologic Project Forest Service 4e conditions.

Based on observation of all years in the hydrologic record, the peak snow measurements in April, the annual local rainfall totals and Five-Dry Year sequences since 1977 shown in Table 6-1, any Five-Year sequence always has an annual water supply availability above the 1977 Safe Yield of 20,100 AFY.

SWRCB Decision Amended

Relicensing of the PG&E Spring Gap Hydroelectric Project also resulted in a 2009 California State Water Resources Control Board (SWRCB) condition that Pinecrest Lake water elevation be held at or above a minimum lake elevation (5,608 feet) in the summer months through the Labor Day holiday. Under this condition, if Pinecrest Lake elevations were to drop below the minimum lake elevation naturally, no withdrawals from Pinecrest Lake would be allowed for TUD prior to Labor Day. This condition was amended in August 2020 allowing lake levels down to 5,603 feet under early end of spill conditions. As presented in Section 3.2.1, Pinecrest Lake levels below 5,610 at Labor Day still requires approval from the Forest Service.

6.2.2 Groundwater Supply Reliability

The pumping amounts for the TUD groundwater wells are adequate and reliable for the approximately 530 customers that rely on isolated groundwater well systems as their primary source of water within the TUD system. For the reliability calculations presented below, TUD is conservatively assuming that the wells could be impacted by reduction in capacity as a result of seasonal or climatic reductions in precipitation levels. When calculating sustained pumping during a critical dry year, TUD assumes that the District's wells in Table 6-2 could sustain 50 percent of the total potential annual yield of 1,465 AFY, equating to approximately 733 AFY. TUD assumes a 50 percent reduction in groundwater availability due to the lack of available data on Sierra foothills wells. However, TUD will continue to monitor the capacities of their groundwater wells to try to better estimate the climate and seasonal variations on groundwater well production.

Table 6-2 provides a comparison potential annual yield to projected demands for each of the four isolated groundwater distribution systems. As shown in Table 6-2, each isolated groundwater system has adequate supply to meet the dry weather condition assumption of 50 percent reduction in the well system's potential annual yield to meet demand projections through the year 2045.

Table 6-2: Isolated Groundwater Distribution System Supply and Demand Comparison

Well Only Systems	Maximum Potential Annual Yield from Wells	Production (AFY)					2040 Surplus Supply		Treatment
	AFY	2020	2025	2030	2035	2040	Surplus Yield	% of Annual Yield	
Apply Valley	382	63	66	69	72	75	307	80	Ortho-poly phosphate
Peaceful Pines	19	8	8	9	9	9	10	51	none
Phoenix Lake Park	62	8	8	9	9	9	53	85	Filter
Wards Ferry	195	18	19	20	21	22	173	89	none

Note:

1. Based on calendar year.

6.2.3 Recycled Water Supply Reliability

Recycled water is used to supplement and offset raw surface water for agricultural irrigation and is considered 100 percent reliable in all year types. The demand for recycled water is intentionally flexible and is used exclusively by local ranchers located downstream of the wastewater treatment facility and quartz reservoir to irrigate pasture for livestock. In dry years if the volume of available recycled water is less than the requested demand for pasture irrigation, ranchers either forgo pasture irrigation for the season water or purchase raw water if available. Currently, the recycled water is not considered water supply for treated potable or other municipal irrigation uses.

6.2.4 Factors Resulting in Inconsistency of Supply

Table 6-3 presents factors that could potentially result in inconsistency of supply for the TUD System. The water supply projections presented in this section incorporate the District's efforts to minimize the effects of these factors on supplies identified within this table.

Table 6-3: Factors Resulting in Inconsistency of Supply

Name of Supply	Legal/Regulatory/ Operations	Environmental	Water Quality	Climatic
PG&E Surface Water	Regulatory Minimum Instream Flows on the SFSR and water level in late summer at Pinecrest Lake can impact water supply availability. Hydroelectric project operations may impact water supply availability.	Water Supply is based on the natural flow of the South Fork of the Stanislaus River which is variable	Taste and Odor impacts water supply if Lyons reservoir water levels fall too low in late summer	Climatic changes affect the amount of natural flow in the South Fork of the Stanislaus River which affect available supplies
Groundwater	None	None	None, treatment is provided as required to sustain necessary water supply	TUD assumes that groundwater supply may be reduced by up to 50 percent during dry years
Recycled Water	None, all wastewater is treated to recycled water standards and is disposed of by agricultural irrigation/land application in conformance with WDR Master Reclamation Permit R5-2002-0202			None, recycled water supply is dependent on raw and potable water demand

The District is aware that climate change can affect its water supply source, the water uses of its customers, and impact the surrounding environment. In general, climate change is expected to result in hotter temperatures and longer durations of hotter temperatures for most of California and the planet. Climate change is believed to result in relatively less snow falling below the 8,000-foot elevation range. This would result in a relatively higher "snow line" and thus provide a lower "snow storage" volume in each year.

In relation to the District's water supply reliability, the result of the gradual change in snowpack taking place over the course of decades could eventually cause a relatively earlier end of spill in the Pinecrest Lake - Lyons Reservoir - South Fork Stanislaus River (SFSR) system. The average historic unimpaired flow for the SFSR is over 100,000 acre-feet, providing ample flow to satisfy TUD demand, environmental flows, and diversions to the Middle Fork of the Stanislaus River (MFSR) for hydroelectric power generation. Records show the unimpaired flow varies each year and has a one percent potential to drop to as low as conditions like 1977, which was 30 percent less unimpaired flow than any other year on record. Such a rare season would require planning and cooperation with PG&E to curtail diversions for power generation and may prompt water conservation and potentially reduce environmental instream flows. Several general observations related to climate change impacts on water supply can be made based on what is known about the watershed:

- Approximately 60 percent of the watershed above Pinecrest Lake and about 40 percent of the watershed to Herring Creek is above 8,000 feet in elevation. The total average end-of-century, April 1 Sierra's snowpack, will be just 36 percent as large as it was in the 1981-2000 where snow losses are projected by the study to be especially severe at elevations between 5,000 and 8,000 feet. This is according to a study by the UCLA Institute of the Environment & Sustainability. (Reich 2018)

- The reservoir storage for this system is quite small relative to the average unimpaired runoff; therefore, it is anticipated that both reservoirs will still fill under these basic climate change assumptions. The impacts of climate change are anticipated to manifest gradually over many years resulting in earlier spring runoffs and earlier end of spills.

- Storage in the Pinecrest Lake has provided water supply and significant diversions to the MFSR from end of spill to the end of the calendar year for the past 50 years.

- Climate change may require adjustments in management to rebalance hydroelectric operations, water supply and Pinecrest Lake level for recreation.

- As Climate Science improves the District will consider future hydrologic modeling to gage impacts to future water supply.

6.3 Average, Single-Dry, and Multiple-Dry Year Planning

The water supply cycle is described in section 3.2.1. The 2018 calendar year was determined to be representative of an average year and the 1977 calendar year was determined to be representative of the single driest year based on the Spring Gap Project data. The representative multiple-dry water year is identified as 1 June 2012 to 31 May 2016, the critical period of record for the TUD Water System. Table 6-4 lists TUD's single-dry year and multiple-dry year periods for both groundwater and surface water supplies. Despite unusually dry conditions that started in 2012, 2014 and 2015, precipitation occurred later in the winter of each of these years. The driest year on record remains 1977 and the driest five-year multiple-dry years were 2012-2016.

Table 6-4: Basis of Water Year Data

Water Year Type	Base Year(s)	Historical Sequence
	Surface Water and Groundwater	
Normal Water Year	2018	1976-2020
Single-Dry Water Year	1977	1976-2020
Multiple-Dry Water Years	2012-2016	1976-2020

Water supply projections for surface water, groundwater, and recycled water sources during normal year, single-dry year, and multiple-dry year scenarios based on the reliability discussions presented above are summarized in Table 6-5 for the TUD Water System for 2045. The normal-year supply represents the expected supply under average hydrologic conditions, the dry-year supply represents the expected supply under the single driest hydrologic year, and the multiple-dry year supply represents the expected supply during a period of five consecutive dry years.

Table 6-5: Supply Reliability for the TUD Water System for Year 2045 (AFY)

Source	Normal Water Year	Single-Dry Water Year	Multiple-Dry Water Years				
			Year 1	Year 2	Year 3	Year 4	Year 5
Surface Water[1]	20,100	20,100	20,100	20,100	20,100	20,100	20,100
Groundwater[2]	1,465	733	733	733	733	733	733
Recycled Water[3]	1,852	1,299	1,282	1,302	1,381	1,389	1,453
Total	23,417	22,132	22,115	22,135	22,213	22,222	22,286
Percent of Normal		95%	94%	95%	95%	95%	95%

Notes:

1. For the purposes of planning, TUD uses 20,100 AFY as a conservative minimum surface water supply for all year types
2. Groundwater is assumed to be impacted by reduced precipitation in dry years with an availability of 50 percent in dry years.
3. Available recycled water supply assumes that 100 percent of the wastewater collected is recycled for agricultural irrigation. Single-Dry and Multiple-Dry Years assume a reduced recycled water supply by 20 percent due to reduced water use.

As discussed above, TUD's surface water supply from the South Fork of the Stanislaus River, which accounts for 89 percent of the total available water supply and 97 percent of the supply available for potable use, is expected to be 100 percent reliable during all year types. The reliability of the surface water and groundwater combined during dry years is 97 percent of normal. TUD's total water supply is projected to be 97 percent reliable for the Year 2045 as shown in Table 6-5**.**

6.4 Supply and Demand Comparison

6.4.1 Average/Normal Water Year

Table 6-6 summarizes the service reliability assessment for a normal water year based on water supply and treated and raw water demand projections.

Table 6-6: Comparison of Projected Normal Year Supply and Demand (AFY)

	2025	2030	2035	2040	2045
Water Supply Total (AFY)[1]	23,205	23,256	23,308	23,362	23,417
Water Demand Total (AFY)	18,324	18,445	18,628	18,800	19,063
Difference (supply minus demand)	4,881	4,811	4,680	4,561	4,354
Difference as % of Supply	21%	21%	20%	20%	19%
Difference as % of Demand	27%	26%	25%	24%	23%

Notes:

1. Based on calendar year.
2. Water supply includes PG&E surface water, TUD groundwater, and recycled water, which assumes 100 percent of the wastewater collected is recycled for agricultural irrigation.

6.4.2 Single-Dry Year

Table 6-7 demonstrates the reliability of water supplies to meet projected annual treated and raw water demands for the TUD System in a single-dry year.

Table 6-7: Comparison of Projected Supply and Demand for Single Dry Year (AFY)

	2025	2030	2035	2040	2045
Water Supply Total (AFY)	22,144	22,185	22,227	22,270	22,314
Water Demand Total (AFY)	17,730	18,026	18,387	18,740	19,006
Difference (supply minus demand)	4,414	4,159	3,840	3,530	3,308
Difference as % of Supply	20%	19%	17%	16%	15%
Difference as % of Demand	25%	23%	21%	19%	17%

Notes:

1. Based on calendar year.
2. Water supply includes PG&E surface water, TUD groundwater, and recycled water, which assumes 100 percent of the wastewater collected is recycled for agricultural irrigation.

6.4.3 Multiple-Dry Year

Table 6-8 presents the projected multiple-dry year water supply and demand assessment.

Table 6-8: Projected Multiple-Dry Year Water Supply and Demand Assessment (AFY)

Year	Supply (AFY)	Demand (AFY)	Difference	Diff. as % of Supply	Diff. as % of Demand
2013	22,132	17,510	4,622	21%	26%
2014	22,115	14,153	7,961	36%	56%
2015	22,135	16,427	5,707	26%	35%
2016	22,213	17,209	5,005	23%	29%
2017	22,222	16,579	5,643	25%	34%
2018	22,286	16,982	5,304	24%	31%
2019	22,351	16,956	5,395	24%	32%
2020	22,106	16,833	5,273	24%	31%
2021	22,113	17,074	5,039	23%	30%
2022	22,121	17,275	4,845	22%	28%
2023	22,129	17,477	4,651	21%	27%
2024	22,136	17,679	4,457	20%	25%
2025	22,144	17,730	4,414	20%	25%
2026	22,152	17,822	4,330	20%	24%
2027	22,160	17,914	4,247	19%	24%
2028	22,169	18,007	4,162	19%	23%
2029	22,177	18,100	4,077	18%	23%
2030	22,185	18,026	4,159	19%	23%
2031	22,193	18,130	4,063	18%	22%
2032	22,201	18,234	3,968	18%	22%
2033	22,210	18,338	3,871	17%	21%
2034	22,218	18,443	3,775	17%	20%
2035	22,227	18,387	3,840	17%	21%
2036	22,235	18,507	3,728	17%	20%
2037	22,244	18,626	3,618	16%	19%
2038	22,252	18,746	3,507	16%	19%
2039	22,261	18,867	3,394	15%	18%
2040	22,270	18,740	3,530	16%	19%
2041	22,278	18,860	3,418	15%	18%
2042	22,287	18,981	3,306	15%	17%
2043	22,296	19,101	3,195	14%	17%
2044	22,305	19,222	3,083	14%	16%
2045	22,314	19,006	3,308	15%	17%

Notes:

1. Based on calendar year.
2. Water supply includes PG&E surface water, TUD groundwater, and recycled water, which assumes 100 percent of the wastewater collected is recycled for agricultural irrigation.

6.4.4 Summary of Comparisons

As shown in Table 6-6, Table 6-7, and Table 6-8, TUD's combined water supplies of surface water, groundwater and recycled water are able to meet demand projections through 2045 under the normal, single dry-year and multiple dry-year scenarios.

6.5 Drought Risk Assessment

The Water Code requires that every urban water supplier include in its UWMP a drought risk assessment for its water service to its customers. This is to benefit and inform the demand management measures and water supply projects and programs to be included in the UWMP.

TUD utilizes several sources of data to assess the TUD water supply and demands in terms of a Five-Year Drought Risk Assessment. Data for the annual unimpaired flow on the Stanislaus River is compared to the annual TUD Demand for the driest five-year sequence on record to assess potential impacts to water supply due to a multi-year drought. TUD has compiled and maintains the data for the annual historic unimpaired flow to New Melones Reservoir, the SFSR, snow measurement data for the SFSR watershed and Sonora annual rainfall totals spanning 1974 to present. Table 6-1 is an abbreviated version of that data showing the 1977 (driest year) and the next driest year, 2014 included the selected dry year sequence 2012-2016.

As described in Section 2.6, water use projections are based on a historical record of meter data from 2005 through 2020, which was analyzed to develop a water use factor for each urban account category/water use type, and then applied to the estimated population growth to generate future water use estimates.

With hotter temperatures and longer duration of hotter temperatures due to climate change, it is naturally expected that water use by customers will increase to compensate for increased water demand on landscape, gardens, evaporative coolers (swamp coolers) and water uses such as pools. The District is continually updating its capital improvement plan to reduce water loss in its infrastructure and to encourage customers to use water in compliance with new state regulations including Senate Bill 555 and Senate Bill 606.

Climate change can also increase the evaporation and seepage rates that occur in the storage reservoirs (Lyons Reservoir and Pinecrest Lake), the South Fork Stanislaus River, and along the raw water conveyance systems including the PG&E Main Tuolumne Canal, Power Creek, Phoenix Lake, TUD open raw water ditches, raw water storage ponds, and natural creeks used to convey water.

The annual water supply availability for the 2012-2016 sequence is assumed to occur in the next five years. This water supply availability is then compared to the demand or Gross Water Use expected in the 2021-2025 multi-year sequence. Since the hydrology for 1977 is the basis that determines the Safe Yield of 20,100 and all years since 1977 has an unimpaired flow at least 30 percent higher than 1977, then for all years in the sequence, the water supply exceeds the demands for the Five-Year Drought Risk Assessment as shown in Table 6-9 and further evaluated in the Safe Yield analysis in Appendix M.

Table 6-9: Five-Year Drought Risk Assessment

	2021	2022	2023	2024	2025
Gross Water Use	17,394	17,597	17,801	18,005	18,058
Total Water Supplies	23,166	23,175	23,185	23,195	23,205
Surplus/Shortfall w/o WSCP Action	5,771	5,578	5,384	5,190	5,147
Planned WSCP Action (use reduction and supply augmentation)					
WSCP - Supply Augmentation benefit	0	0	0	0	0
WSCP - use reduction savings benefit	0	0	0	0	0
Revised Surplus/Shortfall	5,771	5,578	5,384	5,190	5,147
Resulting % Use Reduction from WSCP action	0%	0%	0%	0%	0%

The reliability of this water supply source is vulnerable based on flow and regulatory storage and flow conditions, Hydroelectric operations, and climate over the course of a year as described in Section 3.2.1 and in further detail in the Water Shortage Contingency Plan. However, the unimpaired flow in each year, exceeds the total reservoir storage capacity, both reservoirs fill and spill in each year effectively “resetting” the water supply for each year.

6.6 Seismic Risk Assessment and Mitigation Planning

TUD updated the water elements of the Tuolumne County Local Hazard Mitigation Plan (LHMP) which was adopted by the County Board of Supervisors December 2017. TUD adopted a resolution March 13, 2019, approving the water elements and the LHMP. The LHMP can be found at the link provided in Appendix P. Sections of the LHMP address natural hazards including geologic hazards in Tuolumne County associated with potential seismic activity along the Foothills fault zone and associated ground shaking. The report further represents those peak accelerations in the developed portions of the County do not exceed 20 percent of gravity which puts the County in the lowest potential for the entire state representing a relatively low risk to TUD.

TUD has performed and completed the Risk and Resiliency Assessments (RRA) on all TUD assets in accordance with the Guidance for Small Community Water Systems on Risk and Resilience Assessment under America Water Infrastructure Act including an assessment related to seismic activity that could potentially impact TUD facilities. The assessment certification statements for each TUD system were submitted electronically to the EPA in March 2021.

TUD maintains an Emergency Response Plan Updated in 2020 that addresses natural disasters including earthquakes and the potential damage to TUD facilities due to seismic activity and the response to such events. The RRA will be incorporated in the ERP and is scheduled to be certified in June of 2021.

A Seismic Assessment Report was prepared as part of the comprehensive study completed in 2012 that assessed the vulnerability of the PG&E owned and operated Main Tuolumne Canal, including an assessment of mitigation alternatives. As a result of this study, the TUD ERP includes an Emergency Response Guide to address mitigations related to a Main Tuolumne Canal failure.

Water supply is met each year from storage provided by Lyons Dam as part of the Federal Energy Regulatory Commission Phoenix Hydroelectric Project #1061 and Strawberry Dam as part of the FERC Spring Gap Stanislaus Hydroelectric Project #2130. FERC requires that the owner/operators of these dams prepare and update the FERC Part 12D Safety Inspection Reports for these hydroelectric facilities every five years. The latest update to these reports is dated November 2017. The inspections consist of a comprehensive analysis of all elements of the dam and includes a significant assessment of seismicity related to the dam and facilities. The reports are confidential and kept on file with FERC and the Department of Water Resources, Division of Dam Safety (DSOD).

Section 7: Demand Management Measures

7.1 Overview

This section addresses the water conservation requirements of the Act for TUD and includes a summary of current and planned DMM implementation. It also provides an overview of the proposed TUD program for compliance with SBX7-7, which requires 20 percent statewide reduction in urban water use by 2020. This section is organized following the DWR Guidebook outline for DMMs. The DMM portions of the Act state the following:

> ***CWC 10631***
>
> *(e) Provide a description of the supplier's water demand management measures. This description shall include all of the following:*
>
> *(1)(A) For an urban retail water supplier, as defined in Section 10608.12, a narrative description that addresses the nature and extent of each water demand management measure implemented over the past five years. The narrative shall describe the water demand management measures that the supplier plans to implement to achieve its water use targets pursuant to Section 10608.20.*
>
> *(B) The narrative pursuant to this paragraph shall include descriptions of the following water demand management measures:*
>
> *(i) Water waste prevention ordinances.*
>
> *(ii) Metering.*
>
> *(iii) Conservation pricing.*
>
> *(iv) Public education and outreach.*
>
> *(v) Programs to assess and manage distribution system real loss.*
>
> *(vi) Water conservation program coordination and staffing support.*
>
> *(vii) Other demand management measures that have a significant impact on water use as measured in gallons per capita per day, including innovative measures, if implemented.*
>
> *(2) For an urban wholesale water supplier, as defined in Section 10608.12,a narrative description of the items in clauses (ii), (iv), (vi), and (vii)of subparagraph (B) of paragraph (1), and a narrative description of its distribution system asset management and wholesale supplier assistance programs.*
>
> *(f) Include a description of all water supply projects and water supply programs that may be undertaken by the urban water supplier to meet the total projected water use, as established pursuant to subdivision (a) of Section 10635. The urban water supplier shall include a detailed description of expected future projects and programs that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in normal and single-dry water years and for a period of drought lasting five consecutive water years. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program.*
>
> *(g) Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply.*

7.2 Demand Management Measures for Retail Agencies

The following DMM descriptions are organized according to the DWR Guidebook format. The DMMs described below include a description of TUD's current program. Specific implementation over the past five years and planned implementation are described in Section 7.3 and 7.4, respectively.

7.2.1 Water Waste Prevention Ordinances

The District's Water Rules and Regulations (amended 12 November 2019) contain multiple regulations discouraging and prohibiting water waste:

- 2.10.2 Pressure Regulators Required - The intent of this Regulation is to limit excessive and wasteful use of water as a result of high pressures at point of use.
- 5.01 Disconnection and Restoration of Service - Excessive or wasteful use of water as described in Section 12, after notice by mail or in person that the same be terminated.
- 5.11 Water Misuse - No customer shall knowingly permit leaks or waste of water. Where water is wastefully or negligently used on a customer's premises, the District may discontinue the service.
- 12.03 Water Conservation Programs to be Activated in Phases – Phase I – Ongoing Water Education and Management - Prohibit wasteful use of water.
- 14.02 Responsibilities of Raw Water Customers - Water must not be used wastefully. Any customer may be refused water until conditions causing waste of water or injury to others is remedied.

Regulation No. 12, the conservation section of TUD's Water Rules and Regulations, has been in force since 1993 and was most recently revised on 12 November 2019. Regulation No. 12 provides specific ongoing water management actions during normal, low water supply, and critical dry water years. The water year type is determined based on a February or March snow survey of the South Fork of the Stanislaus River and a forecast of anticipated annual yield. The water management actions are intended to help prevent water waste. In critical water years, enforcement is in a "three step" violation process with appropriate restrictions and fines by the District on the customer. Regulation No. 12 sets forth water use violation fines and the period during which mandatory conservation and rationing measures will be in effect. TUD's Regulation No. 12 is included in Appendix L. Water conservation restrictions include:

- Postponement of irrigation season or limited outdoor watering.
- Use of potable water which results in flooding or runoff in gutters or streets.
- Use of potable water for washing aircraft, cars, buses, boats, trailers or other vehicles without shutoff nozzles.
- Use of potable water for washing buildings structures, driveways, street cleaning or other hard-surfaced areas unless required for health and safety purposes.

- Use of potable water for decorative fountains, lakes, or ponds.
- Use of potable water for sewer flushing, dust control, earth compaction.
- action, and other construction purposes.
- Use of potable water for filling or refilling of swimming pools.

Regulation No. 12 prohibits negligent or wasteful use of water, creates a process for mandatory conservation and rationing, and promotes the use of water saving devices.

7.2.2 Metering

The TUD Treated Water System has been fully metered since 2000. All new connections are required to have meters and all landscape water users must have dedicated meters. Customers are billed volumetrically, and meters are read on a bimonthly basis according to type and customer category using in-line mechanical meters of differing sizes. As of 2020, the District has installed 8,332 radio read meters (AMR) which accounts for 59 percent of the District's connections.

7.2.3 Conservation Pricing

Prior to 2015, all metered customers in the District were charged a base rate combined with a volumetric rate using a tiered water rate structure which charged a higher tiered rate as the user consumed more accumulated water within a billing period. Since 2015, included with the consumption charge, customers are allocated up to 400 cubic feet per month. After the use of 400 cubic feet, customers are charged a quantity rate. The billing unit for most accounts is by 100 cubic foot increments within tiered blocks.

After 2015, all metered customers in the District are now charged a base rate combined with a set volumetric rate for water. The base rates and quantity rates for 2016-2020 are included in Appendix L, the Water Services Charges and Rates section of TUD's Water Rules and Regulations adopted 12 November 2019. All water use types are listed separately, and the rates apply accordingly. The billing unit for most accounts is by 100 cubic foot increments within tiered blocks.

This DMM is currently fully implemented by the District per DWR requirements.

7.2.4 Public Education and Outreach

7.2.4.1 Public Information Programs

TUD has been implementing their Public Information Program since 1992. Part of this program includes regularly attending the local annual home and garden show where information packages are made available to the local community. With the recent drought situation facing most of California, the District has been taking part in a broad spectrum of public outreach activities. Water conservation information and kits are made available at the front counter at the TUD main office. Water conservation kits consist of toilet dye tablets and information how to find and fix common leaks. Water conservation information is also made available on TUD's web site at http://www.tudwater.com/conservation.

Since 2006, TUD has established a partnership with the University of California Agriculture and Natural Resources Cooperative Extension (UCCE) and the Tuolumne County Master Gardeners Program to provide public information regarding water conservation gardening and landscaping. Information from this program is distributed at the main TUD office at 18885 Nugget Blvd. Sonora CA 95370, https://ucanr.edu/sites/Tuolumne_County_Master_Gardeners/, and at other public events and upon request. Handout titles provided by this program and other sources in the past have consisted of:

- Water Conservation Tips for the Home and Garden
- Save Water in Your Garden and Landscape
- Foothill Friendly Gardening
- Gardening During Drought
- Master Gardener Classes and Events
- Master Gardener Radio Show

7.2.4.2 School Education Programs

In 2016-2019 TUD has been contracted with two local coordinators and teachers for school education programs. TUD’s coordinator provides classroom presentations to all third-grade classes in Tuolumne County – even the schools outside the District’s service area and boundary. The program, which began in 1986, meets the state education framework requirements. Instruction material has been provided by the DWR, Office of Education in the past.

Students learned about water conservation practices, respecting the water cycle, and the effects of a drought to the State of California. The program included a short video provided by DWR on “Water Who Needs It?” and a demonstration with student participation, charts, and a worksheet. Materials were also provided for students to take home and share with their parents as a reinforcement tool.

As an interactive tool, the students were asked to demonstrate what they learned from the school water conservation presentation. The District concluded the program by holding a poster drawing contest each Spring with the focus on water conservation and the water cycle.

In the absence of the School Education Programs at the elementary level, the District introduced The Pathway for Opportunity Scholarship which awards two scholarships to Tuolumne County residents in the amount of $1,000 each to attend Columbia College for a total cost of $2,000 per year. The scholarships are awarded to students interested in careers in the following: Water Resources Management, Natural Resources, Geographic Information Systems (GIS) or Engineering. Columbia College is a local community college that is in Tuolumne County.

7.2.5 Water Loss Control

Water audits are performed each year by comparing annual water production volumes, volumes of water transferred to and from the TUD Treated Water System, and total consumption volumes based on customer meter readings and AWWA M36 methodology. This comparison is performed in order to estimate the volume of unaccounted water in the TUD Treated Water System. Leaks reported by the public are typically repaired immediately. Apparent leaks identified on the customer's side of the meter are also noted and reported to the affected customer. Appendix J contains the water audit reports conducted for 2020.

The District maintains three leak detection devices used in circumstances where leaks are suspected to exist and is in the plan phase creating a database to correct the issues based on the severity level. TUD WTPs are continuously evaluated for backwash water recycling. Many other components and factors are considered and inspected such as water theft, use of unmetered water for construction, and unmetered use by other agencies.

The TUD Treated Water System consists of 11 distribution systems, identified in Section 1, which have been acquired and integrated into the Treated Water System over the course of decades. Each water system acquired by TUD was typically outdated and consisted of aging infrastructure in poor to very poor condition. Each distribution system has required significant expenditure to renovate the infrastructure in an already disadvantaged community. In terms of system water audits and water conservation, considerable progress has been achieved over the past few decades in performing these activities to achieve a higher state of operation and regulatory compliance. At the same time, there are many remaining deficiencies requiring significant renovation including aged tanks, aged pumping stations, and general water treatment operations and processes requiring new design or complete replacement. TUD's focus has been to make improvements to correct each deficiency based on priorities.

Water loss figures are reported to the TUD Operations Group to prioritize field crews to locate potential problem components and implement repairs. Leaks are repaired under priority status of population and severity of loss. The focus for TUD is to capitalize repairs or undertake replacement of infrastructure known to be in poor condition.

7.2.6 Water Conservation Program Coordination and Staffing Support

Since 1996, implementing the various details of the UWMP has required the effort of several TUD staff members. Currently, TUD has designated a member of the staff as Conservation Coordinator. The Conservation Coordinator has the responsibility of compiling program information received from conservation staff, tracking, and reporting on DMM implementation.

- Staff members spend time each month administering the TUD water conservation program. The conservation staff members, under supervision of the Conservation Coordinator, are responsible for the following activities:

- Support staff processes water conservation kits and toilet/showerhead rebate programs when it was in implementation.

- Community Affairs Specialist manages the School Education Program and contracts with outside consultant/instructor.
- Community Affairs Specialist implements most of the media, shows, web sites and related community education efforts.
- Engineering Technicians compile water flow information to analyze water consumption, account sectors, and related efforts.
- Community Affairs Specialist processes much of the water conservation public information.

7.2.7 Other DMMs

As described above, the District intends to continue to comply with the DMMs being implemented in Sections 7.2.1 to 7.2.6. TUD is responsible for administering the Residential, Landscape, and CII DMMs currently being offered to the retailers' customers.

The District encourages customers to comply with the WaterSense Specifications including conversion to High Efficiency Toilets/Showerheads and High Efficiency Clothes Washers. TUD will consider other DMM programs that provide the highest benefit/cost ratio for the customer base.

1) Residential Assistance Programs

TUD does closely monitor residential water use patterns and has a program to assist customers with unusually high-water use. A high reading or percentage will prompt a water meter technician to perform an on-site visit and check the meter reading and functionality of the meter. If it is determined that the water meter is reading correctly, a notice is then provided to the customer that high water use is detected.

TUD tracks and responds to all residential calls regarding water distribution issues including leaks, high bill complaints, or suspicions of high-water use. During a response, either a customer service person assists the customer over the phone or a water distribution technician visits the customer to investigate and discuss the problem. If there is a leak in the TUD system, it is scheduled for repair. If a leak is part of a private water system, the technician or customer service person specifically explains the functions of the water meter to assist the owner in tracking their leak. In some cases, a smart meter may be installed to assist the owner in tracking their water use. These meters are capable of logging data every fifteen minutes for up to 90 days. Analysis of data can help determine when and how frequently abnormal water usage is occurring, which often leads to a solution.

In addition, TUD staff is responsible for exploring opportunities to convert residential customers with irrigation systems located near TUD's raw water ditches from treated water irrigation supply to raw water irrigation supply. The benefits of such a conversion are two-fold in that customers can use this less expensive water for gardening and landscape while at the same time TUD realizes a reduction in treated water demand.

2) WaterSense Specification (WSS) Toilets and Showerheads

TUD provides an Ultra Low Flush Toilet (ULFT) Rebate program and reimburses consumers when they install a ULFT (1.6 gallons per flush or less) in their household that replaces a non-low flow toilet (3.0 gallons per flush or more). The ULFT rebate program started in 1991 and ended in 2016. Customers received a $45 per toilet rebate with a maximum of three toilets per residential customer account. There was no maximum for commercial businesses. In 2017-2018 TUD received a grant through Tuolumne County Resource Conservation District to pay up to $100 rebates for qualifying toilets. TCRCD also provided up to $25 rebates for showerheads. This program has been discontinued and is no longer being funded as of September 2019.

3) Commercial, Industrial, and Institutional DMMs

TUD serves approximately 1050 commercial and 200 Institutional/industrial accounts, and CII customers make up roughly 18 percent of total water use in the District. TUD is currently in the process of evaluating the highest water users amongst these sectors and more accurately defining and sorting these customer sector groups from TUD’s complete customer database. This new information will be the basis for future evaluation of conservation water savings to the CII accounts.

4) Large Landscape

The same landscape water use services available to residential customers are provided to CII and Large Landscape customers. Program offerings include water meter reading instruction, assistance in tracking a high-water bill through a smart meter, and notification of unusually high meter readings. Since Large Landscape usage makes up less than 1(one) percent of the total water production, no devices or programs are offered specifically to Large Landscape customers. TUD plans to implement a proactive program to contact customers from all sectors that have unusually high-water usage, which is further described in Section 7.4.

7.3 DMM Implementation Over the Past Five Years

This section describes specific activities associated with the District’s conservation program from 2016 to 2020. A general description of each DMM is provided in Section 7.2.

TUD utilizes measurable methods to the effectiveness of each DMM to the extent practicable. For example, the effectiveness of the Water Waste Prevention and Water Loss Control DMMs can be measured, in part, from completing the annual water loss audits and documenting a year over year reduction in unaccounted-for water. Reduction in unaccounted-for water has a direct conservation savings. The District will use its existing billing system to carefully monitor metered consumption across a broad range of customer categories, providing a means to quantify savings realized from this pricing structure. Since 2016, water loss within the Treated Water System has increased to an average of 34 percent of total treated retail water demand for 2016-2020 compared to 16 percent for 2011-2015. A new method of water auditing has created an increase of loss but also acts as a provider for water loss data so improvements can be made.

Likewise, the effectiveness of implementation of the Public Information and School Education DMMs will be measured by tracking customer participation in the various incentive programs offered by TUD such as rebates and audits offered. TUD looks forward to resuming School

Education DMMs and rebate programs in the future. A successful public information program should encourage customers to take advantage of conservation incentives being offered by TUD.

7.3.1 Water Waste Prevention Ordinances

The District's Water Rules and Regulations (amended 12 November 2019) contain multiple regulations discouraging and prohibiting water waste:

- 2.10.2 Pressure Regulators Required - The intent of this Regulation is to limit excessive and wasteful use of water as a result of high pressures at point of use.
- 5.01 Disconnection and Restoration of Service - Excessive or wasteful use of water as described in Section 12, after notice by mail or in person that the same be terminated.
- 5.11 Water Misuse - No customer shall knowingly permit leaks or waste of water. Where water is wastefully or negligently used on a customer's premises, the District may discontinue the service.
- 12.03 Water Conservation Programs to be Activated in Phases – Phase I – Ongoing Water Education and Management - Prohibit wasteful use of water.
- 12.03.3 Phase III-Critical Water Years – Water Restrictions. Excessive water usage is prohibited and is defined as: i. Allowing plumbing system leaks, including sparkler and drip systems, to remain un-repaired for seven (7) calendar days following notification by the District.
- 14.02 Responsibilities of Raw Water Customers - Water must not be used wastefully. Any customer may be refused water until conditions causing waste of water or injury to others are remedied.

7.3.2 Metering

Water audits of the TUD systems have demonstrated significant water losses in some parts of the system. It is suspected that much of the losses are due to apparent losses from customer water meters that are under-read. TUD implemented a water meter replacement program that began in 2002 replacing about 400-1000 water meters annually dependent on budgetary constraints. 2020 being one of the highest meter replacement years. This program was implemented to replace all water meters that were suspected of under-reading or water meters that had obviously failed, but to secondly reach the goal of replacing all water meters in the TUD system.

Many of the older water meters have been found to under-read actual water use. TUD has discovered that water use went down for customers with new meters. As a result, this demonstrated that TUD systems may have significant apparent water losses associated with each water audit.

The new water meters have the capability to log customer water use at a 15-minute interval. This data can be (and is used when available) to provide the customer with essential information about when and how much water they are using to assist them to reduce their water use. Additionally, this technology is used to determine if there is a customer side leak further leading to water use reduction. The new water meters also utilize radio frequency read technology, so the meter reader needs only be close to the meter for a data collection device to read it thus improving the efficiency of reading meters.

The District is currently working towards increasing funding to support meter replacements. This program has seen an increase of meter replacements year to year. This program is expected to excel further and further in the coming years.

7.3.3 Conservation Pricing

A summary of the revenue from total fixed and volumetric charges generated in the District between 2016 and 2020 is provided in Table 7-1. Volumetric pricing made up 23 percent and increase to 26 percent of the District's revenues over the past five years.

As noted below, the revenues increased between 2016 and 2020. In 2015 TUD implemented a rate restructuring study and adopted a rate schedule to rebalance the rate format to fix a higher percentage of the charges on the base rate to better align to TUD's revenue needs when water sales are lower. The new rate structure also eliminated all tiered rates due to the liability to TUD created by the San Juan Capistrano court case that ruled that a Special District water agency could not charge a tiered rate for water unless it could demonstrate a higher cost for water at the higher tiers. TUD's cost of delivery of water to a high-volume user is the same for water delivered at a normal volume and rate.

Table 7-1: TUD Revenue Summary

	2016	2017	2018	2019	2020
Fixed Charges	$7,470,540	$8,987,000	$9,734,700	N/A*	$11,228,760
Volumetric Charges	$2,231,460	$2,838,000	$3,420,300	N/A*	$3,945,240
Total Charges	$9,702,000	$11,825,000	$13,155,000	$13,9112,000	$15,174,000
Percent Volumetric	23%	24%	26%	N/A*	26%

Note:

Data for 2019 could not be accurately calculated due to an accounting software program change in the second quarter of 2019.

7.3.4 Public Education and Outreach

7.3.4.1 Public Information Programs

A summary of the number of outreach activities implemented and associated costs as part of the public information program is included in Table 7-2.

Table 7-2: Outreach Activities Summary

Item	2016	2017	2018	2019	2020
Paid Advertising/Newspaper	$0	$0	$1125	$1000	$1102
Paid Advertising/Radio	$0	$0	$0	$0	$2532
Website Advertising/MyMotherlode.com	$5400	$5400	$5400	$5400	$5700
Bill Inserts / Newsletters / Brochures(1)	$10800	$10800	$10800	$7500	$7620
Demonstration Gardens	$0	$0	$0	$0	$0
Special Events, Media Events	$1323	$1323	$1587	$1434	$0

Note:

1. Bill insert, newsletter, and brochure use has declined with increased website use

- Mother Lode Views – local radio show: The District's General Manager and Public Outreach Coordinator were interviewed several times to give an update on the water supply and offer water conservation tips.

- Community Forums: The District partnered with the County of Tuolumne Office of Emergency Services and held various forums throughout the County to educate the public on the drought and water conservation.

- EPA – Drought Guidelines/Video Collaboration: TUD partnered with the U.S. Environmental Protection Agency (EPA) to develop a drought response video and outreach guide to help other water utilities nationwide combat drought issues. In November of 2014, a specialized crew of Strategic Planners, Engineers, EPA coordinators and video producers filmed a video in Tuolumne County to begin the process of building a drought resilience plan for other water utilities. This plan and the video were released in January 2016.

- Facebook: The District utilizes the social media platform to inform the public on water conservation, repairs, and improvements on TUD water systems.

7.3.4.2 School Education Programs

Table 7-3 below provides a summary of program participation results between 2016 and 2020.

Table 7-3: School Education Activities

	2016	2017	2018	2019	2020
Number of Presentations	19	18	17	15	N/A
Grade	3rd	3rd	3rd	3rd	N/A
Estimated Number of Students	500	370	338	352	N/A

Notes:

7.3.5 Water Loss Control

Since TUD manages 11 separate systems, it used a two-tiered approach to evaluating water loss that included prescreening of the systems followed by a more detailed audit for those where losses were greatest. Prescreening for water losses was conducted by comparing the total volume of water sales and other verifiable uses against the total water supply into the treated water system. In 2019, TUD has incorporated the use of new accounting software. This software has been instrumental in auditing water losses. TUD is working on a plan to audit water meters for accuracy and replace those that are found to be faulty. Table 7-4 summarizes these results.

Table 7-4: Water Loss Control Evaluation Summary – 11 System Average

Report Year	Prescreen Completed	Prescreen Result (percent)
2016	Yes	29.7
2017	Yes	21.9
2018	Yes	16.8
2019	Yes	21.9
2020	Yes	17.4

TUD prepared a prescreening analysis for the 11 separate water systems for 2020. The prescreening by separate system compares the annual water distribution volumes, volumes of water transferred to and from the TUD Treated Water System, and total consumption volumes based on customer meter readings adjusted for estimate of water line flushing and contributions from water wells. The results are provided in Table 7-5.

Table 7-5: Water Loss Control Evaluation Pre-Screening Summary 2020

Apple Valley	Columbia/Gibbs	Cedar Ridge	Sonora/Jamestown	Upper Basin	Peaceful Pines	Phoenix Lake Park	Ponderosa Hills	Scenic View/Brook	Tuolumne City	Wards Ferry Ranches
N/A	12%	20%	20%	23%	20%	40%	23%	N/A	18%	5%

The results of the pre-screen evaluation are discussed below.

- Phoenix Lake Park system typically produces less than 6 MG annually and more than 6 MG in 2016 and 2017. Recent maintenance to the system has reduced water loss. TUD is in the process of auditing water treatment facility meters for the Phoenix Lake system (the Phoenix Lake system treats ground water). This system is under scrutiny to determine distribution water meter accuracy and customer water meter accuracies. Future improvements and customer meter replacements are subject to budget constraints.

- Peaceful Pines water system produces approximately 1 MG annually. It is suspected that the customer water meters in this system are reading low and the system is isolated and not complex. A mainline break in the Peaceful Pines system caused a significant loss of water resulting in a large percentage loss due to its already relatively small production. This system is under scrutiny to determine distribution water meter accuracy and customer water meter accuracies and leaks. Future improvements and customer meter replacements are subject to budget constraints.

- Cedar Ridge water system produces approximately 30 MG annually. It is suspect that the distribution meter is mal functioning in addition to customer meters reading low. Water is frequently lost to system leaks that are repaired when found. Over the last few years TUD has been able to fix leaks and reduce water loss. TUD will continue to monitor this system for performance. Customer water meters are vital in determining the extent of water loss due to leaks. Future improvements and customer meter replacements are subject to budget constraints.

- The Sonora/Jamestown system is TUDs largest water system producing upwards of 700 MG annually. This system has some of the oldest infrastructure and water meters in the combined TUD system. Water loss is suspected to be leaking out of the old pipe infrastructure but is also attributable to customer meters reading low. Many water mainlines have been replaced due to the high frequency of mainline breaks. Properly operating customer water meters are vital in determining the extent of water loss due to leaks. Future improvements and customer meter replacements are subject to budget constraints.

- For Ponderosa Hills and Upper Basin water loss is attributable to customer meters reading low and system leaks. TUD will continue to monitor this system for performance.

Properly operating customer water meters are vital in determining the extent of water loss due to leaks. Future improvements and customer meter replacements are subject to budget constraints.

- Tuolumne City customer water meters were all replaced with new automated read water meters several years ago under a focused meter replacement program. The meter replacement project resulted in a reduction in the system demand and an increase in billings as the meters are now accurately capturing water use. The system losses are within a reasonable range and the system is a model for meter replacement for all other TUD systems.
- Apple Valley/Scenic View had a boundary change between these adjacent systems in 2018 causing a shift of existing customers from Scenic View to Apple Valley systems that did not get recorded in the accounting system. These changes made the consumption data inaccurate and not auditable as of 2018-2020. TUD has corrected this error and is currently tracking down a potential source error in the intertie between both systems.

TUD has prepared water audits using AWWA Water Audit Software WAS version 5.0 for all individual TUD systems based on calendar year from 2016-2020 data. The output from these water audit analyses is provided in Appendix J.

7.3.6 Water Conservation Program Coordination and Staffing Support

TUD currently fully implements this DMM as discussed in Section 7.2.5.

7.3.7 Other DMMs

7.3.7.1 Residential Assistance Programs

TUD has installed approximately 2800 smart meters between in 2016 and 2020. TUD provides residential assistance to customer via E-mail or over- the-phone. The annual number of residential calls resulting in over-the-phone customer service assistance or on-site visits is estimated based on call volume between 2016-2020 Table 7-6.

Table 7-6: On-site Visits in Response to Customer Calls

Item	2016	2017	2018	2019	2020
Phone assistance or On-site visits	1060	1130	1190	1250	1320

TUD has implementing several water billings formats that shows water usage with comparison to previous year's usage. The current format illustrates two-year of water usage numerically and a color bar chart to visually illustrate the changes through the years. This billing format is available to customer on TUD's Online Payment Website. Link can be found at TUDwater.com.

7.3.7.2 WaterSense Specification (WSS) Toilets and Showerheads

The number of ULFT rebates issued in the last 5 years is listed in Table 7-7.

Table 7-7: WaterSense Rebates and Replacements Received by TUD Customers

Actual	2016	2017	2018	2019	2020
Number of WaterSense Toilet Rebate	53	122	37	87	N/A
Estimated Water Savings (AFY)	1.749	4.026	1.221	2.871	N/A
Number of WaterSense Showerheads Rebate	0	36	10	14	N/A
Estimated Water Savings (AFY)	0	0.298	0.083	0.116	N/A
Total Est. Water Savings (AFY)	1.749	4.324	1.304	2.987	N/A

Toilet and showerhead rebates data is tracked and summarized each year. TUD uses published water use savings data measured in savings of 0.033 AFY per toilet and 2700 gallon per showerhead each year. This data combined with the number of new low flow toilets and low flow showerheads installed between 2016-2019 accounts for roughly 10.5 AFY of water that would otherwise be consumed on an annual basis. This measure is assumed effective in part due to the longevity of toilets in general.

7.4 Planned DMM Implementation to Achieve Water Use Targets

The SBX7-7 water use for TUD is 128 GPCD and the 2020 compliance target goal is 165 GPCD as documented in Section 2.

TUD plans to continue to implement water conservation programs which combine financial incentives, rules and regulations, and information elements to build on existing activities. Based on the projected demands discussed in Section 3, TUD's water use in 2015 was 110 GPCD but monitoring usage to remain in compliance with SBX7-7 targets through 2025 and beyond. TUD is focused on maintaining current water savings and increasing savings through the additional initiatives summarized below.

All conservation activities are subject to approval by the TUD Board of Directors before programs can be implemented. For DMM Programs to be implemented in the 2021-2025 period that are deemed necessary to meet TUD's SBX7-7 water use targets, an economic analysis will be prepared and considered before approval.

The following DMM program changes and DMMs planned for implementation from 2021 to 2025 are described below.

7.4.1 Water Waste Prevention Ordinances

TUD currently fully implements this DMM.

7.4.2 Metering

Information from meters and tracking of water use represents a new element to the existing TUD conservation program focusing on collecting and processing information and ensuring that the programs are on track to meet the goals. These activities will also help in program design by providing more robust information about customers and their water use patterns. The immediate priorities include:

1. Proximity Read Meters: TUD will continue to implement and utilize proximity read meters which can be read remotely as a priority to obtain accurate data for water usage and identify customer-side leaks. This information can also help TUD monitor the impacts of existing programs, make adjustments where necessary and develop new programs.

2. Water Use Tracking Tools: TUD will consider plans to design and develop database tracking tools for water savings associated with its conservation plans and increase flexibility in adding or changing program elements.

3. The District continuously works towards budgeting and funding the meter replacement program again, but it will be suspended while higher priority and drought emergency projects are funded first. TUD is actively seeking financial assistance and pursuing grant programs to assist TUD with funding replacement of customer meters.

7.4.3 Conservation Pricing

TUD currently fully implements this DMM.

7.4.4 Public Education and Outreach

7.4.4.1 Public Information Programs

TUD is planning to continue the partnership with the UCCE Tuolumne County Master Gardener program to provide information about water conservation focusing on outdoor watering activities. Listed below is a brief outline of those planned activities as well as other public information programs to be undertaken by TUD:

Planned Public Education Materials:

- Copies of “Save Water” and “Foothill-Friendly Gardening” brochures for the Tuolumne County Home and Garden Show or via TUDwater.com/conservation/.

- Water-wise landscaping articles, written by UCCE Tuolumne County Master Gardener program, to distribute at the Tuolumne County Home and Garden Show and to TUD clients.

- Landscape information, vendor sources, and water-efficient landscape plants for display at the Home and Garden Show booth. A listing of drought tolerant plants for the Sierra foothill region.

- “Save Our Water,” water conservation education resources hosted by the State of California.

- Toilet Tank Leak Detector Tablets Program, tablets and informational material are available for pick up at the District at no cost to customer.

The District frequently updates its website to include current drought related information within our region and the State. These resources are available and linked at www.TUDwater.com/Conservation. Other helpful conservation links can also be found by visiting www.TUDwater.com.

Commitment to Increase Outreach:

TUD began significant outreach activities starting in 1992 under directive of the TUD Board. TUD has been active each year since then and will continue to implement the Public Information Programs using outreach activities. The District maintains a Facebook page in order to offer updates on the water supply, weather updates and water conservation tips. In addition to the items listed above, TUD is pursuing the opportunity of offering additional public workshops in order to provide information to the general public on a variety of water efficiency related issues including:

- Updates to the TUD website, www.TUDwater.com with video links on water meter and smart meter operations and how to go about finding a leak on private property.

- TUD provides customers with information on their water bills to see their water usage. This is provided to be a very helpful tool during the last few years. Customers can see a comparison of their water use from previous years in order to visualize what steps they need to take to reduce water consumption.

7.4.5 Water Loss Control

TUD will continue to focus on increasing conservation through Water Loss Control. It is anticipated that a majority of the required GPCD reduction can be achieved through water system infrastructure renovations that will reduce the current unaccounted-for water loss volumes.

As discussed in Section 7.2.5, TUD currently monitors individual water system loss by comparing WTP production and total customer water usage in each distribution system. The District has employed this method for years and uses local and historic knowledge of the individual water systems to interpret water loss and direct resources to control these losses. This has been a sensible method for the District and has been used for many years.

To increase the precision of water loss tracking, TUD plans to begin implementing procedures as outlined in the AWWA M36 manual starting with the systems with the most suspected water losses. This AWWA M36 approach guides the auditor through a series of financial, leak, and operational performance indicators. Data is normalized and indices are calculated through an intensive compilation of data from trusted and accurate water and financial measurements and indicators. It is anticipated that this will require the installation of several new measurement and logging devices throughout the TUD distribution systems.

All eleven systems operated by TUD will be monitored for performance and TUD will prepare water audits using the most recent version of AWWA Water Audit Software for all individual systems for each calendar year through 2025.

7.4.6 Water Conservation Program Coordination and Staffing Support

TUD currently fully implements this DMM.

7.5 California Urban Water Conservation Council

In 1991, TUD became a signatory to the California Urban Water Conservation Council (CUWCC), Memorandum of Understanding (MOU). The CUWCC was established to encourage broad implementation of DMM Programs throughout California. As a long-time signatory, TUD has established its firm commitment to the implementation of DMMs that result in more efficient water use in its water systems. TUD has met DMM requirements by reporting to DWR through the UWMP update process. For the purposes of this UWMP, this section includes a summary of DMM implementation activity from 2016 to 2020 and planned activity for 2021 to 2025.

Although CUWCC has since sunset, TUD has remained active in planning and implementing DMMs since that time. TUD voluntarily participates in DMM outlined requirement in order to achieve the highest amount of water conservation, consumer consumption and continuous educational outreach on water conservation methods.

Section 8: Water Shortage Contingency Planning

8.1 Overview / Appendix N

Section 10632 of the Act details the requirements of the water-shortage contingency analysis. The Water Shortage Contingency Plan (WSCP) is provided in Appendix N.

8.2 Purpose of the WSCP

TUD has developed a WSCP to provide guidance if triggering events occur—whether from reduced supply, increased demand, or an emergency declaration—and to identify corresponding actions to be taken during the various stages of a water shortage. The plan includes voluntary and mandatory stages which are intended to be fair to all water customers and users while having the least impact on business, employment, and quality of life for residents.

8.3 Annual Assessment

New provisions in Water Code Section 10632.1. require that an urban water supplier such as the District, conduct an annual water supply and demand assessment (“Annual Assessment”), on or before July 1 of each year, to be submitted to DWR. As part of the WSCP, TUD has identified the timeline, staff and outside agency coordination, and other actions necessary to conduct the Annual Assessment.

8.4 Shortage Stages

The WSCP describes six water shortage stages corresponding to progressive ranges of up to 10, 20, 30, 40, and 50 percent shortages and greater than 50 percent shortage.

8.5 Water Shortage Response Actions

The WSCP identifies water shortage response actions, including:

- Supply augmentation
- Customer demand reduction measures (including enforcement)
- Operational changes
- Consumption reduction methods

References

American Water Works Association (AWWA). 2016. *M36 Standard Water Audit Methodology*, 4th edition.

Augustine Planning Associates, Inc. 2017. *Initial Study and Mitigated Negative Declaration Tuolumne Utilities District Ditch Maintenance Activities*. September 2017. https://tudwater.com/wp-content/uploads/2017/12/Final-Ditch-Maintenance-IS-MND-9-12-17-1.pdf

California Department of Water Resources (DWR). 2003. *California's Groundwater: Bulletin 118-2003*. <https://water.ca.gov/Programs/Groundwater-Management/Bulletin-118#>

California Department of Water Resources (DWR). 2009. Water Use and Efficiency Branch. Division of Statewide Integrated Water Management. *Senate Bill No. 7*.

California Department of Water Resources (DWR). 2011. Water Use and Efficiency Branch. Division of Statewide Integrated Water Management. *Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use*.

California Department of Water Resources (DWR). 2012. California Data Exchange System, Water Conditions in California: Bulletin 120. <http://cdec.water.ca.gov/snow/bulletin120/index2.html>

California Department of Water Resources (DWR). 2016. *2015 Urban Water Management Plan Guidebook for Urban Water Suppliers.*

California Department of Water Resources (DWR). 2021. California Data Exchange System, Sonora RS (SNS): Precipitation, Accumulated. <https://cdec.water.ca.gov/snow_rain.html>

California Government Code. 2005. Chapter 727, Government Code Section 65589.7. 2005. <https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=GOV&sectionNum=65589.7>

California Irrigation Management Information System (CIMIS). 2016. *Monthly Average ETo*. <http://www.cimis.water.ca.gov>

California Regional Water Quality Control Board, Central Valley Region (CRWQCB). *Order No. R5-2002-0202*.

California Regional Water Quality Control Board, Central Valley Region (CRWQCB). *Order No. R5-2008-0162*.

California Urban Water Conservation Council (CUWCC). 2016. *Memorandum of Understanding Regarding Urban Water Conservation in California*.

Federal Energy Regulatory Commission (FERC). 2009. *Spring Gap Hydroelectric Project, No. 2130*.

HDR Engineering, Inc. 1999. *Simulation Analysis of the South Fork Stanislaus River System*.

Kennedy/Jenks Consultants. 2009. *Updated Draft Small Community Wastewater Grant TUD Regional WWTP and Disposal System Feasibility Report (Wastewater Feasibility Report).*

Pacific Gas and Electric (PG&E) Company and Tuolumne County. 1983. *Purchase Agreement*.

Reich, KD, N Berg, DB Walton, M Schwartz, F Sun, X Huang, and A Hall. 2018. "Climate Change in the Sierra Nevada: California's Water Future." UCLA Center for Climate Science. https://www.ioes.ucla.edu/project/climate-change-sierra-nevada/

Stantec Consulting, Inc. 2008. Hazard Assessment Report: South Fork Stanislaus Water Supply Tuolumne Main Canal, Tuolumne County, California, October 2008.

Stantec Consulting, Inc. 2012. *Tuolumne Utilities District Ditch Sustainability Project Historic Resource Evalution Report.* January 2012. *https://tudwater.com/wp-content/uploads/2017/12/Historic-Ditch-Resources-Report_2012.pdf*

Tuolumne County. 2010. Geographic Information System (GIS) Assessor's Parcel Map. April 2010.

Tuolumne County. 2013. *Tuolumne County General Plan, Draft Update to Chapter 3: Housing Element*.

Tuolumne County. *2018. Multi-Jurisdictional Hazard Mitigation Plan Volume 1: Countywide Elements 2018 Update.*

Tuolumne Utilities District (TUD) and Tuolumne Regional Water District (TRWD). 1992. *Agreement to Submit Plan to Local Agency Formation Commission of Tuolumne County (LAFCO) to Dissolve TRWD and to Form a New County Water District as a Successor to TRWD and its Water and Sewer Systems; and to Transfer County's Tuolumne Water Systems and Related Assets to the New District*.

Tuolumne Utilities District (TUD). 2010. *Request for Proposal: Phoenix Lake Preservation and Restoration Plan.*

Tuolumne Utilities District (TUD). 2011. *2010 Urban Water Management Plan*.

Tuolumne Utilities District (TUD). 2014. *Consumer Confidence Report, Annual Quality Report*.

Tuolumne Utilities District (TUD). 2015. *Water Rules and Regulations*.

Tuolumne Utilities District (TUD). 2018. Treated Water System Optimization Plan Projected 20-Year Growth Rates in Active Water Service Connection by Water Service Area Memo (TWSOP Growth Memo).

U.S. Census Bureau. 2014. “Population & Housing Unit Counts – Blocks.” 2014 TIGER/Line Shapefiles (machine-readable data files).

U.S. Environmental Protection Agency. 2016. *Drought Response and Recovery: A Basic Guide for Water Utilities*. EPA Office of Water MC 4608T EPA 810-B-16-001. March 2016.

Western Regional Climate Center (WRCC). 2016. *Period of Record Monthly Climate Summary*. <http://www.wrcc.dri.edu>

Appendix A

UWMP Checklist

This checklist is developed directly from the Urban Water Management Planning Act and SB X7-7. It is provided to support water suppliers during preparation of their UWMPs. The UWMP Checklist is organized according subject matter. In the event that information or recommendations in these tables are inconsistent with, conflict with, or omit the requirements of the Act or applicable laws, the Act or other laws shall prevail.

Each water supplier submitting an UWMP can also provide DWR with the UWMP location of the required element by completing the last column of either checklist. This will support DWR in its review of these UWMPs. The completed form can be included with the UWMP.

If an item does not pertain to a water supplier, then state the UWMP requirement and note that it does not apply to the agency. For example, if a water supplier does not use groundwater as a water supply source, then there should be a statement in the UWMP that groundwater is not a water supply source.

Checklist Arranged by Subject

CWC Section	UWMP Requirement	Subject	Guidebook Location	UWMP Location
10615	A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, reclamation and demand management activities.	Introduction and Overview	Chapter 1	Section 3, Section 4, and Section 7
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	Chapter 1	Section 1.1 - 1.3, and Section 6
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	Section 2.2	Section 1.1
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	Section 2.6	Section 1.2.1 and Section 1.4.1
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 1.4.1, Section 1.5.2, Appendix B, and Appendix H

CWC Section	UWMP Requirement	Subject	Guidebook Location	UWMP Location
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 2.6, Section 6.1	N/A
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	Section 2.6	N/A
10631(a)	Describe the water supplier service area.	System Description	Section 3.1	Section 1.6
10631(a)	Describe the climate of the service area of the supplier.	System Description	Section 3.3	Section 1.8
10631(a)	Provide population projections for 2025, 2030, 2035, 2040 and optionally 2045.	System Description	Section 3.4	Section 2.2.2.2 and Table 2-3
10631(a)	Describe other social, economic, and demographic factors affecting the supplier's water management planning.	System Description	Section 3.4.2	Section 1.10
10631(a)	Indicate the current population of the service area.	System Description and Baselines and Targets	Sections 3.4 and5.4	Section 2.2.1
10631(a)	Describe the land uses within the service area.	System Description	Section 3.5	Section 1.7
10631(d)(1)	Quantify past, current, and projected water use, identifying the uses among water use sectors.	System Water Use	Section 4.2	Section 2.3, Table 2-4, Section 2.6.2, Table 2-15, Table 2-16, Section 2.6.3, Table 2-17, Section 2.6.4, Table 2-18, Section 2.7, and Table 2-21
10631(d)(3)(C)	Retail suppliers shall provide data to show the distribution loss standards were met.	System Water Use	Section 4.2.4	Section 2.4
10631(d)(4)(A)	In projected water use, include estimates of water savings from adopted codes, plans, and other policies or laws.	System Water Use	Section 4.2.6	Section 2.6.5

CWC Section	UWMP Requirement	Subject	Guidebook Location	UWMP Location
10631(d)(4)(B)	Provide citations of codes, standards, ordinances, or plans used to make water use projections.	System Water Use	Section 4.2.6	Section 2.2.2 and Section 2.6.2
10631(d)(3)(A)	Report the distribution system water loss for each of the 5 years preceding the plan update.	System Water Use	Section 4.3.2.4	Section 2.4, Table 2-6
10631.1(a)	Include projected water use needed for lower income housing projected in the service area of the supplier.	System Water Use	Section 4.4	Section 2.6.4.1 and Table 2-19
10635(b)	Demands under climate change considerations must be included as part of the drought risk assessment.	System Water Use	Section 4.5	Section 6.5
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	Chapter 5	Section 2.5.1 and Section 2.5.2
10608.24(a)	Retail suppliers shall meet their water use target by December 31, 2020.	Baselines and Targets	Chapter 5	Section 2.5.3
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	Section 5.1	NA
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 5.2	NA
10608.22	Retail suppliers' per capita daily water use reduction shall be no less than 5 percent of base daily per capita water use of the 5-year baseline. This does not apply if the suppliers base GPCD is at or below 100.	Baselines and Targets	Section 5.5	Section 2.5.2
10608.4	Retail suppliers shall report on their compliance in meeting their water use targets. The data shall be reported using a standardized form in the SBX7-7 2020 Compliance Form.	Baselines and Targets	Section 5.5 and Appendix E	Section 2.5.3
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 6.1 and 6.2	Section 6.2 and Section 6.3

CWC Section	UWMP Requirement	Subject	Guidebook Location	UWMP Location
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 6.1	Section 6.2 and Section 6.3
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	Section 6.1	Section 3.2
10631(b)(3)	Describe measures taken to acquire and develop planned sources of water.	System Supplies	Section 6.1.1	Section 3.7
10631(b)	Identify and quantify the existing and planned sources of water available for 2020, 2025, 2030,2035, 2040 and optionally 2045.	System Supplies	Section 6.2.8	Section 3.2
10631(b)	Indicate whether groundwater is an existing or planned source of water available to the supplier.	System Supplies	Section 6.2	Section 3.2.2
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 of the plan or authorization.	System Supplies	Section 6.2.2	3.2.2
10631(b)(4)(B)	Describe the groundwater basin.	System Supplies	Section 6.2.2	Section 3.2.2
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	Section 6.2.2	Section 3.2.2
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	Section 6.2.2.1	NA, Section 3.2.2
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	Section 6.2.2.4	Section 3.2.2 and Table 3-3
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	Section 6.2.2	Section 3.2 and Table 3-4
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 3.3

CWC Section	UWMP Requirement	Subject	Guidebook Location	UWMP Location
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 (Recycled Water)	Section 6.2.5	Section 4.3, Table 4-2, Section 4.4, and Table 4-3
10633(c)	Describe the recycled water currently being used in the supplier's service area.	System Supplies (Recycled Water)	Section 6.2.5	Section 4.4
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 (Recycled Water)	Section 6.2.5	Section 4.4.1
10633(e)	Describe the projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected.	System Supplies (Recycled Water)	Section 6.2.5	Section 4.4.1, Table 4-4, and Table 4-5
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 (Recycled Water)	Section 6.2.5	Section 4.4.2 and Table 4-6
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 4.4.2
10631(g)	Describe desalinated water project opportunities for long-term supply.	System Supplies	Section 6.2.6	Section 3.5
10633(a)	Describe the wastewater collection and treatment systems in the supplier’s service area with quantified amount of collection and treatment and the disposal methods.	System Supplies (Recycled Water)	Section 6.2.5	Section 4.2, Section 4.3, and Table 4-2
10631(f)	Describe the 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 6.3.7	Section 3.7
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 and Appendix O	Section 3.6
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 7.2	Section 5
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 7.2.4	Section 1.8.8

CWC Section	UWMP Requirement	Subject	Guidebook Location	UWMP Location
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 to the water supplier with the total projected water use over the next 20 years.	Water Supply Reliability Assessment	Section 7.3	Section 6.3 and Table 6-5
10635(b)	Provide a drought risk assessment as part of information considered in developing the demand management measures and water supply projects.	Water Supply Reliability Assessment	Section 7.3	Section 6.5
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 7.3	Section 6.2.1, Section 6.2.2, and Section 6.2.3
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	Section 7.3	Section 6.2.1, Section 6.2.2, Section 6.2.3, and Section 6.3
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	Section 7.3	Section 6.4
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	Section 7.3	Section 6.2.4 and Table 6-3
10632(a)	Provide a water shortage contingency plan (WSCP) with specified elements below.	Water Shortage Contingency Planning	Chapter 8	Appendix N
10632(a)(1)	Provide the analysis of water supply reliability (from Chapter 7 of Guidebook) in the WSCP	Water Shortage Contingency Planning	Chapter 8	Appendix N Introduction
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	Section 8.10	Appendix N Section 9

CWC Section	UWMP Requirement	Subject	Guidebook Location	UWMP Location
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	Section 8.2	Appendix N Section 9
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	Section 8.2	Appendix N Section 1
10632(a)(3)(A)	Define six standard water shortage levels of 10, 20, 30, 40, 50 percent shortage and greater than 50 percent 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 catastrophic interruption of supply.	Water Shortage Contingency Planning	Section 8.3	Appendix N Section 2.1
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	Section 8.3	Appendix N Section 2.1
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	Section 8.4	Appendix N Section 3.1
10632(a)(4)(B)	Specify locally appropriate demand reduction actions to adequately respond to shortages.	Water Shortage Contingency Planning	Section 8.4	Appendix N Section 3.2
10632(a)(4)(C)	Specify locally appropriate operational changes.	Water Shortage Contingency Planning	Section 8.4	Appendix N Section 3.3
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	Section 8.4	Appendix N Section 3.4
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	Section 8.4	Appendix N Section 3.4 Table 3-1
10632.5	The plan shall include a seismic risk assessment and mitigation plan.	Water Shortage Contingency Plan	Section 8.4.6	Appendix N Section 2.4
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	Section 8.5	Appendix N Section 4

CWC Section	UWMP Requirement	Subject	Guidebook Location	UWMP Location
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	Section 8.5 and8.6	Appendix N Section 4
10632(a)(6)	Retail supplier must describe how it will ensure compliance with and enforce provisions of the WSCP.	Water Shortage Contingency Planning	Section 8.6	Appendix N Section 5
10632(a)(7)(A)	Describe the legal authority that empowers the supplier to enforce shortage response actions.	Water Shortage Contingency Planning	Section 8.7	Appendix N Section 6
10632(a)(7)(B)	Provide a statement that the supplier will declare a water shortage emergency Water Code Chapter 3.	Water Shortage Contingency Planning	Section 8.7	Appendix N Section 6
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	Section 8.7	Appendix N Section 6
10632(a)(8)(A)	Describe the potential revenue reductions and expense increases associated with activated shortage response actions.	Water Shortage Contingency Planning	Section 8.8	Appendix N Section 7
10632(a)(8)(B)	Provide a description of mitigation actions needed to address revenue reductions and expense increases associated with activated shortage response actions.	Water Shortage Contingency Planning	Section 8.8	Appendix N Section 7
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	Section 8.8	Appendix N Section 7
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	Section 8.9	Appendix N Section 8
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	Section 8.11	Appendix N Section 3.2.3
10635(c)	Provide supporting documentation that Water Shortage Contingency Plan has been, or will be, provided to any city or county within which it provides water, no later than 30 days after the submission of the plan to DWR.	Plan Adoption, Submittal, and Implementation	Sections 8.12 and10.4	Appendix N Section 10

CWC Section	UWMP Requirement	Subject	Guidebook Location	UWMP Location
10632(c)	Make available the Water Shortage Contingency Plan to customers and any city or county where it provides water within 30 after adopted the plan.	Water Shortage Contingency Planning	Section 8.14	Appendix N Section 10
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	Sections 9.1 and9.3	N/A
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. The description will address specific measures listed in code.	Demand Management Measures	Sections 9.2 and9.3	Section 7.2 and Section 7.3
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	Chapter 10	Section 1.8.3
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 Table 10-1.	Plan Adoption, Submittal, and Implementation	Section 10.2.1	Section 1.8.2.1, Table 1-2, and Appendix H
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 10.4	Section 1.8.4
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	Sections 10.2.2,10.3, and 10.5	Section 1.8.2.2, Appendix H, Appendix I, and Appendix N
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 10.2.2	Section 1.8.2.1, and Appendix H
10642	Provide supporting documentation that the plan and contingency plan has been adopted as prepared or modified.	Plan Adoption, Submittal, and Implementation	Section 10.3.2	Section 1.8.3.1 and Appendix H
10644(a)	Provide supporting documentation that the urban water supplier has submitted this UWMP to the California State Library.	Plan Adoption, Submittal, and Implementation	Section 10.4	Section 1.8.4.3
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	Section 10.4	Section 1.8.4.4

CWC Section	UWMP Requirement	Subject	Guidebook Location	UWMP Location
10644(a)(2)	The plan, or amendments to the plan, submitted to the department shall be submitted electronically.	Plan Adoption, Submittal, and Implementation	Sections 10.4.1and 10.4.2	Section 1.8.4.2
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 hours.	Plan Adoption, Submittal, and Implementation	Section 10.5	Section 1.8.5
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 normal business hours.	Plan Adoption, Submittal, and Implementation	Section 10.5	Appendix N
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	Section 10.6	N/A
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 10.7.2**	N/A

Appendix B

Documentation of Agency Coordination and Notices

TUOLUMNE UTILITIES DISTRICT

TUD

March 10, 2021

To: **Tuolumne County Public Agencies, Water Agencies and Community Representatives**

Subject: **Tuolumne Utilities District, 2020 Update of the Urban Water Management Plan and Water Shortage Contingency Plan**

The Tuolumne Utilities District (TUD) is updating its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) which will be submitted to the State of California's Department of Water Resources (DWR) following adoption by the TUD Board of Directors currently scheduled to occur in June 2021.

TUD is required by the California Water Code to update and adopt an UWMP and submit a completed plan to the DWR every five years. The UWMP provides an overview of TUD's water supply sources and usage, recycled water, and water conservation programs. The UWMP is part of TUD's long-range resource planning program to ensure water service reliability for TUD customers, especially during multiple-year drought periods or other natural or man-made supply interruptions. TUD hired the engineering firm of Kennedy Jenks of Sacramento who possesses unique expertise in water supply planning and updates to urban water management plans to assist staff with the update.

The WSCP provides a plan of action to be followed during the various stages of a water shortage. This plan will reflect many elements TUD already maintains in the TUD Water Rules and Regulations. The WSCP includes some of the following elements: water supply reliability analysis, annual water supply and demand assessment procedures, water shortage stages and response.

TUD is encouraging community members to participate and engage in this local water planning process. Please be advised of these important dates:

Urban Water Management Plan and Water Shortage Contingency Plan Update Tentative Schedule

Date	Description
March 10, 2021	Notice to Public of UWMP update
May 4, 2021	Release of public draft of UWMP and WSCP for 30-day review and comment

Urban Water Management Plan and Water Shortage Contingency Plan Update Tentative Schedule (Continued)	
May 20, 2021	Presentation to TUD Water Committee
June 7, 2021	Deadline to provide public comment
June 8, 2021	TUD Board Meeting and Presentation
June 22, 2021	TUD Board Meeting and Public Hearing
July 1, 2021	Submittal to DWR

The anticipated draft UWMP update will be available for public review near the beginning of May 2021 on the TUD website at www.tudwater.com. The existing 2015 UWMP provides good information and is available now via the TUD website at:

https://www.tudwater.com/wp-content/uploads/2016/07/TUD-2015_UWMP_Final-2016.pdf

Additional information about Urban Water Management Plans can be found at the DWR website at:

https://water.ca.gov/Programs/Water-Use-And-Efficiency/Urban-Water-Use-Efficiency/Urban-Water-Management-Plans

If you have any questions or if you would like additional information, please contact Glen Nunnelley at (209 532-5536 ext. 514.

Sincerely,

Glen Nunnelley, P.E.
Senior Engineer

CC: TUD Board of Directors

UWMP Mailing List 2021

Contact	Title	Agency	Mailing Address	City	Zip	Email
Stephanie Suess	Community and Resources Development	Chicken Ranch Rancheria	PO Box 1159	Jamestown, CA	95327	stephanie@tcrcd.org
Andrea Reich	Tribal Chairwoman	Tuolumne Band of Me-Wuk Indians	PO Box 699	Tuolumne, CA	95379	
Quincy Yaley	Director	County of Tuolumne Community Resources Agency	2 South Green Street	Sonora, CA	95370	
Rachelle Kellogg	Director	City of Sonora Community Development	94 No. Washington Street	Sonora, CA	95370	
Cole Przybyla	Director	Innovation and Business Assistance	99 No. Washington Street	Sonora, CA	95370	
Betsy Hurst	President	Tuolumne County Assoc. of Realtors	14195 Tuolumne Road	Sonora, CA	95370	
Melinda Fleming	Executive Director	TuCare	PO Box 1056	Twain Harte, CA	95383	
John Buckley	Executive Director	CSERC	PO Box 396	Twain Harte, CA	95383	
Parkyre Zelinsky-Salcedo	Executive Director	Tuolumne County Chamber of Commerce	197-B Mono Way	Sonora, CA	95370	
Tom Trott	General Manager	Twain Harte CSD	PO Box 649	Twain Harte, CA	95383	
Manager		LAST CHANCE WATER CO	21361 TUOLUMNE RD N	TWAIN HARTE, CA	95383	
Manager		OAKVIEW MHP LLC	500 GUISEPPI COURT # 2	ROSEVILLE, CA	95678	
Manager		PULPIT ROCK WATER CO	18468 DALY COURT	JAMESTOWN, CA	95327	
Manager		MULLER MUTUAL WATER	P O BOX 716	TUOLUMNE, CA	95379	
Manager		SAWMILL FLAT WTR ASSOC	P O BOX 112	COLUMBIA, CA	95310	
Manager		SONORA MEADOWS	PO BOX 3718	Sonora, CA	95370-1176	
Manager		SLEEPY HOLLOW WATER ASSOC INC	P O BOX 714	TWAIN HARTE, CA	95383	
Manager		SPRINGFIELD RANCH ROAD MUTUAL ASSOC	PO BOX 1517	COLUMBIA, CA	95310	
Manager		SONORA WATER CO	PO BOX 2196	COLUMBIA, CA	95310	
Manager		ONETO EST WATER ASSOC	21050 JACK PAGE RD	Sonora, CA	95370-8879	
Manager		MI WUK VILLAGE WATER	PO BOX 61	MI WUK VILLAGE	95346	

Appendix C

Public Hearing Documentation

PURSUIT

Continued from Page A1

gan pursuing it about 8:30 p.m.

The chase went "literally all over the county," Sandelin said, from the township of Tuolumne to the City of Sonora and down into Jamestown before eventually ending after about 11 miles at Lime Kiln Road and Dusty Trail, where the suspect allegedly got out of the truck and took off on foot.

Sheriff's deputies handed off the pursuit before it ended to CHP, which used a fixed-wing aircraft to search the area. Dispatch logs showed there were several calls into the Sheriff's Office between about 9:30 and 11:30 p.m. from residents in the area asking why there was a plane flying overhead.

Sandelin said they cleared the scene about midnight after calling off the search.

"It was heavy foliage and kind of rough terrain," Sandelin said. "We had a perimeter set and people searching the area, but eventually couldn't find him."

No one reportedly suffered any injuries during the pursuit Monday night.

Foster was last accused of leading personnel from multiple law enforcement agencies on a high-speed pursuit in January last year, which culminated in him similarly ditching his vehicle on Chicken Ranch Road and successfully fleeing from the pursuing officers on foot. He was arrested a week later in Tuolumne.

The same Sean Foster allegedly also led a CHP officer on a chase in February 2017 in Jamestown, after which he was arrested on suspicion of driving on a suspended license; reckless evading; resisting, obstructing and delaying arrest; and being a felon possessing ammunition.

In July 2010, Foster was also arrested after being involved in a pursuit in the Twain Harte area in a truck that was allegedly stolen.

No information was immediately available Tuesday about Foster's previous cases.

Foster is described as 6-foot-4 and roughly between 170 and 190 pounds. Anyone with more information on his wherabouts is asked to contact CHP at (209) 984-3944 or the Sheriff's Office at (209) 533-5815.

Shelly Thorene / Union Democrat

Deputy County Administrator Maureen "Moe" Frank (fourth from the left) and crew members from Roebbelen Contracting Inc. of El Dorado Hills, Boyer Construction of Sonora, and architectural firm Lionakis, break ground on the Tuolumne Community Resilience Center project on Bay Street in Tuolumne City on Tuesday (above). The center will be built on Bay Street (below).

CENTER

Continued from Page A1

resiliency centers.

Grants from the competition were intended to fund disaster recovery in affected areas and prepare for potential new natural disasters. Tuolumne County was given funding through the state to recover from the Rim Fire and better withstand future catastrophes.

The two resiliency centers, in total, are expected to cost about $25 million to construct.

An official groundbreaking for the center in Groveland will be on July 13, though like the Tuolumne site, work has already begun there.

"I think it's a great opportunity," said Office of Emergency Services Coordinator Dore Bietz. "This is going to be a way and a step for us to prepare for another Rim Fire."

At the county Board of Supervisors meeting on Tuesday prior to the groundbreaking, Frank and other officials provided updates on the ongoing projects, which also includes a biomass energy and wood products manufacturing facility as well as forest restoration and the installation of fuel breaks.

Frank said the restoration of forests, meadows, fences and troughs were mostly completed, with fuel breaks expected to be installed next year. She also said last June the Sierra Nevada Conservancy, the other projects funded by the grant, sought companies who use biomass as a part of their industry and wanted to relocate to Tuolumne County. Three potential businesses were in the loan application process, she said.

The resiliency centers are just one pillar of the project, accounting for about $20 million from the grant. Another $28 million was earmarked for projects to restore forested areas mostly in the Stanislaus National Forest and create fuel breaks, while the remaining $22 million was to develop a biomass energy and wood products manufacturing facility.

During statements on Tuesday, multiple references were made to county and state efforts to bridge a $5 million funding gap for the centers and provide for both sites instead of just one. The money was granted by the state through the federal Neighborhood Stabilization Program, which was intended to help stabilize communities with high rates of abandoned and foreclosed homes as a result of the 2008 economic crash.

According to a sign at the site, the Tuolumne center is set to be finished in the fall of next year.

The Groveland center will be located on Ferretti Road past the Groveland Community Services District headquarters, while the Tuolumne center will be on the corner of Bay Street and Cherry Boulevard.

Both centers will be about 8,775 square feet and contain a lobby area, office space, large gathering room for up to 200 people, commercial kitchen, bathrooms and up to two classrooms. They will also have approximately 200 parking spaces and a "multi-functional outdoor area," such as a covered picnic area or stage.

The Tuolumne center, for example, is set to hold a Tuolumne County Sheriff's Office community services outpost and educational services through the Tuolumne County Superintendent of Schools Office. The Amador-Tuolumne Community Action Agency, Groveland Community Services District, Mother Job Training, county Animal Control, and the county library are also expected to provide services.

County Supervisor David Goldemberg inquired at the meeting as to whether Tuolumne County Arts would be able to use the community for art programs, which was confirmed. It was also noted to him that the biomass facility was granted an additional year extension, so county officials were confident the project would be finished without loss of funding.

Organizations renting the facilities are expected to offset the cost of maintenance and operation, about $45,000 a year. In May, county supervisors approved a contract with the state pledging to maintain and operate them through at least 2027, or pay back the grant funding used for their construction.

The Groveland site plans to host hospitality courses through Columbia College due to its proximity to Yosemite National Park.

The intended multi-uses of the sites vary outside of their primary function as gathering or sheltering places during natural disasters.

Public input specified Groveland as more of a center for gatherings and events and will include an amphitheater.

The Tuolumne site, however, is geared more toward economic stimulation.

"I think true economic development is if you can affect a person," said County Supervisor Anaiah Kirk in a speech at the groundbreaking. "I am really looking forward to seeing how this building can help build the economy in that capacity."

Sonora-based Robert E. Boyer Construction Inc. is constructing the resiliency centers in both facilities with a $16.7 million contract. Robert E. Boyer Construction has also worked on construction of Rush Creek Lodge on Highway 120 near the entrance to Yosemite National Park, the yet-to-open Sonora Armory entertainment venue, and a $35 million reconstruction of the City of Berkeley's Tuolumne Camp that burned in the 2013 Rim Fire.

Contact Giuseppe Ricapito at gricapito@uniondemocrat.net or (209) 588-4526.

TUOLUMNE UTILITIES DISTRICT NOTICE OF PUBLIC HEARING REGARDING ADOPTION OF THE 2020 URBAN WATER MANAGEMENT PLAN AND WATER SHORTAGE CONTINGENCY PLAN

Notice is hereby given that the Board of Directors of the Tuolumne Utilities District will hold a Public Hearing at 9:00 am. on Tuesday, June 22, 2021, telephonically using Zoom due to COVID-19 restrictions, to consider the adoption of the 2020 update of TUD's Urban Water Management Plan and Water Shortage Contingency Plans (Water Code § 10608 et seq.). The objective of this hearing will be to inform and receive public input regarding the 2020 update to the Urban Water Management Plan and Water Shortage Contingency Plan. At said hearing, oral and written presentations can be made and all interested persons will be heard regarding the proposed Urban Water Management Plan and Water Shortage Contingency Plans.

Topic: TUD Board Meeting
Time: Jun 22, 2021 09:00 AM Pacific Time (US and Canada)

Join Zoom Meeting
https://us02web.zoom.us/j/82456203078?pwd=ZGZEbTNPTGhhd1pIQ2hhdGFCU0tjUT09

Meeting ID: 824 5620 3078
Passcode: 318122
One tap mobile
+16699009128,,82456203078#,,,,*318122# US (San Jose)
+12532158782,,82456203078#,,,,*318122# US (Tacoma)

Dial by your location
+1 669 900 9128 US (San Jose)
+1 253 215 8782 US (Tacoma)
Meeting ID: 824 5620 3078
Passcode: 318122

Complete copies of the 2020 update to the Urban Water Management Plan and Water Shortage Contingency Plans are available for inspection on the District web site at http://www.tudwater.com. Comments will be accepted through June 22, 2021, and may be submitted to lwestbrook@tudwater.com or made during the meeting. Contact Melissa McMullen at the District office at (209) 532-5536 ext. 510 with additional questions.

Dated: June 9, 2021

Melissa McMullen, Executive Secretary/Board Clerk

23964 060921

Senators request Supreme Court travel records

By TODD RUGER
CQ-Roll Call

WASHINGTON — Two key senators want travel records of Supreme Court justices as part of a broader congressional look at financial disclosure standards for the receipt of gifts, travel and other financial gains by senior government officials.

Rhode Island Democratic Sen. Sheldon Whitehouse and Louisiana Republican Sen. John Kennedy asked the Justice Department and the U.S. Marshals Service last week for information and documents about the last 10 years of trips for members of the high court.

The Supreme Court Police handles protection for the justices in the Washington metropolitan area. But the justices can request security from the Marshals Service, which is part of the Justice Department, for other domestic travel.

Whitehouse and Kennedy, in a letter sent Friday, asked the Marshals Service for "all documents" related to those trips, the name of the justice who traveled, where the trips were, and the cost to taxpayers.

That information will "help us assess how disclosures by members of the Court accord with the judicial branch's disclosure standards, and to improve the consistency of disclosure standards across the three branches," Whitehouse and Kennedy wrote.

Whitehouse is the chairman of the Senate Judiciary Subcommittee on Federal Courts, Oversight, Agency Action and Federal Rights; Kennedy is the top Republican on that panel.

A nonprofit group obtained similar records through a public records request in 2018 and found examples of security for trips to the theater for Justice Sonia Sotomayor and a night at the opera for the late Justice Ruth Bader Ginsburg, but security for only one part of the late Justice Antonin Scalia's fateful hunting trip to western Texas in February 2016 when he died.

Such trips could raise concerns about conflicts of interest when the justices have their expenses paid. Scalia, who went on 259 expenses-paid trips from 2004 to 2014, was staying for free at a hunting lodge owned by a businessman whose company had recently had a matter before the Supreme Court, The New York Times reported at the time.

Warriors' Curry joins Antetokounmpo, Jokic on All-NBA first team

The Mercury News

Warriors guard Stephen Curry was named to the 2020-21 All-NBA first team, the league announced Tuesday.

Curry joins Denver Nuggets center Nikola Jokic, the 2020-21 season MVP, and Milwaukee Bucks forward Giannis Antetokounmpo as the leading vote getters.

Curry, who averaged a league-leading 32 points this season, received 98 first-team votes in his fourth selection to the first team and seventh overall All-NBA team honor. Only Antetokounmpo (100) and Jokic (99) had more first-place votes than Curry.

In addition to Antetokounmpo (500 total points), Jokic (498 points) and Curry (496 points), the All-NBA first team includes Dallas Mavericks guard Luka Doncic (402 points) and LA Clippers forward Kawhi Leonard (323 points).

This should come as no surprise as Curry, 33, had one of the best seasons of his decorated career. He shot 48.2% overall and 42.1% from 3-point range, and his historic scoring stretch to end the season helped propel the Warriors into the play-in tournament.

Over Golden State's final 20 games, in which they went 15-5, Curry averaged a blistering 37.2 points on 48.7% shooting, including 44.3% from 3-point range, 5.5 rebounds and 5.3 assists. Curry finished third in MVP voting behind Jokic and Embiid.

Curry last made the All-NBA first team during Golden State's most recent Finals run in 2018-19. His only other first-team honors came during his two MVP seasons (2014-16).

The All-NBA second team consists of Portland Trail Blazers guard Damian Lillard, Philadelphia 76ers center Joel Embiid, Phoenix Suns guard Chris Paul, New York Knicks forward Julius Randle and Los Angeles Lakers forward LeBron James.

The third team features Utah Jazz center Rudy Gobert, Miami Heat forward Jimmy Butler, Clippers forward Paul George, Washington Wizards guard Bradley Beal and Brooklyn Nets guard Kyrie Irving.

The All-NBA team is selected by a panel of 100 sportswriters and broadcasters. Players are awarded five points for each first-team vote, three points for each second-team vote and one point for each third-team vote. Voters selected two guards, two forwards and one center for each team, choosing players at the position they play regularly. According to the league office, players who received votes at multiple positions were slotted at the position where they received the most votes.

VOLUNTEERING NEWS
in the Mother Lode

Tuolumne County

Volunteers are the Heart of Tuolumne!

Sierra NonProfit Services

Red Cross
is in need of **Donor Ambassadors**. The Donor Ambassador manages the reception process by ensuring each donor is warmly greeted and assisted with initial intake according to the donor appointment priority system. They offer refreshments to the donor, thanking them for their contribution.
Minimum Requirements-
1- One 4-6 hr. shift per month .
2- Professional, clear & diplomatic communication skills.
3- Assesibility to demonstrate customer service values
4- Comfortable approaching people you don't know. Shifts are: Monday & Tuesday 12-4, Friday & Saturday 7-11 & 11-3.

If interested, call Sheri Bethoney at 916/261-0351 or e-mail her at Sherilyn.Bethoney@Red.Cross.org You can also visit RedCross.org/volunteer

Sponsored by Sierra Nonprofit Services
VISTA
We serve those who serve others!
591 S. Washington St., Sonora • Tuesday - Friday 10-4
AmeriCorps/VISTA Host Site • 209-533-1093

Calaveras County

Volunteers are very special people!

Habitat for Humanity - Calaveras
Call and find out what project they are working on for the summer. Be a committee member, try construction, graphic design for signs, yard work, word processing, music/entertainment, telephoning, database entry, photography, errands in your car, office work, public speaking, hauling in your truck, bulk mail, special events, food preparation, writing, warehouse help. See website. www.habitatforhumanity.org.

If interested, call Alexis Peters Volunteer Coordinator at 209/890-3848

Pay it forward!
Special People Volunteer
Volunteer Center of Calaveras County
209-754-1699
www.calaverasvolunteer.com

For inquiries please contact gayle@sierranonprofit.org or call 533-1093
This volunteer listing is provided as a community service.
25001 061021

TUD

TUOLUMNE UTILITIES DISTRICT NOTICE OF PUBLIC HEARING REGARDING ADOPTION OF THE 2020 URBAN WATER MANAGEMENT PLAN AND WATER SHORTAGE CONTINGENCY PLAN

Notice is hereby given that the Board of Directors of the Tuolumne Utilities District will hold a Public Hearing at 9:00 am. on Tuesday, June 22, 2021, telephonically using Zoom due to COVID-19 restrictions, to consider the adoption of the 2020 update of TUD's Urban Water Management Plan and Water Shortage Contingency Plans (Water Code § 10608 et seq.). The objective of this hearing will be to inform and receive public input regarding the 2020 update to the Urban Water Management Plan and Water Shortage Contingency Plan. At said hearing, oral and written presentations can be made and all interested persons will be heard regarding the proposed Urban Water Management Plan and Water Shortage Contingency Plans.

Topic: TUD Board Meeting
Time: Jun 22, 2021 09:00 AM Pacific Time (US and Canada)

Join Zoom Meeting
https://us02web.zoom.us/j/82456203078?pwd=ZGZEbTNPTGhhd1pIQ2hhdGFCU0tjUT09

Meeting ID: 824 5620 3078
Passcode: 318122
One tap mobile
+16699009128,,82456203078#,,,,*318122# US (San Jose)
+12532158782,,82456203078#,,,,*318122# US (Tacoma)

Dial by your location
+1 669 900 9128 US (San Jose)
+1 253 215 8782 US (Tacoma)
Meeting ID: 824 5620 3078
Passcode: 318122

Complete copies of the 2020 update to the Urban Water Management Plan and Water Shortage Contingency Plans are available for inspection on the District web site at http://www.tudwater.com. Comments will be accepted through June 22, 2021, and may be submitted to lwestbrook@tudwater.com or made during the meeting. Contact Melissa McMullen at the District office at (209) 532-5536 ext. 510 with additional questions.

Melissa McMullen

Dated: June 9, 2021

Melissa McMullen, Executive Secretary/Board Clerk

23964 060921

K.C. Alfred /The San Diego Union-Tribune /TNS

Kikuyu rough is visible at the 13th hole ofTorrey Pines South, where U.S. Open will be played this week, on Wednesday, June 9, in San Diego.

ROUGH

Continued from Page B1

> *"I think it could be a really good test, to the point where they have to think about the shot, how the ball is going to come off the club. It might make it a little more interesting than just knee-deep rough that you do everything you can just to get it out in the fairway. … As long as it's penal, but not to the point where it's unfair."*
>
> **— Rich McIntosh, course superintendent for Torrey Pines**

Pines superintendent who came here from kikuyu-less Ohio. "It's a very small part of the industry. It's seen as a weed in a lot of places, even here in Southern California. There's not a whole lot of research out there.

"So it's a love-hate relationship. But I think it fits perfectly here. It's one of those things, to completely eradicate it, you've got to remove a lot of soil. The roots and the rhizomes are so deep in the soil out here, and it's been out here so long, you continually fight it. You just learn to live with it."

Which is what the 156 players in the U.S. Open will have to do this week. Live with it. Live to tell about it.

"That grass, man," two-time U.S. Open champion Brooks Koepka says. "You put it in the rough, you're going to struggle."

Bodenhamer gets a glimmer in his eyes when the subject of kikuyu comes up, because, well, it's the USGA. Its ethos is creating the "greatest test in golf," and that often means straddling the line between manageable and masochistic. U.S. Open layouts are known for their slippery greens and deep rough, and kikuyu is the mother of all roughs.

"Our DNA is to be tough and push it to the edge, but not go over the edge," Bodenhamer told Golf Channel recently. "We want what we create at a U.S. Open to be special, so that when these players win they're doing something special … We have safeguards in place. But we push it hard. We want to do that, and we'll do it again."

In another interview, he put it this way: "We want the rough to be what it should be."

To that end, the USGA acknowledges that the Torrey Pines rough at the 2008 U.S. Open wasn't as infernal as they had hoped, even though Tiger Woods and Rocco Mediate were the only players under par (and that was by a single stroke). The culprit, they later realized, was the overseeded ryegrass from the Farmers, which had grown so high that the kikuyu below it never got enough sunlight through the spring to fully sprout.

So McIntosh and his crew shaved the rough down to an inch in some places, along with reducing overseed rates of the ryegrass and increasing chemical eradication "to get the kikuyu moving." That seemed to help, although the gloomy, cloudy spring didn't cooperate until this past week. The kikuyu is higher than in 2008, up to 6 inches or more in some area, although not uniform height and density across the course.

That presents its own challenges, however. Unpredictability is the bane of golfers.

"I think potentially it's going to be a little deceiving," McIntosh says. "It's going to blend in well with the ryegrass. It's going to allow for some inconsistent lies in the rough. The ball could sit up a couple inches, and in other areas it could sit down. You're going to have to address every lie separately, which you don't get with a straight ryegrass overseed.

"I think it could be a really good test, to the point where they have to think about the shot, how the ball is going to come off the club. It might make it a little more interesting than just knee-deep rough that you do everything you can just to get it out in the fairway. … As long as it's penal, but not to the point where it's unfair."

Another factor: The $14 million renovation of the South Course in 2019 was largely underground, installing a modern irrigation system with 2,500 sprinkler heads that can be controlled individually by computer.

The USGA likes its U.S. Open courses "firm and fast," which is code for they don't water them. But if you don't water the rough, the blades of grass lose their moisture content and lie down, making extraction easier as the tournament progresses because the ball sits up. The new sprinkler system allows them to water the rough but nothing else, keeping the kikuyu hydrated. Keeping the kikuyu as kiku-yuck.

In a practice round Sunday afternoon, reigning Masters champion Hideki Matsuyama spent 10 minutes trying to teach young Japanese pro Rikuya Hoshino the proper technique to cut through it on the backside of the 11th green, open the club face, bend the knees, explode the stroke. Hoshino swung, and the ball came out hot and skidded across the green. He dropped another ball, watched it disappear into the green forest of grass and tried again. He barely advanced it 2 feet.

The next group through included Michael Johnson, a qualifier who grinds away on minitours. Asked how the rough is, he laughed and said: "It's there."

Bryson DeChambeau, golf's "mad scientist," applies his cerebral, methodical approach to the thick stuff as well. During practice rounds, he'll drop balls in it and try to hit various clubs to determine which lofts work. Also important to him his how the ball gets there, and he adjusts his shot trajectory accordingly. A low, line drive skipping along the ground has a better chance at sitting up; a high, arcing shot is more likely to be buried deep in the knotted thatch.

"It really depends on the type of grass," DeChambeau says. "So, for example, if it's deep down into the rough in kikuyu, it's almost impossible to get out of. If it's ryegrass, that's a different situation. It could be down to the bottom, base level of the ground and you can still get it out for the most part.

"You don't want that golf ball going to the ground in kikuyu."

The rough was also deep last September for the U.S. Open at Winged Foot Golf Club in Mamaroneck, N.Y. DeChambeau reasoned he could get through it with his pumped-up physique and hence there was little need for driving accuracy. So he merrily blasted away with his driver into the rough, then powered wedges through it onto the greens.

Xander Schauffele, who finished fifth, said the USGA "played the tournament right into his hands" with its set-up and DeChambeau made Winged Foot "look like a pitch and putt," winning by six strokes despite hitting only 23 of 56 fairways. It sent a collective shudder through the golf world. The last time Winged Foot was host, in 2006, in the winning score was 5-over.

"I know everyone says, 'Look at what Bryson did last year,'" Bodenhamer says, cracking an impish smile. "We'll see what happens this year. Kikuyu's tough."

HOULIHAN

Continued from Page B1

self as a clean coach, privately and publicly calling for vigorous drug testing. He ripped track's governing bodies in a statement Monday night.

"What I've learned has eroded all the faith I had in their ability to fairly serve and protect clean athletes," he wrote.

"Throughout this process we were confident that the truth would lead to justice. What I've come to learn instead is that anti-doping authorities are okay with convicting innocent athletes so long as nine out of ten convictions are legitimate. That is wrong."

Innocent people getting swept up in heavy-handed enforcement is the inevitable outcome of any war on drugs anywhere, something Schumacher has a hard time squaring in his statement.

"To the clean athletes that I've coached against: You have every reason to be confused and distrustful of people in this sport. You are forced to witness and compete against dopers all the time …. All I can tell you is that I'm sorry this adds another layer of doubt.

"Shelby, your competitor, friend, and teammate has had her entire career taken away from her for something she didn't do. Not all of you will believe me and many of you will be skeptical. But to those that do, you should be outraged that this can happen."

Tellingly, U.S. anti-doping head Travis Tygart — someone who has doggedly pursued doping cases — has been ripping the World Anti-Doping Agency over situations like this for years. "We've had dozens of cases where athletes are dealing with low-level positives caused by meat contamination or intimacy with a partner, multivitamin, mineral or supplement contamination," he said when an Australian swimmer was suspended earlier this year. "The only question is going to be how many innocent athletes are railroaded before the rules finally change?"

In her statement, Houlihan wrote that she had her hair tested and "WADA agreed that test proved that there was no build up of this substance in my body, which there would have been if I were taking it regularly. … Instead, they simply concluded that I was a cheater and that a steroid was ingested orally, but not regularly."

Appendix D

Public Comments and Responses on the UWMP

Central Sierra Environmental Resource Center
Box 396, Twain Harte, CA 95383 • (209) 586-7440 • fax (209) 586-4986
Visit our website at: www.cserc.org or contact us at: johnb@cserc.org

June 22, 2021

From John Buckley, Executive Director
Central Sierra Environmental Resource Center
P.O. Box 396
Twain Harte, CA 95383

To Glen Nunnelley and Lisa Westbrook
Tuolumne Utilities District (TUD)
18885 Nugget Blvd
Sonora, CA 95370

Re: 2020 Urban Water Management Plan

These are CSERC's written comments that point out the extreme amount of misinformation, inaccurate text, and wildly exaggerated water use demand projections that are contained in the TUD 2020 Urban Water Management Plan.

This Plan looks impressive on paper, but despite it being approved today by the TUD Board, the State should not accept it because it based on wildly exaggerated and inflated growth rates that are in stark contrast to facts and reality.

Example 1 - TUD's treated water growth rate is projected to skyrocket due to system acquisition connections. The Plan predicts water demand to soar in coming years based on many thousands of snew system acquisition connections, but the truth is that <u>not one</u> – not a single system acquisition connection has actually been added in the last 14 years. Glenn dismissed this concern by saying that there was a TUD approved growth memo that makes certain assumptions about acquisition connections in the future. The fact that there is a memo doesn't change the fact that no actual acquisition connections at all have been added in 14 years, and thus that is not rationale grounds to claim that thousands of new connections "might" someday be requested. Instead, this simply is an attempt to justify TUD claims that a high future water demand allows TUD to claim it needs to take over PG&E facilities or to fight increased minimum water flows in the South Fork Stanislaus River during FERC relicensing proceedings.

Example 2 – Treated water use is predicted to soar from 2,562 AF for single family connections last year to 4,555 AF in 4 more years – an incredible jump of nearly double all of the water use growth that has taken place in the last 25 years… all to suddenly happen by 2025. There is no basis in reality for such a unsubstantiated, predicted leap in water use demand.

TUD has only added an average of 29 connections a year for the past 14 years. The Plan bizarrely predicts 10 times that number of new connections every year for the next 5 years.

Example #3 – The actual number of single-family connections in 2020 was almost exactly the same as way back in 2010 – but page 2-5 of the Plan predicts TUD will have a skyrocketing growth rate going from 11,800 single family connections last year to more than 13,100 four years from now. Again, there hasn't been that number of new connections added in total over the last 17 years. Yet the Plan falsely predicts a sudden and then on-going skyrocketing of the number of new connections.

Key factual points the Plan totally ignores:

A careful read of historic use shows that the TOTAL TUD TREATED WATER USE IN RECENT YEARS IS ONLY 70% OF TUD WATER DEMAND WAY BACK 15 YEARS AGO. INSTEAD OF WATER USE SPIRALING UP, TREATED WATER DEMAND BY TUD CUSTOMERS IS GREATLY REDUCED.

That stagnant amount of water use is due to Tuolumne County's population being nearly stagnant for the past decade as well as improved water use practices by TUD customers. Similarly, raw water use in recent years is also lower, not more, than historic raw water use 10-15 years ago. So any claim that TUD water use is rising is total misinformation.

This final point is pivotal for the State to consider.

The Plan on page 2-20 makes it very clear that last year – similar to all years of record – **55%** of **TUD's combined treated and raw water was LOST and unaccounted** for due to leaks, breaks, inaccurate meters, water used in operations, reservoir/tank overflows, unauthorized connections, ditch losses, and other water never reaching a TUD customer.

700 AF of treated water was lost last year – compared to 3,800 AF reaching a customer. But more staggering, 8,460 AF of raw water is shown as unaccounted system loss, with only 3,086 AF of raw non-recycled water reaching a customer. Combined, more than half of all the water TUD controls is is lost and never reaches a customer – far worse than what TUD managers have ever admitted at Board meetings.

This UWMP does reveal some significant disclosures about water loss – but for purposes of TUD water planning and meeting requirements of the State, this TUD Urban Water Management Plan wildly inflates water demand both in the short term and long term. It is revealing that based on encouragement from staff, the TUD Board ignored all criticisms raised and unanimously approved the adoption of the Plan, shrugging off the flaws due to staff dismissing them as minor.

John Buckley

Executive Director

Response to comments:

John Buckley provided verbal comments during the public hearing on June 22, 2021. Additionally, the same comments are expressed in a comment letter that was submitted to TUD after the public hearing on 6/22/2021.

Comment:

Mr. Buckley presented in his statements and letter that the growth rate used in the UWMP is too high and lists 3 examples.

Response:

The growth rate used in the Urban Water Management Plan is based on the growth rate assumed to occur by the combined system acquisition growth and general population growth in the TUD service area. These assumptions are outlined in the Growth Memo included in the appendix of the plan.

As outlined in the memo, TUD acquired eight systems with over 2,200 connections between the years 1992 and 2021. There are approximately 4,400 total connections remaining in the surrounding small systems identified in the memo that have the potential to be acquired. These smaller systems face increasing failures in their aging infrastructure and more costly regulatory compliance issues that are assumed to lead to a TUD acquisition similar in nature to the eight that occurred historically. The acquisitions are assumed to occur evenly over the next 20 years.

The actual pattern of system acquisition (as a future event) is impossible to know or if any acquisitions will even occur in the next 20 years. Using the assumptions in the memo, however, leads TUD to better manage, plan, and accommodate these potential acquisitions to minimize cost and risk to the District over time.

Additionally, many of the identified systems do not increase the demand on water supply as they are already using the existing water supply as a TUD wholesale customer. In many cases, the acquisition has little change to the community except that TUD would take over operations of these systems using the Technical Managerial and Financial capacity of TUD that may not otherwise be available in the smaller systems now. TUD is actively working now with one of these known local systems due to its failing infrastructure and compliance issues.

The growth in population is consistent with the growth anticipated in the Tuolumne County General Plan.

Comment:

Mr. Buckley presented in his statements that these growth assumptions are to *"…justify the takeover of PG&E facilities or to fight increased minimum water flows in the South Fork Stanislaus River during the FERC relicensing proceedings…"*

Response:

This statement is not true and is unfounded.

Comment:

Mr. Buckley presented in his letter under a bolded heading “***Key factual points the Plan totally ignores***” a series of statements about water use and stagnant Tuolumne County Populations and further states that “*So any claim that TUD water use is rising is total misinformation*.”

Response:

The UWMP does not ignore issues of water demand and population. Chapter 2 of the UWMP presents detailed information of the historic water use which does show that there is a declining demand at the water source and declining water use by TUD customers.

Further, population of the TUD service area is presented in Section 2.2 and Appendix F. This reflects that the population declined between 2010 and 2015 and has increased between 2015 and 2020.

TUD assumes that Mr. Buckley’s reference to “…*water use raising…”* is about the TUD projected water use. TUD assumes that growth in system acquisition and general population will naturally result in an increase in treated water demand accordingly as outlined in Chapter 2.

Comment:

Mr. Buckley presented in his letter under a bolded heading “***This final point is pivotal for the State to consider***” a series of statements about water loss in the treated water and raw water conveyance systems.

Response:

The UWMP addresses urban treated water and related distribution systems losses which are presented in Section 2.4 and are further outlined in the Water Audit reports for each TUD system included in Appendix J. TUD will be held to the requirements of Senate Bill 555 that will require that water agencies meet specific efficiency standards starting now with even more efficiency standards rolling out over the next few years.

Source water and related conveyance for TUD is described in several locations in the Plan including Sections 2.6.4 and 3.2. A significant part of the supply water for TUD is first routed through the PG&E owned Main Tuolumne Canal, Power Creek and Phoenix Lake where environmental losses will occur before reaching the TUD ditch system. The TUD ditch system is discussed in Section 1.9.2 which describes the TUD Raw Water Conveyance system and refers to three publications including the Historic Resources Evaluation Report, Ditch System Sustainability Project Operation and Maintenance Strategies for Reduction Non-Competitive Use, and the Initial Study & Mitigated Declaration Tuolumne Utilities District Ditch Maintenance Activities, posted on the TUD website, that provide guidance for maintenance under the California Environmental Quality Act for the protections of the environmental and historic properties of the TUD ditch system.

Appendix E

Tuolumne Utilities District Board Resolution

RESOLUTION NO. 10-21
TUOLUMNE UTILITIES DISTRICT
ADOPTION OF THE 2020 URBAN WATER MANAGEMENT PLAN AND 2020 WATER SHORTAGE CONTINGENCY PLAN

WHEREAS, the District is a supplier of water providing water to over 12,000 customers and over 3,000 acre-feet of water annually; and

WHEREAS, the Plan shall be periodically reviewed at least every five years, and the District shall make amendments or changes to its Plan which are indicted by the review; and

WHEREAS, the Plan and Water Shortage Contingency Plan must be adopted by the Board of Directors and filed with the California Department of Water Resources within thirty days of adoption; and

WHEREAS, the District has prepared and circulated for public review the Draft Urban Water Management Plan and Draft Water Shortage Contingency Plan, and the District properly noticed a public hearing regarding said Plan on June 22, 2021; and

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors for the Tuolumne Utilities District as follows:

1. The District's 2020 Urban Water Management Plan (UWMP) has been prepared in compliance with Sections 10610 through 10656 of the Urban Water Management Planning Act (Act), which were added by Statute 1983, Section 1009, and became effective on January 1, 1984. The Act, as amended, requires development of an UWMP every 5 years. The UWMP is intended to serve as a general, flexible, and open-ended document that periodically can be updated to reflect changes in the regional water supply trends, and conservation and water use efficiency policies. The District's 2020 UWMP revises the 2015 UWMP, and incorporates changes enacted by legislation since that time.
2. The 2020 Urban Water Management Plan is hereby adopted with all necessary amendments and orders that it be filed with the California Department of Water Resources within 30 days after this date;
3. The 2020 Water Shortage Contingency Plan is hereby adopted with all necessary amendments and orders that it be filed with the California Department of Water Resources within 30 days after this date;
4. The Interim General Manager is hereby authorized and directed to implement the Water Conservation Programs as set forth in the 2020 Urban Water Management Plan and Water Shortage Contingency Plan.

PASSED AND ADOPTED by the Board of Directors of Tuolumne Utilities District on June 22, 2021 by the following vote:

AYES: Balen, Boatright, Kerns, Murphy, Ringen

NOES: None

ABSENT: None

ABSTAINED: None

ATTEST:

Barbara J Balen

Barbara Balen, President
Board of Directors

Melissa McMullen

Melissa McMullen
Executive Secretary/Board Clerk

Appendix F

Population Methodology

1.1 Introduction

The purpose of this document is to describe the methodology used by TUD to develop the baseline population estimates for use in calculating SBX7-7 Baseline Daily Per Capita Water Use (Baseline GPCD). TUD first reported its Baseline GPCD in its 2010 UWMP; however, at the time the 2010 UWMP was prepared, complete 2010 Census data was not available. Therefore, for the 2015 UWMP, TUD is required to recalculate baseline and target water use using 2010 Census data.

The historical (baseline) population for the TUD service area was estimated using the directions outlined in Methodology 2: Service Area Population from the “Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use” by DWR. Additional guidance on population methodologies was provided in the DWR Guidebook. TUD’s treated water system boundaries do not correspond with a city or census designated place and the rural population density varies significantly throughout the service area. Therefore, the Department of Finance and DWR Population Tool methodologies presented in the DWR Guidebook are not appropriate population methodologies for the TUD service area.

1.2 Methodology

TUD’s population methodology uses a similar premise as the DWR Population Tool; but instead allocates a percent of Census block group population according to number of households instead of GIS system boundary. The population methodology steps are outlined as follows:

1. The number of households for each TUD system service area is calculated from single family and multi-family connections recorded in TUD’s database.
    a. All single-family residence service connections are assumed to be one (1) household.
    b. Private multi-family residence service connections are assumed to be two (2) households.
    c. Multi-family facilities including apartments, long-term care and mobile home parks for each water service were queried from the TUD database and the number of housing units is assumed equivalent to the number of households for each multi-family service connection.
2. TUD single and multi-family connections are overlaid with 2010 Census block group boundaries.
    a. TUD maintains Computer Aided Mapping (CAD) data of each TUD water system or service area which includes a water service element for each residential connection.
    b. The CAD mapping elements are superimposed with the 2010 census block group data. A graphic representation of this overlay configuration for TUD is provided in Figure F-1.

   c. From this data, it is noted that each TUD service area is typically overlaid by some fraction of multiple census block groups.

3. Number of TUD households are compared to total 2010 Census block group households to develop the percent of households within TUD service areas for each individual block group.
   a. The TUD water service elements are counted for the areas where TUD service areas overlays on particular block groups.
   b. The total household values obtained from this distribution process are compared to the known number of households for each TUD service area. The estimated households for each block group are then adjusted (keeping a similar distribution spread) in order that the total matches the known household count.
4. Population for each block group is estimated as 2010 Census population (per block group) multiplied by the calculated percent of households within TUD service areas.
5. Total population is the sum of all block group populations for all TUD service areas.
6. Total population was adjusted to take into consideration Census population changes in Tuolumne County and growth in TUD's number of service connections.
   a. For Tuolumne County, which is approximately two thirds of TUD's service area), Census data shows a **decrease** in total population by approximately 2.86 percent between 2010 and 2015 and an **increase** in population by approximately 1.61 percent between 2015 and 2019.
   b. TUD service connection data shows an **increase** in service connections by approximately 1.13 percent between 2010 and 2015 and an **increase** by approximately 1.43 percent between 2015 and 2019.
   c. The total change in service area population is assumed to be the sum of Census population data and service connection data:
      i. 2010 to 2015: -2.86% + 1.13% = -1.72%
         1) The combined change (-1.72%) is multiplied by the 2010 service area population to obtain the 2015 service area population. The 2011 to 2014 service area populations are divided accordingly using the combined change over 5 years.
      ii. 2015 to 2019: 1.61% + 1.43% = 3.04%
         1) The combined change (3.04%) is multiplied by the 2015 service area population to obtain the 2020 service area population. The 2016 to 2019 service area populations are divided accordingly using the combined change over 5 years.

1.3 Results

By this method, a persons-per-connection ratio of 2.49 is established using the adjusted 2015 U.S. Census population data (29,998) and the total number of TUD residential connections recorded for 2015 (12,029). In 2020, TUD's single family and multi-family connections totaled 12,194, for an estimated population of 30,910.

Appendix G

Treated Water System Optimization Plan Growth Memo

Memo

-GROWTH

To: **Kennedy Jenks Consultants**

Project Manager: Tim Williams

From: **Tuolumne Utilities District**

District Engineer: Erik Johnson EJ

Associate Engineer: Glen Nunnelley GWN

Date: 03/27/2018

Re: **Treated Water Systems Optimization Plan**

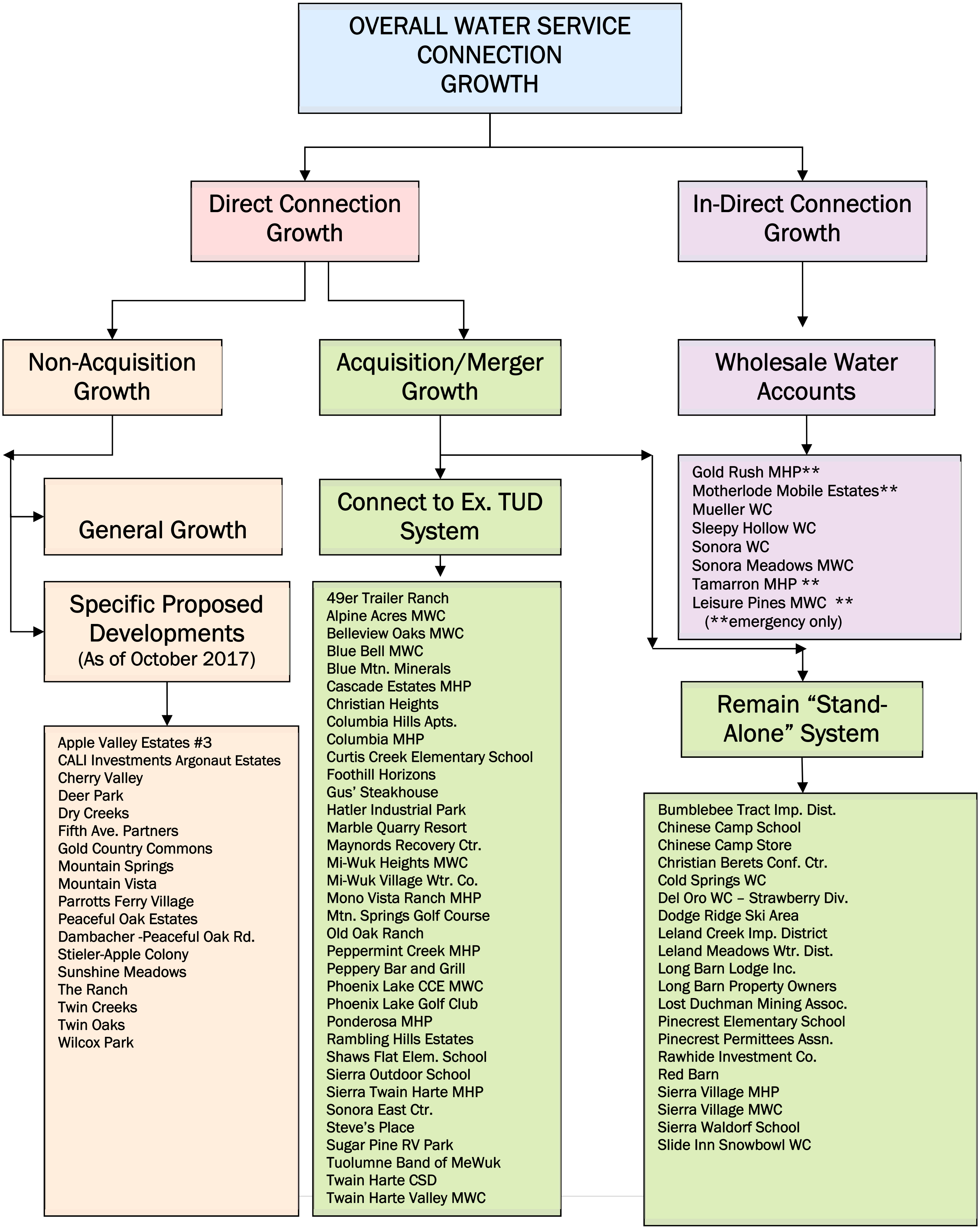
Projected 20- Year Growth Rates in Households and Commercial, Industrial, Institutional, and Irrigation Water Service Connections by Water Service Area

---

This memorandum will identify historical and projected growth rates in households receiving treated water and in water service connections serving commercial, industrial, institutional, and irrigation (CII) accounts for the period of 2017 – 2037. The data contained in this memorandum shall serve as the basis for projecting the future water demands to be used in the Treated Water Systems Optimization Plan. Through the process detailed below, **it has been determined that the annual growth rate for the next 20 years (2017-2037) is assumed to be 2%.** Historic growth in TUD connections since 1992 has been about 1.58% and is a combination of both non-acquistion and acquition growth as described herein. Assuming the same general growth and that all nearby private and mutual water systems are merged with TUD in the next 20 years, equates to about 2% total growth.

Population trends do not correlate well to growth in households receiving treated water. Since 1993, approximately 51% of the District's growth in households being served was associated with acquisition of existing private/mutual water companies. Increases in direct connections are categorized as: 1) Non-Acquisition Growth, which includes specific proposed developments and general growth resulting from population increases and hookups of parcels previously served by wells to the public water system; and 2) Acquisition/Merger Growth, which is associated with the acquisition/merger of discrete private and mutual water companies, as well as, any community service districts or water districts.

Water service connection growth is further separated into two categories: 1) Direct and 2) Indirect, which includes connections served through wholesale water accounts. Water to wholesale accounts is delivered through a master meter, which is technically counted as one-(1) service connection. Growth in areas that are served from a master meter will be assumed to match the growth rates that are proposed for the remainder of TUD's water systems.



OVERALL WATER SERVICE CONNECTION GROWTH

Direct Connection Growth

In-Direct Connection Growth

Non-Acquisition Growth

Acquisition/Merger Growth

Wholesale Water Accounts

General Growth

Specific Proposed Developments
(As of October 2017)

Connect to Ex. TUD System

Remain "Stand-Alone" System

Gold Rush MHP**
Motherlode Mobile Estates**
Mueller WC
Sleepy Hollow WC
Sonora WC
Sonora Meadows MWC
Tamarron MHP **
Leisure Pines MWC **
(**emergency only)

Apple Valley Estates #3
CALI Investments Argonaut Estates
Cherry Valley
Deer Park
Dry Creeks
Fifth Ave. Partners
Gold Country Commons
Mountain Springs
Mountain Vista
Parrotts Ferry Village
Peaceful Oak Estates
Dambacher -Peaceful Oak Rd.
Stieler-Apple Colony
Sunshine Meadows
The Ranch
Twin Creeks
Twin Oaks
Wilcox Park

49er Trailer Ranch
Alpine Acres MWC
Belleview Oaks MWC
Blue Bell MWC
Blue Mtn. Minerals
Cascade Estates MHP
Christian Heights
Columbia Hills Apts.
Columbia MHP
Curtis Creek Elementary School
Foothill Horizons
Gus' Steakhouse
Hatler Industrial Park
Marble Quarry Resort
Maynords Recovery Ctr.
Mi-Wuk Heights MWC
Mi-Wuk Village Wtr. Co.
Mono Vista Ranch MHP
Mtn. Springs Golf Course
Old Oak Ranch
Peppermint Creek MHP
Peppery Bar and Grill
Phoenix Lake CCE MWC
Phoenix Lake Golf Club
Ponderosa MHP
Rambling Hills Estates
Shaws Flat Elem. School
Sierra Outdoor School
Sierra Twain Harte MHP
Sonora East Ctr.
Steve's Place
Sugar Pine RV Park
Tuolumne Band of MeWuk
Twain Harte CSD
Twain Harte Valley MWC

Bumblebee Tract Imp. Dist.
Chinese Camp School
Chinese Camp Store
Christian Berets Conf. Ctr.
Cold Springs WC
Del Oro WC – Strawberry Div.
Dodge Ridge Ski Area
Leland Creek Imp. District
Leland Meadows Wtr. Dist.
Long Barn Lodge Inc.
Long Barn Property Owners
Lost Duchman Mining Assoc.
Pinecrest Elementary School
Pinecrest Permittees Assn.
Rawhide Investment Co.
Red Barn
Sierra Village MHP
Sierra Village MWC
Sierra Waldorf School
Slide Inn Snowbowl WC

Assumptions

1. Although, this memo identifies growth in households receiving water service and growth in service connections specifically designated for commercial, industrial, institutional, or irrigation use; it does not attempt to distinguish between the water demands that result from varying types of use, as well as other factors such as elevation and parcel size. Water demand factors are addressed in a separate memorandum.

2. Any proposed development that currently has an approved Tentative Subdivision Map or a Recorded Map on file with Tuolumne County will be developed to buildout within the next 20 year time period and is assumed to be part of the non-acquisition growth.

3. Private and/or mutual water companies that are assumed acquired by the District are primarily residential water connections. However, there will be CII connections for some of the potential water systems acquired. The total CII connections for each system are listed at the bottom of the Potential Acquisitions Sheet Appendix C. Approximately 9% of of the total active conections are classified as CII accounts.

4. The overall growth rate for the entire District is calculated by summing the non-acquisition growth distributed amongst all systems and the acquisition/merger growth derived from private and public water systems.

5. Private and/or mutual water companies that are identified as candidates for acquisition by the District will be assigned to the District water system that is best suited to extending water service. For purposes of the Treated Water Systems Optimization Plan, a growth rate will be assigned that assumes that the District will provide water service to each of those private water companies by the Year 2037 Since, there is no way of knowing when those blocks of new connections will be added to the District, it is assumed that the growth will be spread out over a 20-year planning horizon.

6. The Black Oak Casino and associated improvements (Tuolumne Band of MeWuk) could possibly connect to the District's system sometime in the future. The impact of that connection has already been realized by the District when it constructed a new WTP (2010) in Tuolumne City and installed a new pressure filter dedicated solely for tribal development. The capacity of that filter is 432 gpm (MDD) and since the District is already prepared to serve this demand it is not included as future growth.

Historic Connection Growth

Appendix A details historic growth statistics. From this table, growth in non-acquisition connections is found to be 0.84% and the growth in acquisition connections is 0.88% since 1993. The combined growth rate is 1.58% annually for 1993-2017 and is described further below.

The District added 4,352 connections between 1992-2017. Of those, 2,121 (49%) were categorized as non-acquisition growth and 2,231 (51%) were associated with acquisition/merger growth. Non-Acquisition growth from 1992-2017 averaged 0.84% annually.

After factoring in acquisitions of Sugar Pine, Gibbs, Ponderosa, Mono Village, Big Hill, Monte Grande, Curtis Creek Ranches, and Wards Ferry Ranches Water Systems, the average growth rate from 1993-2017 increases to 1.58% annually.

Of mention, the Sonora/Jamestown and Crystal Falls systems accounted for over half, 52%, of the non-acquisition growth.

Recommended Growth Rate:

For purposes of this Treated Water System Optimization Plan, the District will use a total acquisition and non-acquisition growth rate of **2.0% for systemwide annual growth for the next 20 years.**

The historic non-acquisition growth rate of 0.84% (1993-2017) is applied for the years 2017-2037. This growth rate is shown in the table presented in *Appendix D* and results in adding 2612 non-acquistion connections to the total TUD system in the next 20 years (2017-2037).

Appendix B identifies the proposed new developments (having an approved county tentative map) and number of connections that TUD would likely provide service. These connections make up part of the 0.88% acquisition growth assumed for the first 20 years (2017-2037).

Separately and additively, acquisition growth is based on assuming that all known potential (private, mutual and community service districts) water systems near TUD will be acquired over the next 20 years (2017-2037). There are 4402 known potential connections (as of 2017) assumed to be acquired in the next 20 years (2017-2037) due to acquisitions. The total number of acquisition and non-acquisition connections forecasted to be added in the next 20 years is 2612 + 4402 or 7014 total connections. This equates to the 2% growth total for the next 20 years (2017-2037).

Additionally, it is assumed that, of the total connections added in the next 20 years, 9% of those connections will be CII accounts or 365 CII accounts as shown in *Appendix D*. These CII connections are not additive but are handled separately to calculate growth in CII demand and described further in a separate demand memorandum.

Appendix C identifies all of the potential private, mutual, community services districts, and mobile home parks whose water systems could be acquired by the District at some time within the next 20 years. The table also distinguishes between those systems that are expected to remain as “stand-alone” service areas versus those systems that could connect to one of the District’s existing water systems.

Allocation of Growth looking forward the next 20 years

Water systems are ranked by the projected share of **non-acquisition** growth: The Allocated Growth is depicted in *Appendix D* and shows the distribution of anticipated growth by water system including the growth in connections for the next 20 years (2017-2037). This allocation is derived by proximity of estimated known open parcels and known developments in progress, and potential acquisitions. The allocation percentage is shown in descending order in Table A below for the first 20 years of growth.

TABLE A

	%	***20-Yr. Non-Acquisition Growth*** ***(Connections)***
1. Sonora/Jamestown	40.00%	1097
2. Mono Village	12.86	336
3. Crystal Falls	10.00%	261
4. Upper Basin	9.00%	235
5. Columbia/Gibbs	7.64%	200
6. Cedar Ridge	5.00%	101
7. Tuolumne City	5.00%	131
8. Ponderosa Hills	3.75%	72
9. Cuesta Ctr./Lambert Lakes	2.25%	59
10. Apple Valley	1.50%	39
11. Big Hill	1.50%	39
12. Scenic View/Brook	0.66%	18
13. Monte Grande	0.40%	13
14. East Sonora	0.20%	5
15. Phoenix Lake Park	0.10%	3
16. Wards Ferry Ranches	0.10%	3
17. Peaceful Pines	0.05%	1.
	Total	***2612***

Water systems ranked by projected share of **acquisition** growth for the first 20 years of growth:

TABLE B

		20-Yr. Acquisition Growth	
		%	***(Connections)***
1.	Upper Basin	62.83%	2752
2.	Crystal Falls	16.29%	717
3.	Columbia/Gibbs	8.77%	386
4.	Cuesta Ctr/Lambert Lakes	6.84%	301
5.	Sonora/Jamestown	2.75%	121
6.	Scenic View/Brook	2.04%	90
7.	Apple Valley	0.34%	15
8.	Ponderosa Hills	0.34%	15
9.	Mono Village	0.11%	5
		Total	***4402***

Growth in years 2037-2057

The projected growth rate used for the second span of 20 years (2037-2057) is 0.84% total. This assumes that all acquisitions will have been acquired in the first 20 year time frame and that all growth following the first 20 years will be non-acquition growth. From this, there are a total of 3897connections (assumed all non-acquisition) forecasted to be added in 2037-2057 as depicted in *Appendix D.* The Twain Harte Community Services District (THCSD) is included as an acquisition in the next 20 years growth rate. The THCSD board however does not forsee this acquisition to take place in this time frame as noted in the letter included in *Appendix* F.

Appendix A – HISTORIC GROWTH

Appendix B – PROPOSED DEVELOPMENTS

Appendix C – POTENTIAL ACQUISITIONS

Appendix D – GROWTH AND SYSTEM ALLOCATION

Appendix F – TWAIN HARTE COMMUNITY SERVICES LETTER MARCH 2018

APPENDIX A

HISTORIC WATER CONNECTION GROWTH

Year	# New Connection Notices	Acquisitions	Yearly Total	Estimated Total Active Direct Connections includes Commercial, industrial, institutional, irrigation (not Wholesale)	Annual % Increase in Total Active Connections	Estimated Total Active and CII (Including Wholesale)
1992				9,066		9,911
1993	73		73	9,139	0.81%	9,984
1994	54		54	9,193	0.59%	10,038
1995	58	349	407	9,600	4.43%	10,445
1996	57	585	642	10,242	6.69%	11,087
1997	81		81	10,323	0.79%	11,168
1998	104	536	640	10,963	6.20%	11,808
1999	112		112	11,075	1.02%	11,920
2000	148		148	11,223	1.34%	12,068
2001	149	305	454	11,677	4.05%	12,522
2002	157		157	11,834	1.34%	12,679
2003	214		214	12,048	1.81%	12,893
2004	184	275	459	12,507	3.81%	13,352
2005	167		167	12,674	1.34%	13,519
2006	118	181	299	12,973	2.36%	13,818
2007	78		78	13,051	0.60%	13,896
2008	56		56	13,107	0.43%	13,952
2009	22		22	13,129	0.17%	13,974
2010	15		15	13,144	0.11%	13,989
2011	22		22	13,166	0.17%	14,011
2012	32		32	13,198	0.24%	14,043
2013	16		16	13,214	0.12%	14,059
2014	31		31	13,245	0.23%	14,090
2015	49		49	13,294	0.37%	14,139
2016	53		53	13,347	0.40%	14,192
2017	71		71	13,418	0.53%	14,263
	2121	***2231***	**Avg. Annual Non-Acquisition Growth Rate 1993-2017**		**0.84%**	
	49%	51%	**Avg. Annual Acquisition Growth Rate 1993-2017**		**0.88%**	
Total--->	**4352**		**Avg. Annual Combined Growth Rate1993-2017**		**1.58%**	

Year	Apple Valley	Big Hill	Cedar Ridge	Columbia/Gibbs	Crystal Falls	Cuesta Ctr - Lambert Lks	East Sonora	Mono Village	Monte Grande	Peaceful Pines	Phoenix Lake Park	Ponderosa Hills	Scenic View/Brook	Sonora/Jamestown	Tuolumne City	Upper Basin	Wards Ferry Ranches	
1992																		
1993																		
1994																		
1995																349		
1996				585														
1997																		
1998												536						
1999																		
2000																		
2001	12	235	0	16	28	7	3	0	70	0	0	10	4	52	6	11	0	149
2002	4	0	5	20	36	16	0	0	0	0	2	12	2	47	2	11	0	157
2003	2	0	8	18	86	14	1	0	0	0	2	6	2	53	3	19	0	214
2004	3	0	14	8	56	6	2	275	0	0	3	5	6	59	11	11	0	184
2005	1	0	12	28	31	5	1	1	0	0	1	6	1	63	5	12	0	167
2006	3	0	6	20	20	7	0	2	158	0	1	7	2	34	2	14	23	141
2007	1	0	4	12	17	10	0	1	1	1	1	2	0	16	1	11	0	78
2008	0	0	3	11	10	5	0	0	0	0	0	6	0	18	0	3	0	56
2009	0	1	0	4	5	4	2	0	0	0	0	2	1	3	0	0	0	22
2010	1	0	0	1	1	1	0	1	1	0	0	1	1	5	0	2	0	15
2011	0	0	0	10	0	0	0	1	0	0	0	0	0	6	0	5	0	22
2012	0	0	0	13	3	0	0	1	1	0	0	0	0	11	3	0	0	32
2013	0	0	0	10	0	2	0	0	0	0	0	2	0	1	0	1	0	16
2014	0	2	0	9	2	2	0	0	1	0	0	1	0	10	2	2	0	31
2015	0	3	2	10	5	0	5	0	0	0	0	1	1	18	2	2	0	49
2016	0	0	1	8	0	0	0	0	0	1	0	6	0	25	1	11	0	53
2017	1	0	1	6	0	0	0	0	0	0	0	2	2	47	4	8	0	71
								🟦 Acquisition										
Water System New Connection Growth 2001-2017																		
Non-Acquisition Connection Growth 2001-2017	**28**	**6**	**56**	**204**	**300**	**79**	**14**	**7**	**4**	**2**	**10**	**69**	**22**	**468**	**42**	**123**	**0**	1434
% of Total Non-Acquisition Growth	**1.95%**	**0.42%**	**3.91%**	**14.23%**	**20.92%**	**5.51%**	**0.98%**	**0.49%**	**0.28%**	**0.14%**	**0.70%**	**4.81%**	**1.53%**	**32.64%**	**2.93%**	**8.58%**	**0.00%**	100.00%
Water System Acquisition/Merger Growth 1993-2017																		
Acquisition Growth 1993-2017	**0**	**235**	**0**	**585**	**0**	**0**	**0**	**275**	**228**	**0**	**0**	**536**	**0**	**0**	**0**	**349**	**23**	

APPENDIX B

PROPOSED NEW DEVELOPMENT

	Proposed New Development	
System	**# Svcs**	**Development Name**
Apple Valley	8	Apple Valley Estates Unit #3
Subtotal	***8***	
Columbia/ Gibbs	19	Derby Court/Wilcox
	36	Parrotts Ferry Road
	14	Menelik Estates
Subtotal	***69***	
Crystal Falls	34	Sunshine Meadows
	6	Deer Park
	124	Oak View Estates
Subtotal	***164***	
Mono Village	306	Peaceful Oak Estates
	30	Brown
Subtotal	***336***	
Scenic View	18	Peaceful Oak Rd. - Dambacher
Subtotal	***18***	
Sonora Jamestown	45	The Ranch
	11	Mountain Vista
	218	Dry Creeks
	600	Mountain Springs
	20	CALI Investments (Argonaut Estates)
	61	Twin Creeks
	69	Fifth Ave. Partners
	41	Gold Country Commons
	19	KOR Investors
Subtotal	***1084***	
Tuolumne City	75	Cherry Valley
	9	Stieler-Apple Colony
Subtotal	***84***	
TOTAL	***1763***	

APPENDIX C

POTENTIAL ACQUSITIONS/MERGERS

						Additional Connection Load by TUD System																
Number of Connections MDD (gpm)	*IS or assumed WILL BE* Connected to TUD System within 30 Yrs.	Remain "Stand-Alone" Service Area	Ex. Wholesale Customer (Active)	Ex. Wholesale Customer (Emergency Only)		Apple Valley	Big Hill	Cedar Ridge	Columbia/Gibbs	Crystal Falls	Cuesta Center/Lambert Lakes	East Sonora	Mono Village	Monte Grande	Peaceful Pines	Phoenix Lake Park	Ponderosa Hills	Scenic View/Brook	Sonora-Jamestown	Tuolumne City	Upper Basin	Wards Ferry P
						0.197	0.137	0.088	0.142	0.154	0.318	0.089	0.128	0.290	0.126	0.218	0.152	0.191	0.180	0.105	0.102	0.476
						2.20	3.74	2.86	2.39	2.40	2.20	2.20	1.63	2.40	2.20	2.76	3.11	2.35	2.64	2.38	2.46	2.43
34 12	✓					0	0	0	34 12	0	0	0	0	0	0	0	0	0	0	0	0	0
58 21	✓					0	0	0	0	58 21	0	0	0	0	0	0	0	0	0	0	0	0
168 62	✓					0	0	0	0	168 62	0	0	0	0	0	0	0	0	0	0	0	0
4 1	✓					0	0	0	4 1	0	0	0	0	0	0	0	0	0	0	0	0	0
90 63	✓					0	0	0	0	0	90 63	0	0	0	0	0	0	0	0	0	0	0
22 0		✓				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
113 79	✓			✓		0	0	0	0	0	113 79	0	0	0	0	0	0	0	0	0	0	0
3 0		✓				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1 0		✓				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15 0		✓				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 7	✓					0	0	0	0	0	10 7	0	0	0	0	0	0	0	0	0	0	0
522 0		✓				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15 5	✓					0	0	0	15 5	0	0	0	0	0	0	0	0	0	0	0	0	0
65 22	✓			✓		0	0	0	65 22	0	0	0	0	0	0	0	0	0	0	0	0	0
1 1	✓					0	0	0	0	0	1 1	0	0	0	0	0	0	0	0	0	0	0
383 0		✓				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4 0		✓				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15 6	✓					15 6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX C

POTENTIAL ACQUSITIONS/MERGERS

						Additional Connection Load by TUD System																
Number of Connections MDD (gpm)	*IS or assumed WILL BE* Connected to TUD System within 30 Yrs.	Remain "Stand-Alone" Service Area	Ex. Wholesale Customer (Active)	Ex. Wholesale Customer (Emergency Only)		Apple Valley	Big Hill	Cedar Ridge	Columbia/Gibbs	Crystal Falls	Cuesta Center/Lambert Lakes	East Sonora	Mono Village	Monte Grande	Peaceful Pines	Phoenix Lake Park	Ponderosa Hills	Scenic View/Brook	Sonora-Jamestown	Tuolumne City	Upper Basin	Wards Ferry P
						0.197	0.137	0.088	0.142	0.154	0.318	0.089	0.128	0.290	0.126	0.218	0.152	0.191	0.180	0.105	0.102	0.476
						2.20	3.74	2.86	2.39	2.40	2.20	2.20	1.63	2.40	2.20	2.76	3.11	2.35	2.64	2.38	2.46	2.43
58 20	✓			✓		0	0	0	58 20	0	0	0	0	0	0	0	0	0	0	0	0	0
5 2	✓					0	0	0	0	0	0	0	0	0	0	0	0	0	5 2	0	0	0
10 0		✓				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
85 21	✓			✓		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	85 21	0
22 0		✓				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60 0		✓				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15 0		✓				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
150 0		✓				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 0		✓				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
87 29	✓					0	0	0	87 29	0	0	0	0	0	0	0	0	0	0	0	0	0
15 7	✓					0	0	0	0	0	0	0	0	0	0	0	15 7	0	0	0	0	0
160 40	✓					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	160 40	0
768 193	✓					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	768 193	0
30 11	✓					0	0	0	0	30 11	0	0	0	0	0	0	0	0	0	0	0	0
76 53	✓			✓		0	0	0	0	0	76 53	0	0	0	0	0	0	0	0	0	0	0

APPENDIX C

POTENTIAL ACQUSITIONS/MERGERS

						Additional Connection Load by TUD System																
Number of Connections MDD (gpm)	*IS or assumed WILL BE* Connected to TUD System within 30 Yrs.	Remain "Stand-Alone" Service Area	Ex. Wholesale Customer (Active)	Ex. Wholesale Customer (Emergency Only)		Apple Valley	Big Hill	Cedar Ridge	Columbia/Gibbs	Crystal Falls	Cuesta Center/Lambert Lakes	East Sonora	Mono Village	Monte Grande	Peaceful Pines	Phoenix Lake Park	Ponderosa Hills	Scenic View/Brook	Sonora-Jamestown	Tuolumne City	Upper Basin	Wards Ferry P
						0.197	0.137	0.088	0.142	0.154	0.318	0.089	0.128	0.290	0.126	0.218	0.152	0.191	0.180	0.105	0.102	0.476
						2.20	3.74	2.86	2.39	2.40	2.20	2.20	1.63	2.40	2.20	2.76	3.11	2.35	2.64	2.38	2.46	2.43
15 7	✓					0	0	0	0	0	0	0	0	0	0	0	0	0	15 7	0	0	0
55 0	✓		✓			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16 0		✓				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100 48	✓					0	0	0	0	0	0	0	0	0	0	0	0	0	100 48	0	0	0
1 0	✓					0	0	0	0	0	0	0	0	0	0	0	0	0	1 0	0	0	0
351 130	✓					0	0	0	0	351 130	0	0	0	0	0	0	0	0	0	0	0	0
5 2	✓					0	0	0	0	5 2	0	0	0	0	0	0	0	0	0	0	0	0
10 0		✓				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
384 0		✓				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61 23	✓					0	0	0	0	61 23	0	0	0	0	0	0	0	0	0	0	0	0
39 13	✓					0	0	0	39 13	0	0	0	0	0	0	0	0	0	0	0	0	0
96 0		✓				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 0		✓				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
84 28	✓					0	0	0	84 28	0	0	0	0	0	0	0	0	0	0	0	0	0
1 0		✓				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25 0		✓				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44	✓									44												

APPENDIX C

POTENTIAL ACQUSITIONS/MERGERS

						Additional Connection Load by TUD System																
Number of Connections MDD (gpm)	*IS or assumed WILL BE* Connected to TUD System within 30 Yrs.	Remain "Stand-Alone" Service Area	Ex. Wholesale Customer (Active)	Ex. Wholesale Customer (Emergency Only)		Apple Valley	Big Hill	Cedar Ridge	Columbia/Gibbs	Crystal Falls	Cuesta Center/Lambert Lakes	East Sonora	Mono Village	Monte Grande	Peaceful Pines	Phoenix Lake Park	Ponderosa Hills	Scenic View/Brook	Sonora-Jamestown	Tuolumne City	Upper Basin	Wards Ferry
						0.197	0.137	0.088	0.142	0.154	0.318	0.089	0.128	0.290	0.126	0.218	0.152	0.191	0.180	0.105	0.102	0.476
						2.20	3.74	2.86	2.39	2.40	2.20	2.20	1.63	2.40	2.20	2.76	3.11	2.35	2.64	2.38	2.46	2.43
16						0	0	0	0	16	0	0	0	0	0	0	0	0	0	0	0	0
30 0		✓				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
156 0		✓				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15 0		✓				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100 0		✓				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 1	✓					0	0	0	0	0	0	0	5 1	0	0	0	0	0	0	0	0	0
430 0	✓		✓			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
359 0	✓		✓			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 8	✓					0	0	0	0	0	11 8	0	0	0	0	0	0	0	0	0	0	0
70 18	✓					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	70 18	0
90 41	✓			✓		0	0	0	0	0	0	0	0	0	0	0	0	90 41	0	0	0	0
1562 392	✓					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1562 392	0
107 27	✓					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	107 27	0
				Total # of Connections		15	0	0	386	717	301	0	5	0	0	0	15	90	121	0	2752	0
				Potential Acquisition Growth MDD (gpm)		**6**	**0**	**0**	**131**	**265**	**211**	**0**	**1**	**0**	**0**	**0**	**7**	**41**	**57**	**0**	**690**	**0**
										5	**12**		**5**				**15**		**6**		**86**	
										PLG	**curtis sch.**		**Son east**				**maynards**		**gus**		**THCSD**	

APPENDIX D

20-YR. ALLOCATED GROWTH BY SYSTEM

Non-Acquisition Growth Rate	# of (N) Svcs over 20 yrs. (RES & CII)	20 Year Water Service Growth Projections												
0.84%	2612	9% of 2612 = 236 growth in CII connections. (Applied for both 0-20 and 20-40 year forcast)---->							20 YEAR COMMERCIAL GROWTH			20-40 YEAR COMMERCIAL GROWTH		
		Non-Acquisition Growth												
System	% Allocation of Non-Acquisition Growth[1]	Proposed New Development	General Growth	Total Non-Acquisition Growth	Total Acquisition/Merger Growth[2]	Total Combined Growth[3]	Total Existing Active Connections (incl. wholesale) (2017)[4]	Calculated Annual Growth Rate by System (Acq. & Non-Acq.)[5]	Growth in CII Connections by General Growth[6]	Growth in CII Connections by Acq.	Total Growth in CII by system	Growth in CII Connections by General Growth[7]	Growth in CII Connections by Acq.	Total Growth in CII by system[8]
									236	See CII accounts from WS Potential tab	**365**	**236**	See CII from WS Potential	**229**
Apple Valley	1.50%	8	31	**39**	**15**	**54**	**142**	**1.63%**	**4**		**4**	**0**		**0**
Big Hill	1.50%		39	**39**	**0**	**39**	**231**	**0.79%**	**4**		**4**	**0**		**0**
Cedar Ridge	3.86%		101	**101**	**0**	**101**	**675**	**0.70%**	**9**		**9**	**9**		**9**
Columbia/Gibbs	7.64%	69	131	**200**	**386**	**586**	**1670**	**1.51%**	**18**		**18**	**18**		**18**
Crystal Falls	10.00%	164	97	**261**	**717**	**978**	**2273**	**1.81%**	**24**	**5**	**29**	**24**		**24**
Cuesta Ctr. - Lambert Lakes	2.25%		59	**59**	**301**	**360**	**206**	**5.18%**	**5**	**12**	**17**	**5**		**5**
East Sonora	0.20%		5	**5**	**0**	**5**	**95**	**0.27%**	**0**		**0**	**0**		**0**
Mono Village	12.86%	336	0	**336**	**5**	**341**	**265**	**4.23%**	**30**	**5**	**35**	**30**		**30**
Monte Grande	0.50%		13	**13**	**0**	**13**	**234**	**0.27%**	**1**		**1**	**1**		**1**
Peaceful Pines	0.05%		1	**1**	**0**	**1**	**33**	**0.19%**	**0**		**0**	**0**		**0**
Phoenix Lake Park	0.10%		3	**3**	**0**	**3**	**56**	**0.23%**	**0**		**0**	**0**		**0**
Ponderosa Hills	2.75%		72	**72**	**15**	**87**	**691**	**0.59%**	**6**	**15**	**21**	**6**		**6**
Scenic View/Brook	0.69%	18	0	**18**	**90**	**108**	**273**	**1.68%**	**2**		**2**	**2**		**2**
Sonora/Jamestown	42.00%	1084	13	**1097**	**121**	**1218**	**4790**	**1.14%**	**99**	**6**	**105**	**99**		**99**
Tuolumne City	5.00%	84	47	**131**	**0**	**131**	**686**	**0.88%**	**12**		**12**	**12**		**12**
Upper Basin	9.00%		235	**235**	**2752**	**2987**	**1920**	**4.80%**	**21**	**86**	**107**	**21**		**21**
Wards Ferry Ranches	0.10%		3	**3**	**0**	**3**	**23**	**0.54%**	**0**		**0**	**0**		**0**
Systemwide TOTAL	**100.00%**	**1763**	**849**	**2612**	**4402**	**7014**	**14263**	**2.02%**	**236**		**365**	**229**		**229**
				37%	63%	**Total Est. Active Connections (2037)**	**21277**							
				Non-Acq.	Acq.			**Total**						
			20 Yr. Growth Rate	**0.84%**	**1.35%**			**2.02%**						

Notes:

[1] Allocations were originally based upon historic growth from 2001-2010 and assuming future development will mimic that pattern. However several developments have been proposed that require the growth allocation to be adjusted. Most proposed developments fall within Sonora/Jamestown and Mono Village. These larger developments will result in a higher growth allocation being assigned to those areas and a smaller growth allocation being assigned to the remaining systems. Furthermore, projections required an iterative process to ensure that the projected in-fill growth did not exceed the current count on

[2] Based on most recent data fromState Water Board regarding number of connections for regulated water systems in Tuolumne County. Excludes connections in systems where the District already wholesales water (ie. Sonora Meadows) and systems that would remain as isolated, discrete water service areas, and

[3] Total combined growth is growth in all classes of service connections (residential, commercial, industrial, and institutional).

[4] Existing services by system are based data from 2017 and include the number of active connections within wholesale accounts.

[5] Historically the District has experienced an overall annual growth rate of **1.58%** from 1993-2017. Approximately, **51%** of that growth has been associated with system acquisition. The District assumes to acquire all remaining in the next 20 years resulting in an estimated **63%** of the growth in the next 20 years.

[6] Total CII growth 0-20 years is (CII connections/total connections) * total general growth in connections 9%*2612 = 236. This growth in CII connections is distributed amongst each system by the 2017 distribution.

[7] Total CII growth for years 2037-2057 is assumed the same number of CII as 0-20. i.e. 9%*(2612) = 236. Additionally, some systems are assumed built out in terms of CII connections and reflect 0 growth in CII connections, thus the total is less at 229

[8] Growth in CII connetions for some systems are assumed built out in the years 0-20 and assumed to have no new CII connnections in the years 20-40

Note on modeling total WTP capacity when 2050 MDDs are less.

Note Mobile Home Parks are considered to have demands like regular residential.

APPENDIX D

40-YR. ALLOCATED GROWTH BY SYSTEM

Non-Acquisition Growth Rate	# of (N) Svcs over 40 yrs.	40 Year Water Service Growth Projections *(Total Growth over a 40 yr. Period)
0.84%	5703	

System	% Allocation of Non-Acquisition Growth[1]	Non-Acquisition Growth		Total Non-Acquisition Growth	Total Acquisition/Merger Growth[2]	General Growth within Acquired/Merged Systems (Yrs 21-40)[3]	Total Combined Growth[4]	Total Existing Active Connections (incl. wholesale) (2017)[5]	Calculated Annual Growth Rate by System[6]
		Proposed New Development	General Growth						
Apple Valley	1.50%	8	78	**86**	**15**	**3**	**103**	**142**	**1.38%**
Big Hill	1.50%		86	**86**	**0**	**0**	**86**	**231**	**0.79%**
Cedar Ridge	5.00%		285	**285**	**0**	**0**	**285**	**675**	**0.88%**
Columbia/Gibbs	8.00%	69	387	**456**	**386**	**71**	**913**	**1670**	**1.10%**
Crystal Falls	10.00%	164	406	**570**	**717**	**131**	**1419**	**2273**	**1.22%**
Cuesta Ctr. - Lambert Lakes	2.25%		128	**128**	**301**	**55**	**484**	**206**	**3.07%**
East Sonora	0.20%		11	**11**	**0**	**0**	**11**	**95**	**0.28%**
Mono Village	10.50%	336	263	**599**	**5**	**1**	**605**	**265**	**3.02%**
Monte Grande	0.50%		29	**29**	**0**	**0**	**29**	**234**	**0.29%**
Peaceful Pines	0.10%		6	**6**	**0**	**0**	**6**	**33**	**0.40%**
Phoenix Lake Park	0.10%		6	**6**	**0**	**0**	**6**	**56**	**0.24%**
Ponderosa Hills	3.75%		214	**214**	**15**	**3**	**232**	**691**	**0.73%**
Scenic View/Brook	0.50%	18	11	**29**	**90**	**16**	**135**	**273**	**1.01%**
Sonora/Jamestown	42.00%	1084	1311	**2395**	**121**	**22**	**2538**	**4790**	**1.07%**
Tuolumne City	5.00%	84	201	**285**	**0**	**0**	**285**	**686**	**0.87%**
Upper Basin	9.00%		513	**513**	**2752**	**504**	**3769**	**1920**	**2.75%**
Wards Ferry Ranches	0.10%		6	**6**	**0**	**0**	**6**	**23**	**0.56%**
Systemwide TOTAL	**100.00%**	**1763**	**3940**	**5703**	**4402**	**806**	**10911**	**14263**	**1.43%**
				52%	*40%*	*7%*			

		Growth	baseline conn.	Calc. Growth Rate
Annual Growth Rate by Time Range	*(Yrs 0-40)*	10911	14263	*1.43%*
	(Yrs 0-20)	7014	14263	*2.02%*
	(Yrs 21-40)	3897	21277	*0.84%*

Notes:

---

[1] Allocations were originally based upon historic growth from 2001-2017 and assuming future development will mimic that pattern. The Proposed New Development category is based on current applications on file at the County. These developments are all assumed to buildout within the first 20 years. Over years 21-40, we assume that the % allocation of non-acquisition growth will remain the same by system but since we cannot predict how many connections will be associated with new developments we are lumping all non-acquisition growth into the "General Growth" category.

[2] Based on most recent data from CDPH regarding number of connections for regulated water systems in Tuolumne County. Excludes connections in systems where the District already wholesales water (ie. Sonora Meadows) and systems that would remain as isolated, discrete water service areas, and would not likely connect to an existing TUD system.

[3] Assumes areas within the systems that were acquired/merged in years 0-20 will grow at **0.84%** from years 21-40.

[4] Total combined growth is growth in all classes of service connections (residential, commercial, industrial, institutional & irrigation). The District does not have growth numbers by customer class broken out by individual system. The reality is that most growth in commercial and institutional services will occur in the Sonora/Jamestown system which has been allocated 42% of all non-acquisition growth for the next 40 years.

[5] Existing services by system are based on data from 2017 and include the number of active connections within wholesale accounts.

[6] Historically the District has seen an overall annual growth rate of 1.58% from 1992-2017. Approximately, **51%** of that growth has been associated with system acquisition. The District would expect this trend to continue for the first 0-20 years or until all acquisitions and mergers have been exhausted. In years 21-40 there will essentially be no more systems left to acquire or merge with; therefore, the overall growth rate for years 21-40 will reflect the non-acquisition growth rate of **0.84%** only. The cumulative growth rate for 0-20 years is **2.02%**, 21-40 is **0.84%** and for the entire 40 year period the growth rate would be **1.43%**. Additionally, acquisitions and mergers will represent approximately **40%** of the overall growth over a 40 year time frame.

APPENDIX F

Twain Harte Community Services District

P. O. Box 649 ▪ Twain Harte, CA 95383
Phone: (209) 586-3172 ▪ Fax: (209) 586-0424
www. twainhartecsd.com

Directors: Gary Sipperley ▪ Bill McManus ▪ Jim Johnson ▪ Richard Knudson ▪ Eileen Mannix

March 30, 2018

Erik Johnson, District Engineer
Tuolumne Utilities District
18885 Nugget Blvd.
Sonora, CA 95370

SUBJECT: Treated Water System Optimization Plan - Projected 20-Year Demand and Acquisitions Growth Twain Harte Community Services District Comments

Dear Mr. Johnson:

Thank you for including Twain Harte Community Services District (THCSD) in the review of the memorandum you prepared for Kennedy/Jenks Consultants on January 30, 2018, regarding projected 20-year water demand growth rates. The purpose of this letter is to provide comments on the memorandum's assumption that THCSD's water demands should be included in TUD's projected growth as a result of a future acquisition/merger.

The THCSD Board of Directors (Board) discussed this topic at their board meeting on March 14, 2018. ***The Board does not foresee THCSD requiring or benefitting from an acquisition/merger in the next 20 to 40 years.*** The Board noted, however, that there is not enough information available to thoroughly evaluate the possibility.

While the Board does not foresee a THCSD acquisition/merger within TUD's planning horizon, THCSD is not opposed to TUD continuing to include THCSD's water demands in its future growth projections for the purposes of the Treated Water Systems Optimization Plan (TWSOP). Any future proposal of an acquisition/merger will require additional information so that potential benefits can be fully evaluated by THCSD at that time.

Please include this letter in the appendix of the TWSOP for future reference.

Sincerely,

TOM C. TROTT
General Manager

Appendix H1

DWR SBX7-7 2020 Compliance Form

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

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:	

SB X7-7 Table 3: 2020 Service Area Population

2020 Compliance Year Population	
2020	30,910

NOTES:

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.*	
	4,623	191		-	-	-	**4,432**

* **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:

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	PG&E		
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
	4,483	-	4,483

[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

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	Groundwater		
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
	140		140

[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:

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**
4,432	30,910	**128**

NOTES:

SB X7-7 Table 9: 2020 Compliance

	Optional Adjustments to 2020 GPCD						
	Enter "0" if Adjustment Not Used						
Actual 2020 GPCD[1]	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?**
128	-	-	-	-	128	165	**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 H2

DWR SBX7-7 Verification Tables

SB X7-7 Table 0: Units of Measure Used in UWMP*

(select one from the drop down list)

Acre Feet

**The unit of measure must be consistent with Table 2-3*

NOTES:

SB X7-7 Table-1: Baseline Period Ranges

Baseline	Parameter	Value	Units
10- to 15-year baseline period	2008 total water deliveries	6,168	Acre Feet
	2008 total volume of delivered recycled water	0	Acre Feet
	2008 recycled water as a percent of total deliveries	0.00%	Percent
	Number of years in baseline period[1, 2]	10	Years
	Year beginning baseline period range	1999	▨
	Year ending baseline period range[3]	2008	▨
5-year baseline period	Number of years in baseline period	5	Years
	Year beginning baseline period range	2003	▨
	Year ending baseline period range[4]	2007	▨

[1] *If the 2008 recycled water percent is less than 10 percent, then the first baseline period is a continuous 10-year period. If the amount of recycled water delivered in 2008 is 10 percent or greater, the first baseline period is a continuous 10- to 15-year period.*

[2] *The Water Code requires that the baseline period is between 10 and 15 years. However, DWR recognizes that some water suppliers may not have the minimum 10 years of baseline data.*

[3] *The ending year must be between December 31, 2004 and December 31, 2010.*

[4] *The ending year must be between December 31, 2007 and December 31, 2010.*

NOTES:

SB X7-7 Table 3: Service Area Population

Year		Population
10 to 15 Year Baseline Population		
Year 1	1999	25,841
Year 2	2000	26,184
Year 3	2001	27,241
Year 4	2002	27,604
Year 5	2003	28,104
Year 6	2004	28,995
Year 7	2005	29,384
Year 8	2006	30,067
Year 9	2007	30,246
Year 10	2008	30,377
5 Year Baseline Population		
Year 1	2003	28,104
Year 2	2004	28,995
Year 3	2005	29,384
Year 4	2006	30,067
Year 5	2007	30,246
2015 Compliance Year Population		
2015		30,794
NOTES:		

SB X7-7 Table 2: Method for Population Estimates

	Method Used to Determine Population (may check more than one)
☐	**1. Department of Finance** (DOF) DOF Table E-8 (1990 - 2000) and (2000-2010) and DOF Table E-5 (2011 - 2015) when available
☑	**2. Persons-per-Connection Method**
☐	**3. DWR Population Tool**
☐	**4. Other** DWR recommends pre-review
NOTES:	

SB X7-7 Table 4: Annual Gross Water Use *

Baseline Year *Fm SB X7-7 Table 3*		Volume Into Distribution System *This column will remain blank until SB X7-7 Table 4-A is completed.*	Deductions					Annual 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.*	
10 to 15 Year Baseline - Gross Water Use								
Year 1	1999	5,391	243		0		0	5,148
Year 2	2000	5,582	309		0		0	5,273
Year 3	2001	6,016	287		0		0	5,729
Year 4	2002	6,105	297		0		0	5,808
Year 5	2003	5,866	278		0		0	5,588
Year 6	2004	6,371	288		0		0	6,083
Year 7	2005	5,762	279		0		0	5,483
Year 8	2006	6,038	304		0		0	5,734
Year 9	2007	5,843	260		0		0	5,583
Year 10	2008	6,168	278		0		0	5,890
10 - 15 year baseline average gross water use								**5,632**
5 Year Baseline - Gross Water Use								
Year 1	2003	5,866	278		0		0	5,588
Year 2	2004	6,371	288		0		0	6,083
Year 3	2005	5,762	279		0		0	5,483
Year 4	2006	6,038	304		0		0	5,734
Year 5	2007	5,843	260		0		0	5,583
5 year baseline average gross water use								**5,694**
2015 Compliance Year - Gross Water Use								
2015		3,902	253		0		0	**3,650**
* NOTE that the units of measure must remain consistent throughout the UWMP, as reported in Table 2-3								
NOTES:								

SB X7-7 Table 4-A: Volume Entering the Distribution System(s)

Complete one table for each source.

Name of Source: PG&E

This water source is:

☐ The supplier's own water source

☑ A purchased or imported source

Baseline Year *Fm SB X7-7 Table 3*		Volume Entering Distribution System	Meter Error Adjustment* *Optional* *(+/-)*	Corrected Volume Entering Distribution System
10 to 15 Year Baseline - Water into Distribution System				
Year 1	1999	5,391		5,391
Year 2	2000	5,582		5,582
Year 3	2001	6,016		6,016
Year 4	2002	6,105		6,105
Year 5	2003	5,866		5,866
Year 6	2004	6,371		6,371
Year 7	2005	5,487		5,487
Year 8	2006	5,749		5,749
Year 9	2007	5,599		5,599
Year 10	2008	5,868		5,868
5 Year Baseline - Water into Distribution System				
Year 1	2003	5,866		5,866
Year 2	2004	6,371		6,371
Year 3	2005	5,487		5,487
Year 4	2006	5,749		5,749
Year 5	2007	5,599		5,599
2015 Compliance Year - Water into Distribution System				
2015		3,809		3,809

** Meter Error Adjustment - See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 4-A: Volume Entering the Distribution

Name of Source: Groundwater

This water source is:

☑ The supplier's own water source

☐ A purchased or imported source

Baseline Year *Fm SB X7-7 Table 3*		Volume Entering Distribution System	Meter Error Adjustment* *Optional (+/-)*	Corrected Volume Entering Distribution System
10 to 15 Year Baseline - Water into Distribution System				
Year 1	1999	0		0
Year 2	2000	0		0
Year 3	2001	0		0
Year 4	2002	0		0
Year 5	2003	0		0
Year 6	2004	0		0
Year 7	2005	274.665054		275
Year 8	2006	288.475028		288
Year 9	2007	244.589997		245
Year 10	2008	300.750561		301
5 Year Baseline - Water into Distribution System				
Year 1	2003	0		0
Year 2	2004	0		0
Year 3	2005	274.665054		275
Year 4	2006	288.475028		288
Year 5	2007	244.589997		245
2015 Compliance Year - Water into Distribution System				
2015		93		93

** Meter Error Adjustment - See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 5: Gallons Per Capita Per Day (GPCD)

Baseline Year *Fm SB X7-7 Table 3*		Service Area Population *Fm SB X7-7 Table 3*	Annual Gross Water Use *Fm SB X7-7 Table 4*	Daily Per Capita Water Use (GPCD)
10 to 15 Year Baseline GPCD				
Year 1	1999	25,841	5,148	178
Year 2	2000	26,184	5,273	180
Year 3	2001	27,241	5,729	188
Year 4	2002	27,604	5,808	188
Year 5	2003	28,104	5,588	177
Year 6	2004	28,995	6,083	187
Year 7	2005	29,384	5,483	167
Year 8	2006	30,067	5,734	170
Year 9	2007	30,246	5,583	165
Year 10	2008	30,377	5,890	173
10-15 Year Average Baseline GPCD				**177**
5 Year Baseline GPCD				
Baseline Year *Fm SB X7-7 Table 3*		Service Area Population *Fm SB X7-7 Table 3*	Gross Water Use *Fm SB X7-7 Table 4*	Daily Per Capita Water Use
Year 1	2003	28,104	5,588	177
Year 2	2004	28,995	6,083	187
Year 3	2005	29,384	5,483	167
Year 4	2006	30,067	5,734	170
Year 5	2007	30,246	5,583	165
5 Year Average Baseline GPCD				**173**
2015 Compliance Year GPCD				
2015		30,794	3,650	**106**
NOTES:				

SB X7-7 Table 6: Gallons per Capita per Day

Summary From Table SB X7-7 Table 5

10-15 Year Baseline GPCD	177
5 Year Baseline GPCD	173
2015 Compliance Year GPCD	106
NOTES:	

SB X7-7 Table 7: 2020 Target Method

Select Only One

Target Method		Supporting Documentation
☐	Method 1	SB X7-7 Table 7A
☐	Method 2	SB X7-7 Tables 7B, 7C, and 7D *Contact DWR for these tables*
☑	Method 3	SB X7-7 Table 7-E
☐	Method 4	Method 4 Calculator

NOTES:

SB X7-7 Table 7-A: Target Method 1

20% Reduction

10-15 Year Baseline GPCD	2020 Target GPCD
177	142

NOTES:

SB X7-7 Table 7-E: Target Method 3

Agency May Select More Than One as Applicable	Percentage of Service Area in This Hydrological Region	Hydrologic Region	"2020 Plan" Regional Targets	Method 3 Regional Targets (95%)
☐		North Coast	137	130
☐		North Lahontan	173	164
☐		Sacramento River	176	167
☐		San Francisco Bay	131	124
☑	100%	San Joaquin River	174	165
☐		Central Coast	123	117
☐		Tulare Lake	188	179
☐		South Lahontan	170	162
☐		South Coast	149	142
☐		Colorado River	211	200
Target *(If more than one region is selected, this value is calculated.)*				**165**

NOTES:

SB X7-7 Table 7-F: Confirm Minimum Reduction for 2020 Target

5 Year Baseline GPCD *From SB X7-7 Table 5*	Maximum 2020 Target[1]	Calculated 2020 Target[2]	**Confirmed 2020 Target**
173	165	165	**165**

[1] Maximum 2020 Target is 95% of the 5 Year Baseline GPCD

[2] 2020 Target is calculated based on the selected Target Method, see SB X7-7 Table 7 and corresponding tables for agency's calculated target.

NOTES:

SB X7-7 Table 8: 2015 Interim Target GPCD

Confirmed 2020 Target *Fm SB X7-7 Table 7-F*	10-15 year Baseline GPCD *Fm SB X7-7 Table 5*	2015 Interim Target GPCD
165	177	171
NOTES:		

SB X7-7 Table 9: 2015 Compliance

Actual 2015 GPCD	2015 Interim Target GPCD	Optional Adjustments *(in GPCD)*					2015 GPCD *(Adjusted if applicable)*	Did Supplier Achieve Targeted Reduction for 2015?
		Extraordinary Events	Weather Normalization	Economic Adjustment	TOTAL Adjustments	Adjusted 2015 GPCD		
106	171	*0*	*0*	*0*	0	106	106	YES
NOTES:								

Appendix I

DWR Tables

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 *
Add additional rows as needed			
CA5510028	Apple Valley	245	92
CA5510013	Columbia Gibbs	1,925	552
CA5510015	Cedar Ridge	676	99
CA5510002	Ponderosa Hills	640	193
CA5510025	Phoenix Lake Park	57	17
CA5510021	Peaceful Pines	33	3
CA5510001	Sonora/Jamestown	5,053	2,232
CA5510033	Scenic View	174	51
CA5510003	Tuolumne City	686	228
CA5510012	Upper Basin	4,005	1,137
CA5500363	Wards Ferry	23	21
TOTAL		13,517	4,625

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

NOTES:

Submittal Table 2-2: Plan Identification

Select Only One	Type of Plan		Name of RUWMP or Regional Alliance *if applicable* (select from drop down list)
☑	**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)**		

NOTES:

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
If using fiscal years provide month and date that the fiscal year begins (mm/dd)	
Units of measure used in UWMP * (select from drop down)	
Unit	AF
**** Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*	
NOTES:	

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
NOTES: TUD does not receive wholesale supply, therefore this table was not completed.

Submittal Table 3-1 Retail: Population - Current and Projected

Population Served	2020	2025	2030	2035	2040	2045*(opt)*
	30,910	33,928	37,570	41,599	45,945	48,787

NOTES:

Submittal Table 4-1 Retail: Demands for Potable and Non-Potable 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 WUEdata online submittal tool	Additional Description (as needed)	Level of Treatment When Delivered Drop down list	Volume*
Add additional rows as needed			
Single Family		Drinking Water	2,562
Multi-Family		Drinking Water	269
Commercial		Drinking Water	440
Industrial		Drinking Water	0
Institutional/Governmental		Drinking Water	258
Landscape		Drinking Water	83
Other Potable		Drinking Water	120
Losses		Drinking Water	700
Sales/Transfers/Exchanges to other Suppliers		Drinking Water	191
		TOTAL	4,624

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

NOTES: Water losses in this table are based on meter readings only and are not corrected for meter inaccuracies or systematic data handling errors. TUD's treated water system losses for 2020 were analyzed using AWWA's Water Audit System (v. 5.0) and are presented in Table 4-4. Much of the raw water losses fall outside of TUD jurisdiction and control and is associated with the year-round conveyance and operation of the Main Tuolumne Canal, natural losses due to flow in Power Creek, natural losses that support the aquatic habitat and ground water recharge at Phoenix Lake, including environmental flows on Sullivan Creek before being received into a TUD owned and controlled raw water conveyance infrastructure. Additionally, the annual losses associated with the TUD raw water conveyance system includes ecological functions for the local terrestrial and aquatic habitat and species, supporting recreational uses and supporting the historic properties of the ditch system as outlined in the various studies listed in Section 1.9.2 of the UWMP.

Submittal Table 4-2 Retail: Use for Potable and Non-Potable Water - Projected

Use Type	Additional Description (as needed)	Projected Water Use* *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 WUEdata online submittal tool		2025	2030	2035	2040	2045 (opt)
Add additional rows as needed						
Single Family	Drinking Water	3,227	3,574	3,957	4,371	4,555
Multi-Family	Drinking Water	339	374	412	455	475
Commercial	Drinking Water	514	550	589	651	678
Industrial	Drinking Water	2	2	2	2	2
Institutional/Governmental	Drinking Water	350	379	410	437	472
Landscape	Drinking Water	99	108	118	132	145
Other Potable	Drinking Water	27	30	33	36	38
Losses	Drinking Water	652	718	790	870	910
Sales/Transfers/Exchanges to other Suppliers	Drinking Water	143	96	48	0	0
	TOTAL	5,467	5,956	6,497	7,106	7,434

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

NOTES: Starting in 2025, TUD will start to acquire its wholesale customers (Sales - Drinking Water and Raw Water) and convert them to direct retail customers. The acquisitions will occur every five years until all systems are acquired by 2040. Much of the raw water losses fall outside of TUD jurisdiction and control and is associated with the year-round conveyance and operation of the Main Tuolumne Canal, natural losses due to flow in Power Creek, natural losses that support the aquatic habitat and ground water recharge at Phoenix Lake, including environmental flows on Sullivan Creek before being received into a TUD owned and controlled raw water conveyance infrastructure. Additionally, the annual losses associated with the TUD raw water conveyance system includes ecological functions for the local terrestrial and aquatic habitat and species, supporting recreational uses and supporting the historic properties of the ditch system as outlined in the various studies listed in Section 1.9.2 of the UWMP.

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*	4,624	5,467	5,956	6,497	7,106	7,434
Recycled Water Demand[1] *From Table 6-4*	1,592	1,640	1,690	1,743	1,796	1,852
Optional Deduction of Recycled Water Put Into Long-Term Storage[2]	0	0	0	0	0	0
TOTAL WATER USE	6,216	7,107	7,646	8,239	8,902	9,286

[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.*

NOTES:

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]
01/2016	955
01/2017	1,031
01/2018	727
01/2019	724
01/2020	700

[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.*

NOTES:

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) *Drop down list (y/n)*	No
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.	
Are Lower Income Residential Demands Included In Projections? *Drop down list (y/n)*	Yes
NOTES:	

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*	*177*	*165*
5 Year	*2003*	*2007*	*173*	

**All cells in this table should be populated manually from the supplier's SBX7-7 Verification Form and reported in Gallons per Capita per Day (GPCD)*

NOTES:

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)*		
128	*0*	*128*	*165*	*YES*

**All cells in this table should be populated manually from the supplier's SBX7-7 2020 Compliance Form and reported in Gallons per Capita per Day (GPCD)*

NOTES:

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*
Add additional rows as needed						
Fractured Rock		93	108	127	122	140
	TOTAL	93	108	127	122	140

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

NOTES:

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 2015 service area covered by wastewater collection system *(optional)*
	Percentage of 2015 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*
Tuolumne Utilities District	Metered	1,256	Tuolumne Utilities District	Regional Wastewater Treatment Plant	Yes	No
Jamestown Sanitary District	Metered	179	Jamestown Sanitary District	JSD Wastewater Treatment Plant	Yes	No
Twain Harte Community Services District	Metered	157	Tuolumne Utilities District	Regional Wastewater Treatment Plant	Yes	No
Total Wastewater Collected from Service Area in 2020:		1,592				

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

NOTES:

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 [3]	Recycled Outside of Service Area	Instream Flow Permit Requirement
Regional Wastewater Treatment Plant	Land Application Area	Pasture Lands		Land disposal	Yes	Secondary, Disinfected - 2.2	1,412	1,412			
Jamestown Sanitary District Wastewater Treatment Plant	Quartz Reservoir	Pasture Lands		Land disposal	Yes	Secondary, Disinfected - 2.2	179	179			
						Total	1,592	1,592	0	0	0

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

[2] If the **Wastewater Discharge ID Number** is not available to the UWMP preparer, access the SWRCB CIWQS regulated facility website at https://ciwqs.waterboards.ca.gov/ciwqs/readOnly/CiwqsReportServlet?inCommand=reset&reportName=RegulatedFacility

NOTES:

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:	Tuolumne Utilities District (1,500 AF), Jamestown Sanitary District (200 AF)
Name of Supplier Operating the Recycled Water Distribution System:	Tuolumne Utilities District
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)
Agricultural irrigation			Fodder crops/pasture	Secondary, Disinfected - 2.2	1,592	1,640	1,690	1,743	1,796	1,852
Landscape irrigation (exc golf courses)										
Golf course irrigation	Dry land recycled water application	160 AF								
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:	1,592	1,640	1,690	1,743	1,796	1,852
				2020 Internal Reuse						

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

NOTES:

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]
Insert additional rows as needed.		
Agricultural irrigation	1,980	1,592
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	1,980	1,592

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

NOTE: TUD implemented significant improvements to the collection system over the last five years to install lining, grout leaking joints in manholes, install pipe patching and fix cracks in a majority of the system. As a result, there were many relatively large infiltration and inflow (I&I) breaches discovered and remedied that likely caused significant I&I in the past. Additionally, TUD implemented a program to install over 1,200 manhole dishes that prevents storm water from entering the collection system through pick holes and the annular seat of the manholes further reducing I&I. This reduced the available supply of recycled water.

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.		
	Provide page location of narrative in UWMP		
Name of Action	Description	Planned Implementation Year	Expected Increase in Recycled Water Use *
Add additional rows as needed			
Dry Land Banking	Pasture land to apply recycled water	2022	10
Water Use Credits	Contracts currently in place	2020	353
		Total	363
***Units of measure (AF, CCF, MG)** *must remain consistent throughout the UWMP as reported in Table 2-3.*			
NOTES: The District maintains over 130 acres of existing lands used for dry land banking. There is over 130 acres of proposed lands and over 120 of possible irrigation sites for the land application of the secondary treated recycled water. A new wastewater treatment facility will be coming on line in the next year or two depending on construction schedule and will result in additional options for utilizing tertiary treated water for other uses than pasture application.			

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

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 WUEdata online submittal tool		Actual Volume*	Water Quality Drop Down List	Total Right or Safe Yield* (optional)
Add additional rows as needed				
Surface water (not desalinated)	PG&E Contract	4,483	Drinking Water	20,100
Surface water (not desalinated)	PG&E Contract	11,546	Other Non-Potable Water	
Groundwater (not desalinated)		140	Drinking Water	1,465
Recycled Water		1,592	Recycled Water	
	Total	17,761		21,565

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

NOTES: The total safe yield for the PG&E Contract is 20,100 AF, this includes both Drinking Water and Other Non-Potable Water

Submittal Table 6-9 Retail: Water Supplies — Projected

Water Supply	Additional Detail on 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 WUEdata online submittal tool		**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)
Add additional rows as needed											
Surface water (not desalinated)	PG&E Contract, Drinking Water	20,100	20,100	20,100	20,100	20,100	20,100	20,100	20,100	20,100	20,100
Surface water (not desalinated)	PG&E Contract, Other Non-Potable Water										
Groundwater (not desalinated)		1,465	1,465	1,465	1,465	1,465	1,465	1,465	1,465	1,465	1,465
Recycled Water		1,640		1,690		1,743		1,796		1,852	
	Total	23,205	21,565	23,255	21,565	23,308	21,565	23,361	21,565	23,417	21,565

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

NOTES: The total safe yield for the PG&E Contract is 20,100 AF, this includes both Drinking Water and Other Non-Potable Water

Submittal Table 7-1 Retail: Basis of Water Year Data (Reliability Assessment)

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	2004	23,417	100%
Single-Dry Year	1977	22314	95%
Consecutive Dry Years 1st Year	2012	22171	95%
Consecutive Dry Years 2nd Year	2013	22132	95%
Consecutive Dry Years 3rd Year	2014	22115	94%
Consecutive Dry Years 4th Year	2015	22135	95%
Consecutive Dry Years 5th Year	2016	22213	95%

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: Single-Dry and Consecutive Dry Years 1-5 assume full contract supply available from PG&E and 100% groundwater supply but reduced recycled water supply by 20% due to reduced water use. A yield analysis was performed in 2021 demonstrating that the Safe Yield for the South Fork of the Stanislaus River for water supply was 20,100 acre-feet. This is a reduction from 24,500 acre-feet of water availability used in the 2015 UWMP. The reduction is based primarily on the regulatory conditions placed on the Spring Gap-Stanislaus Hydroelectric project owned and operated by PG&E and is used as the base volume of available supply.

Submittal Table 7-2 Retail: Normal Year Supply and Demand Comparison

	2025	2030	2035	2040	2045 *(Opt)*
Supply totals *(autofill from Table 6-9)*	23,205	23,255	23,308	23,361	23,417
Demand totals *(autofill from Table 4-3)*	7,107	7,646	8,239	8,902	9,286
Difference	16,098	15,610	15,068	14,459	14,131
NOTES:					

Submittal Table 7-3 Retail: Single Dry Year Supply and Demand Comparison

	2025	2030	2035	2040	2045 (Opt)
Supply totals*	22,144	22,185	22,227	22,270	22,314
Demand totals*	6,779	7,308	7,891	8,543	8,915
Difference	15,365	14,877	14,336	13,727	13,399

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

NOTES: Single-Dry Year assumes full contract supply available from PG&E and 100% groundwater supply but reduced recycled water supply by 20% due to reduced water use.

Submittal Table 7-4 Retail: Multiple Dry Years Supply and Demand Comparison

		2025*	2030*	2035*	2040*	2045* (Opt)
First year	Supply totals	22,106	22,144	22,185	22,227	22,270
	Demand totals	6,779	7,308	7,891	8,543	8,915
	Difference	15,327	14,837	14,294	13,684	13,354
Second year	Supply totals	22,113	22,152	22,193	22,235	22,278
	Demand totals	6,895	7,434	8,031	8,685	9,056
	Difference	15,217	14,718	14,163	13,550	13,222
Third year	Supply totals	22,121	22,160	22,201	22,244	22,287
	Demand totals	7,012	7,562	8,172	8,825	9,198
	Difference	15,109	14,598	14,030	13,419	13,090
Fourth year	Supply totals	22,129	22,169	22,210	22,252	22,296
	Demand totals	7,129	7,689	8,312	8,966	9,338
	Difference	14,999	14,480	13,898	13,287	12,958
Fifth year	Supply totals	22,136	22,177	22,218	22,261	22,305
	Demand totals	7,245	7,815	8,453	9,105	9,479
	Difference	14,891	14,362	13,766	13,156	12,826
Sixth year *(optional)*	Supply totals					
	Demand totals					
	Difference					

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

NOTES: Consecutive Dry Years 1-5 assume full contract supply available from PG&E and 100% groundwater supply but reduced recycled water supply by 20% due to reduced water use.

Submittal Table 7-5: Five-Year Drought Risk Assessment Tables to address Water Code Section 10635(b)

2021	Total
Total Water Use	6,078
Total Supplies	23,166
Surplus/Shortfall w/o WSCP Action	17,088
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	
Revised Surplus/(shortfall)	17,088
Resulting % Use Reduction from WSCP action	0%

2022	Total
Total Water Use	6,267
Total Supplies	23,175
Surplus/Shortfall w/o WSCP Action	16,908
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	
Revised Surplus/(shortfall)	16,908
Resulting % Use Reduction from WSCP action	0%

2023	Total
Total Water Use	6,457
Total Supplies	23,185
Surplus/Shortfall w/o WSCP Action	16,728
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	
Revised Surplus/(shortfall)	16,728
Resulting % Use Reduction from WSCP action	0%

2024	Total
Total Water Use	6,645
Total Supplies	23,195
Surplus/Shortfall w/o WSCP Action	16,550
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	
Revised Surplus/(shortfall)	16,550
Resulting % Use Reduction from WSCP action	0%

2025	Total
Total Water Use	6,779
Total Supplies	23,205
Surplus/Shortfall w/o WSCP Action	16,426
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	
Revised Surplus/(shortfall)	16,426
Resulting % Use Reduction from WSCP action	0%

Submittal Table 8-1
Water Shortage Contingency Plan Levels

Shortage Level	Percent Shortage Range	Shortage Response Actions (*Narrative description)*
1	Up to 10%	Greater than 50% of normal forecasted flow of the Bulletin 120 for the Stanislaus River
2	Up to 20%	Less than 50% of normal forecasted flow of the Bulletin 120 for the Stanislaus River
3	Up to 30%	Less than 30% of normal forecasted flow of the Bulletin 120 for the Stanislaus River
4	Up to 40%	Less than 10% of normal forecasted flow of the Bulletin 120 for the Stanislaus River
5	Up to 50%	Emergency-Catastrophic water Restriction
6	>50%	Emergency-Catastrophic water Restriction

NOTES:

Submittal Table 8-2: Demand Reduction Actions

Shortage Level	Demand Reduction Actions Drop down list These are the only categories that will be accepted by the WUEdata online submittal tool. Select those that apply.	How much is this going to reduce the shortage gap? Include units used (volume type or percentage)	Additional Explanation or Reference *(optional)*	Penalty, Charge, or Other Enforcement? ***For Retail Suppliers Only*** *Drop Down List*
Add additional rows as needed				
I	Expand Public Information Campaign	7%	Voluntary water use reduction and public notices	No
I	Landscape - Restrict or prohibit runoff from landscape irrigation	2%	N/A	No
I	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	1%	N/A	No
II	Expand Public Information Campaign	3%	Voluntary water use reduction and public notices	No
II	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	1%	Send notices to high water users.	No
II	Landscape - Restrict or prohibit runoff from landscape irrigation	2%	N/A	No
II	Landscape - Limit landscape irrigation to specific times	2%	N/A	No
II	Reduce System Water Loss	1%	N/A	No
II	Other	1%	Review accuracy of water meters	No
III	Expand Public Information Campaign	1%	Water use reduction and public notices	No
III	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	1%	Send notices to high water users.	No
III	Decrease Line Flushing	1%	N/A	No
III	Landscape - Restrict or prohibit runoff from landscape irrigation	1%	Send notices to high water users.	Yes
III	Landscape - Limit landscape irrigation to specific times	1%	Send notices to high water users.	Yes
III	Landscape - Limit landscape irrigation to specific days	1%	N/A	Yes
III	Landscape - Restrict or prohibit runoff from landscape irrigation	1%	N/A	Yes
III	Water Features - Restrict water use for decorative water features, such as fountains	1%	N/A	Yes
III	Reduce System Water Loss	1%	N/A	No
III	Pools and Spas - Require covers for pools and spas	1%	N/A	No
IV	Other - Require automatic shut of hoses	1%	N/A	No
IV	Landscape - Limit landscape irrigation to specific days	1%	Send notices to high water users.	Yes
IV	Landscape - Prohibit certain types of landscape irrigation	1%	Send notices to high water users.	Yes
IV	Other water feature or swimming pool restriction	1%	Send notices to high water users.	Yes
IV	Other - Prohibit use of potable water for construction and dust control	1%	Send notices to high water users.	Yes
IV	Other - Prohibit use of potable water for washing hard surfaces	1%	Send notices to high water users.	Yes
IV	Other - Prohibit vehicle washing except at facilities using recycled or recirculating water	1%	Send notices to high water users.	Yes
IV	CII - Lodging establishment must offer opt out of linen service	1%	Send notices to high water users.	Yes
IV	CII - Restaurants may only serve water upon request	1%	Send notices to high water users.	Yes
IV	CII - Commercial kitchens required to use pre-rinse spray valves	1%	Send notices to high water users.	Yes
V	Increase Water Waste Patrols	1%	N/A	No
V	Landscape - Other landscape restriction or prohibition	7%	Send notices to high water users.	Yes
V	CII - Other CII restriction or prohibition	2%	Send notices to high water users.	Yes
VI	Landscape - Prohibit all landscape irrigation	10%	Send notices to high water users.	Yes

NOTES: TUD's Rules and Regulations states the enforcement of violations shall result in the following penalties: First violation, customer would receive a phone call or written warning about excessive water use from the District that a further violation will result in possible water restrictions and imposing of fines; Second violation, after initial contact regarding the first violation, is a second violation is recorded a restrictor may be installed and an $80 charge will be billed to the customer's account. The customer will need to show proof that they have reduced their water use before the restrictor is removed; Third violation, a $500 penalty may be charged to a customer upon a third violation of not reducing to the mandatory water reduction. The customer continues to violate water restrictions they may have their water discontinued for excessive water use.

Submittal Table 8-3: Supply Augmentation and Other Actions

Shortage Level	Supply Augmentation Methods and Other Actions by Water Supplier ***Drop down list*** *These are the only categories that will be accepted by the WUEdata online submittal tool*	How much is this going to reduce the shortage gap? *Include units used (volume type or percentage)*	Additional Explanation or Reference *(optional)*
Add additional rows as needed			
I	Other Actions (describe)	0%	No supply augmentation
II	Other Actions (describe)	0%	No supply augmentation
III	Other Actions (describe)	0%	No supply augmentation
IV	Transfers	10%	Emergency Purchase of water from local seller
V	Transfers	20%	Emergency Purchase of water from local seller
VI	Transfers	30%	Emergency Purchase of water from local seller

NOTES:

Submittal Table 10-1 Retail: Notification to Cities and Counties

City Name	60 Day Notice	Notice of Public Hearing
Add additional rows as needed		
Sonora	Yes	Yes
County Name *Drop Down List*	60 Day Notice	Notice of Public Hearing
Add additional rows as needed		
Tuolumne County	Yes	Yes
NOTES:		

Appendix J

System Loss Water Audit Output (2020)

AWWA Free Water Audit Software:
Reporting Worksheet

WAS
American Water Works Association.

? Click to access
\+ Click to add a

Water Audit Report for: Tuolumne Utilities District (CA 5510028 / Apple Valley)
Reporting Year: 2020 | 1/2020 - 12/2020

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

Master Meter and Supply Error Adjustments

WATER SUPPLIED

<----------- Enter grading in column 'E' and 'J' ---------->

	Grade	Value	Unit	Grade	Pcnt:		Value:	Unit
Volume from own sources:	3	29.900	MG/Yr	3	0.00%	● ○		MG/Yr
Water imported:	3	0.000	MG/Yr			● ○		MG/Yr
Water exported:	8	0.000	MG/Yr			● ○		MG/Yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: 29.900 MG/Yr

AUTHORIZED CONSUMPTION

Click here: ?
for help using option

	Grade	Value	Unit	Pcnt:		Value:	Unit
Billed metered:	3	15.652	MG/Yr				
Billed unmetered:	n/a	0.000	MG/Yr				
Unbilled metered:	1	0.297	MG/Yr				
Unbilled unmetered:	5	0.374	MG/Yr	1.25%	● ○		MG/Yr

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

AUTHORIZED CONSUMPTION: 16.323 MG/Yr

Use buttons to select percentage of water supplied
OR
value

WATER LOSSES (Water Supplied - Authorized Consumption) 13.577 MG/Yr

Apparent Losses

	Grade	Value	Unit	Pcnt:		Value:	Unit
Unauthorized consumption:		0.075	MG/Yr	0.25%	● ○		MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

	Grade	Value	Unit	Pcnt:		Value:	Unit
Customer metering inaccuracies:	1	0.325	MG/Yr	2.00%	● ○		MG/Yr
Systematic data handling errors:	5	0.039	MG/Yr	0.25%	● ○		MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: 0.439 MG/Yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: 13.138 MG/Yr

WATER LOSSES: 13.577 MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: 14.248 MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

	Grade	Value	Unit
Length of mains:	8	7.0	miles
Number of active AND inactive service connections:	9	245	
Service connection density:		35	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure: 5 | 60.0 psi

COST DATA

	Grade	Value	Unit
Total annual cost of operating water system:	9		$/Year
Customer retail unit cost (applied to Apparent Losses):	9	$3.40	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	3		$/Million gallo ☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 41 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Billed metered
3: Unbilled metered

AWWA Free Water Audit Software:
Reporting Worksheet

WAS
American Water Works Association.

? Click to access
+ Click to add a

Water Audit Report for: Tuolumne Utilities District (CA 5510010 / Cedar Ridge)
Reporting Year: 2020 | 1/2020 - 12/2020

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

<----------- Enter grading in column 'E' and 'J' ---------->

WATER SUPPLIED

Master Meter and Supply Error Adjustments

		Grade	Volume	Unit		Grade	Pcnt:		Value:	
Volume from own sources:	+ ?	3	32.260	MG/Yr	+ ?	3	0.00%	● ○		MG/Yr
Water imported:	+ ?	3	0.000	MG/Yr	+ ?			● ○		MG/Yr
Water exported:	+ ?	8	0.000	MG/Yr	+ ?			● ○		MG/Yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: 32.260 MG/Yr

AUTHORIZED CONSUMPTION

Click here: ?
for help using option

		Grade	Volume	Unit	Pcnt:		Value:	
Billed metered:	+ ?	3	28.298	MG/Yr				
Billed unmetered:	+ ?	n/a	0.000	MG/Yr				
Unbilled metered:	+ ?	9	0.256	MG/Yr				
Unbilled unmetered:	+ ?	5	0.403	MG/Yr	1.25%	● ○		MG/Yr

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

AUTHORIZED CONSUMPTION: ? 28.957 MG/Yr

Use buttons to select percentage of water supplied
OR
value

WATER LOSSES (Water Supplied - Authorized Consumption) 3.303 MG/Yr

Apparent Losses

		Grade	Volume	Unit	Pcnt:		Value:	
Unauthorized consumption:	+ ?		0.081	MG/Yr	0.25%	● ○		MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

		Grade	Volume	Unit	Pcnt:		Value:	
Customer metering inaccuracies:	+ ?	1	0.288	MG/Yr	1.00%	● ○		MG/Yr
Systematic data handling errors:	+ ?	5	0.071	MG/Yr	0.25%	● ○		MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: ? 0.440 MG/Yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: ? 2.863 MG/Yr

WATER LOSSES: 3.303 MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: ? 3.962 MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

		Grade	Value	Unit
Length of mains:	+ ?	8	14.0	miles
Number of active AND inactive service connections:	+ ?	9	676	
Service connection density:	?		48	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: + ? (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

		Grade	Value	Unit
Average operating pressure:	+ ?	5	60.0	psi

COST DATA

		Grade	Value	Unit
Total annual cost of operating water system:	+ ?	9		$/Year
Customer retail unit cost (applied to Apparent Losses):	+ ?	9	$3.40	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	+ ?	3		$/Million gallo☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 47 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Billed metered
3: Customer metering inaccuracies

AWWA Free Water Audit Software:
Reporting Worksheet

WAS
American Water Works Association.

? Click to access

\+ Click to add a

Water Audit Report for: Tuolumne Utilities District (CA 5510013 / Columbia)

Reporting Year: 2020 | 1/2020 - 12/2020

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

<----------- Enter grading in column 'E' and 'J' ---------->

Master Meter and Supply Error Adjustments

WATER SUPPLIED

					Pcnt:		Value:	
Volume from own sources:	3	179.732	MG/Yr	3	0.00%	● ○		MG/Yr
Water imported:	3	0.000	MG/Yr			● ○		MG/Yr
Water exported:	8	0.000	MG/Yr			● ○		MG/Yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED:	179.732	MG/Yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option

				Pcnt:		Value:	
Billed metered:	3	163.087	MG/Yr				
Billed unmetered:	n/a	0.000	MG/Yr				
Unbilled metered:	9	0.736	MG/Yr				
Unbilled unmetered:	5	2.247	MG/Yr	1.25%	● ○		MG/Yr

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

AUTHORIZED CONSUMPTION:	166.070	MG/Yr

Use buttons to select percentage of water supplied
OR
value

WATER LOSSES (Water Supplied - Authorized Consumption)

WATER LOSSES (Water Supplied - Authorized Consumption)	13.662	MG/Yr

Apparent Losses

				Pcnt:		Value:	
Unauthorized consumption:		0.449	MG/Yr	0.25%	● ○		MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	1	8.622	MG/Yr	5.00%	● ○		MG/Yr
Systematic data handling errors:	5	0.408	MG/Yr	0.25%	● ○		MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses:	9.479	MG/Yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses:	4.183	MG/Yr
WATER LOSSES:	13.662	MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER:	16.645	MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	8	35.0	miles
Number of active AND inactive service connections:	9	1,917	
Service connection density:		55	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure:	5	60.0	psi

COST DATA

Total annual cost of operating water system:	9		$/Year
Customer retail unit cost (applied to Apparent Losses):	9	$3.40	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	3		$/Million gallo ☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 47 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources

2: Billed metered

3: Customer metering inaccuracies

AWWA Free Water Audit Software:
Reporting Worksheet

WAS
American Water Works Association.

? Click to access
+ Click to add a

Water Audit Report for: Tuolumne Utilities District (CA 5510021 / Peaceful Pines)
Reporting Year: 2020 1/2020 - 12/2020

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

Master Meter and Supply Error Adjustments

WATER SUPPLIED

<----------- Enter grading in column 'E' and 'J' ---------->

	Grade	Volume	Unit	Grade	Pcnt:		Value:	Unit
Volume from own sources: + ?	3	1.133	MG/Yr	3	0.00%	● ○		MG/Yr
Water imported: + ?	3	0.000	MG/Yr			● ○		MG/Yr
Water exported: + ?	8	0.000	MG/Yr			● ○		MG/Yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: **1.133** MG/Yr

AUTHORIZED CONSUMPTION

Click here: ?
for help using option

	Grade	Volume	Unit	Pcnt:		Value:	Unit
Billed metered: + ?	3	0.912	MG/Yr				
Billed unmetered: + ?	n/a	0.000	MG/Yr				
Unbilled metered: + ?	n/a	0.003	MG/Yr				
Unbilled unmetered: + ?	5	0.014	MG/Yr	1.25%	● ○		MG/Yr

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

AUTHORIZED CONSUMPTION: ? **0.929** MG/Yr

Use buttons to select percentage of water supplied
OR
value

WATER LOSSES (Water Supplied - Authorized Consumption) **0.204** MG/Yr

Apparent Losses

	Grade	Volume	Unit	Pcnt:		Value:	Unit
Unauthorized consumption: + ?		0.003	MG/Yr	0.25%	● ○		MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

	Grade	Volume	Unit	Pcnt:		Value:	Unit
Customer metering inaccuracies: + ?	1	0.038	MG/Yr	4.00%	● ○		MG/Yr
Systematic data handling errors: + ?	5	0.002	MG/Yr	0.25%	● ○		MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: ? **0.043** MG/Yr

Real Losses (Current Annual Real Losses or CARL)
Real Losses = Water Losses - Apparent Losses: ? **0.161** MG/Yr

WATER LOSSES: **0.204** MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: ? **0.221** MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

	Grade	Value	Unit
Length of mains: + ?	8	1.0	miles
Number of active AND inactive service connections: + ?	9	33	
Service connection density: ?		33	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: + ?
(length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure: + ? 5 60.0 psi

COST DATA

	Grade	Value	Unit
Total annual cost of operating water system: + ?	9		$/Year
Customer retail unit cost (applied to Apparent Losses): + ?	9	$3.40	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses): + ?	3		$/Million gallo☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

Add a grading value for 1 parameter(s) to enable an audit score to be calculated

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Unbilled metered
3: Billed metered

AWWA Free Water Audit Software:
Reporting Worksheet

WAS
American Water Works Association.

? Click to access
+ Click to add a

Water Audit Report for: Tuolumne Utilities District (CA 5510025 / Phoenix Lake)
Reporting Year: 2020 | 1/2020 - 12/2020

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

<----------- Enter grading in column 'E' and 'J' ---------->

Master Meter and Supply Error Adjustments

WATER SUPPLIED

						Pcnt:		Value:	
Volume from own sources:	+ ?	3	5.675	MG/Yr	+ ?	3	0.00%	● ○		MG/Yr
Water imported:	+ ?	3	0.000	MG/Yr	+ ?			● ○		MG/Yr
Water exported:	+ ?	8	0.000	MG/Yr	+ ?			● ○		MG/Yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED:	**5.675**	MG/Yr

AUTHORIZED CONSUMPTION

Click here: ?
for help using option

					Pcnt:		Value:	
Billed metered:	+ ?	3	3.431	MG/Yr				
Billed unmetered:	+ ?	n/a	0.000	MG/Yr				
Unbilled metered:	+ ?	9	0.010	MG/Yr				
Unbilled unmetered:	+ ?	5	0.071	MG/Yr	1.25%	● ○		MG/Yr

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

Use buttons to select percentage of water supplied
OR
value

AUTHORIZED CONSUMPTION:	?	**3.512**	MG/Yr

WATER LOSSES (Water Supplied - Authorized Consumption)	**2.163**	MG/Yr

Apparent Losses

					Pcnt:		Value:	
Unauthorized consumption:	+ ?		0.014	MG/Yr	0.25%	● ○		MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	+ ?	1	0.143	MG/Yr	4.00%	● ○		MG/Yr
Systematic data handling errors:	+ ?	5	0.009	MG/Yr	0.25%	● ○		MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses:	?	**0.166**	MG/Yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses:	?	**1.997**	MG/Yr
WATER LOSSES:		**2.163**	MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER:	?	**2.244**	MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	+ ?	8	1.0	miles
Number of active AND inactive service connections:	+ ?	9	57	
Service connection density:	?		57	conn./mile main

Are customer meters typically located at the curbstop or property line?	Yes	
Average length of customer service line: + ?		(length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure:	+ ?	5	60.0	psi

COST DATA

Total annual cost of operating water system:	+ ?	9		$/Year
Customer retail unit cost (applied to Apparent Losses):	+ ?	9	$3.40	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	+ ?	3		$/Million gallo ☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 47 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Billed metered
3: Customer metering inaccuracies

AWWA Free Water Audit Software:
Reporting Worksheet

WAS
American Water Works Association.

? Click to access
+ Click to add a

Water Audit Report for: Tuolumne Utilities District (CA 5510002 / Ponderosa Hills)
Reporting Year: 2020 1/2020 - 12/2020

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

Master Meter and Supply Error Adjustments

WATER SUPPLIED

<----------- Enter grading in column 'E' and 'J' ---------->

						Pcnt:		Value:	
Volume from own sources:	+ ?	3	62.933	MG/Yr	+ ?	3	0.00%	● ○		MG/Yr
Water imported:	+ ?	3	0.000	MG/Yr	+ ?			● ○		MG/Yr
Water exported:	+ ?	8	0.000	MG/Yr	+ ?			● ○		MG/Yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: 62.933 MG/Yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option

					Pcnt:		Value:	
Billed metered:	+ ?	3	52.826	MG/Yr				
Billed unmetered:	+ ?	n/a	0.000	MG/Yr				
Unbilled metered:	+ ?	9	0.132	MG/Yr				
Unbilled unmetered:	+ ?	5	0.787	MG/Yr	1.25%	● ○		MG/Yr

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

Use buttons to select percentage of water supplied
OR
value

AUTHORIZED CONSUMPTION: ? 53.745 MG/Yr

WATER LOSSES (Water Supplied - Authorized Consumption) 9.188 MG/Yr

Apparent Losses

					Pcnt:		Value:	
Unauthorized consumption:	+ ?		0.157	MG/Yr	0.25%	● ○		MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	+ ?	1	2.207	MG/Yr	4.00%	● ○		MG/Yr
Systematic data handling errors:	+ ?	5	0.132	MG/Yr	0.25%	● ○		MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: ? 2.496 MG/Yr

Real Losses (Current Annual Real Losses or CARL)
Real Losses = Water Losses - Apparent Losses: ? 6.692 MG/Yr

WATER LOSSES: 9.188 MG/Yr

NON-REVENUE WATER
NON-REVENUE WATER: ? 10.107 MG/Yr
= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	+ ?	8	20.0	miles
Number of active AND inactive service connections:	+ ?	9	640	
Service connection density:	?		32	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes
Average length of customer service line: + ? (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure:	+ ?	5	60.0	psi

COST DATA

Total annual cost of operating water system:	+ ?	9		$/Year
Customer retail unit cost (applied to Apparent Losses):	+ ?	9	$3.40	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	+ ?	3		$/Million gallo ☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 47 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Billed metered
3: Customer metering inaccuracies

WAS
American Water Works Association.

AWWA Free Water Audit Software:
Reporting Worksheet

? Click to access
\+ Click to add a

Water Audit Report for: Tuolumne Utilities District (CA 5510033 / Scenic View)
Reporting Year: 2020 1/2020 - 12/2020

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

Master Meter and Supply Error Adjustments

WATER SUPPLIED

<----------- Enter grading in column 'E' and 'J' ---------->

							Pcnt:		Value:	
Volume from own sources:	+ ?	3	16.433	MG/Yr	+ ?	3	-1.00%	● ○		MG/Yr
Water imported:	+ ?	3		MG/Yr	+ ?			● ○		MG/Yr
Water exported:	+ ?	8	0.000	MG/Yr	+ ?			● ○		MG/Yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED:	**16.599**	MG/Yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option

					Pcnt:		Value:	
Billed metered:	+ ?	3	24.166	MG/Yr				
Billed unmetered:	+ ?	n/a	0.000	MG/Yr				
Unbilled metered:	+ ?	9	0.078	MG/Yr				
Unbilled unmetered:	+ ?	5	0.207	MG/Yr	1.25%	● ○		MG/Yr

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

Use buttons to select percentage of water supplied
OR
value

AUTHORIZED CONSUMPTION:	?	**24.451**	MG/Yr

Check input values; WATER SUPPLIED should be greater than AUTHORIZED CONSUMPTION

WATER LOSSES (Water Supplied - Authorized Consumption)	**-7.852**	MG/Yr

Apparent Losses

					Pcnt:		Value:	
Unauthorized consumption:	+ ?		0.041	MG/Yr	0.25%	● ○		MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	+ ?	1	1.010	MG/Yr	4.00%	● ○		MG/Yr
Systematic data handling errors:	+ ?	5	0.060	MG/Yr	0.25%	● ○		MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses:	?	**1.112**	MG/Yr

Check input values; APPARENT LOSSES should be less than WATER LOSSES

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses:	?	**-8.965**	MG/Yr
WATER LOSSES:		**-7.852**	MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER:	?	**-7.567**	MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	+ ?	8	6.0	miles
Number of active AND inactive service connections:	+ ?	9	173	
Service connection density:	?		29	conn./mile main

Are customer meters typically located at the curbstop or property line?		Yes	(length of service line, beyond the property boundary, that is the responsibility of the utility)
Average length of customer service line:	+ ?		

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure:	+ ?	5	60.0	psi

COST DATA

Total annual cost of operating water system:	+ ?	9		$/Year
Customer retail unit cost (applied to Apparent Losses):	+ ?	9	$3.40	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	+ ?	3		$/Million gallo☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 47 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources

2: Billed metered

3: Customer metering inaccuracies

WAS
American Water Works Association.

AWWA Free Water Audit Software:
Reporting Worksheet

? Click to access
\+ Click to add a

Water Audit Report for: Tuolumne Utilities District (CA5510001 / Sonora/Jamestown)
Reporting Year: 2020 | 1/2020 - 12/2020

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

<----------- Enter grading in column 'E' and 'J' ---------->

WATER SUPPLIED

Master Meter and Supply Error Adjustments

					Pcnt:		Value:	
Volume from own sources: + ?	5	727.057	MG/Yr	+ ? 3		● ○		MG/Yr
Water imported: + ?	5	0.000	MG/Yr	+ ?		● ○		MG/Yr
Water exported: + ?	n/a	0.000	MG/Yr	+ ?		● ○		MG/Yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: 727.057 MG/Yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option

				Pcnt:		Value:	
Billed metered: + ?	6	601.303	MG/Yr				
Billed unmetered: + ?	n/a	0.000	MG/Yr				
Unbilled metered: + ?	9	2.368	MG/Yr				
Unbilled unmetered: + ?	5	9.088	MG/Yr	1.25%	● ○		MG/Yr

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

Use buttons to select percentage of water supplied
OR
value

AUTHORIZED CONSUMPTION: ? 612.759 MG/Yr

WATER LOSSES (Water Supplied - Authorized Consumption) 114.298 MG/Yr

Apparent Losses

				Pcnt:		Value:	
Unauthorized consumption: + ?		1.818	MG/Yr	0.25%	● ○		MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies: + ?	6	0.000	MG/Yr	🟥	● ○		MG/Yr
Systematic data handling errors: + ?	5	1.503	MG/Yr	0.25%	● ○		MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: ? 3.321 MG/Yr

Real Losses (Current Annual Real Losses or CARL)
Real Losses = Water Losses - Apparent Losses: ? 110.977 MG/Yr

WATER LOSSES: 114.298 MG/Yr

NON-REVENUE WATER
NON-REVENUE WATER: ? 125.754 MG/Yr
= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains: + ?	8	102.4	miles
Number of active AND inactive service connections: + ?	9	5,049	
Service connection density: ?		49	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes
Average length of customer service line: + ? (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure: + ?	5	103.0	psi

COST DATA

Total annual cost of operating water system: + ?	10		$/Year
Customer retail unit cost (applied to Apparent Losses): + ?	9	$3.40	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses): + ?	3		$/Million gallo ☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 62 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Variable production cost (applied to Real Losses)
3: Billed metered

AWWA Free Water Audit Software:
Reporting Worksheet

WAS
American Water Works Association.

? Click to access
\+ Click to add a

Water Audit Report for: Tuolumne Utilities District (CA 55100003 / Tuolumne)
Reporting Year: 2020 1/2020 - 12/2020

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

Master Meter and Supply Error Adjustments

WATER SUPPLIED

<----------- Enter grading in column 'E' and 'J' ---------->

		Grade	Volume	Unit		Grade	Pcnt:		Value:	Unit
Volume from own sources:	+ ?	3	74.209	MG/Yr	+ ?	3	0.00%	● ○		MG/Yr
Water imported:	+ ?	3	0.000	MG/Yr	+ ?			● ○		MG/Yr
Water exported:	+ ?	8	0.000	MG/Yr	+ ?			● ○		MG/Yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: 74.209 MG/Yr

AUTHORIZED CONSUMPTION

Click here: ?
for help using option

		Grade	Volume	Unit	Pcnt:		Value:	Unit
Billed metered:	+ ?	3	65.983	MG/Yr				
Billed unmetered:	+ ?	n/a	0.000	MG/Yr				
Unbilled metered:	+ ?	9	0.025	MG/Yr				
Unbilled unmetered:	+ ?	5	0.928	MG/Yr	1.25%	● ○		MG/Yr

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

AUTHORIZED CONSUMPTION: ? 66.936 MG/Yr

Use buttons to select percentage of water supplied
OR
value

WATER LOSSES (Water Supplied - Authorized Consumption) 7.273 MG/Yr

Apparent Losses

		Grade	Volume	Unit	Pcnt:		Value:	Unit
Unauthorized consumption:	+ ?		0.186	MG/Yr	0.25%	● ○		MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

		Grade	Volume	Unit	Pcnt:		Value:	Unit
Customer metering inaccuracies:	+ ?	1	0.000	MG/Yr	0.00%	● ○		MG/Yr
Systematic data handling errors:	+ ?	5	0.165	MG/Yr	0.25%	● ○		MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: ? 0.350 MG/Yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: ? 6.923 MG/Yr

WATER LOSSES: 7.273 MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: ? 8.226 MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

		Grade	Value	Unit
Length of mains:	+ ?	8	11.0	miles
Number of active AND inactive service connections:	+ ?	9	686	
Service connection density:	?		62	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: + ? (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure: + ? 5 60.0 psi

COST DATA

		Grade	Value	Unit
Total annual cost of operating water system:	+ ?	9		$/Year
Customer retail unit cost (applied to Apparent Losses):	+ ?	9	$3.40	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	+ ?	3		$/Million gallo ☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 47 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Billed metered
3: Customer metering inaccuracies

AWWA Free Water Audit Software:
Reporting Worksheet

WAS
American Water Works Association.

? Click to access
+ Click to add a

Water Audit Report for: Tuolumne Utilities District (CA 5510012 / Upper Basin)
Reporting Year: 2020 | 1/2020 - 12/2020

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

Master Meter and Supply Error Adjustments

WATER SUPPLIED

<----------- Enter grading in column 'E' and 'J' ---------->

							Pcnt:		Value:	
Volume from own sources:	+ ?	5	370.200	MG/Yr	+ ?	3		● ○		MG/Yr
Water imported:	+ ?	5	0.000	MG/Yr	+ ?			● ○		MG/Yr
Water exported:	+ ?	n/a	0.000	MG/Yr	+ ?			● ○		MG/Yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: 370.200 MG/Yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option

					Pcnt:		Value:	
Billed metered:	+ ?	6	292.548	MG/Yr				
Billed unmetered:	+ ?	n/a		MG/Yr				
Unbilled metered:	+ ?	9	1.070	MG/Yr				
Unbilled unmetered:	+ ?	5	4.628	MG/Yr	1.25%	● ○		MG/Yr

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

Use buttons to select percentage of water supplied
OR
value

AUTHORIZED CONSUMPTION: ? 298.246 MG/Yr

WATER LOSSES (Water Supplied - Authorized Consumption)

71.955 MG/Yr

Apparent Losses

					Pcnt:		Value:	
Unauthorized consumption:	+ ?		0.926	MG/Yr	0.25%	● ○		MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	+ ?	6	0.000	MG/Yr	🟥	● ○		MG/Yr
Systematic data handling errors:	+ ?	5	0.731	MG/Yr	0.25%	● ○		MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: ? 1.657 MG/Yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: ? 70.298 MG/Yr

WATER LOSSES: 71.955 MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: ? 77.652 MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	+ ?	8	105.6	miles
Number of active AND inactive service connections:	+ ?	9	4,003	
Service connection density:	?		38	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: + ? (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure: + ? 5 96.0 psi

COST DATA

Total annual cost of operating water system:	+ ?	10		$/Year
Customer retail unit cost (applied to Apparent Losses):	+ ?	9	$3.40	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	+ ?	3		$/Million gallo ☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 62 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources

2: Variable production cost (applied to Real Losses)

3: Billed metered

WAS
American Water Works Association.

AWWA Free Water Audit Software:
Reporting Worksheet

? Click to access
+ Click to add a

Water Audit Report for: Tuolumne Utilities District (CA 5500363 / Wards Ferry)
Reporting Year: 2020 | 1/2020 - 12/2020

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

WATER SUPPLIED

<----------- Enter grading in column 'E' and 'J' ---------->

Master Meter and Supply Error Adjustments

							Pcnt:		Value:	
Volume from own sources:	+ ?	3	6.696	MG/Yr	+ ?	3	0.00%	● ○		MG/Yr
Water imported:	+ ?	3	0.000	MG/Yr	+ ?			● ○		MG/Yr
Water exported:	+ ?	8	0.000	MG/Yr	+ ?			● ○		MG/Yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: 6.696 MG/Yr

AUTHORIZED CONSUMPTION

Click here: ?
for help using option

					Pcnt:		Value:	
Billed metered:	+ ?	3	6.354	MG/Yr				
Billed unmetered:	+ ?	n/a	0.000	MG/Yr				
Unbilled metered:	+ ?	9	0.012	MG/Yr				
Unbilled unmetered:	+ ?	5	0.084	MG/Yr	1.25%	● ○		MG/Yr

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

Use buttons to select percentage of water supplied
OR
value

AUTHORIZED CONSUMPTION: ? 6.450 MG/Yr

WATER LOSSES (Water Supplied - Authorized Consumption) 0.246 MG/Yr

Apparent Losses

					Pcnt:		Value:	
Unauthorized consumption:	+ ?		0.017	MG/Yr	0.25%	● ○		MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	+ ?	1	0.197	MG/Yr	3.00%	● ○		MG/Yr
Systematic data handling errors:	+ ?	5	0.016	MG/Yr	0.25%	● ○		MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: ? 0.230 MG/Yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: ? 0.017 MG/Yr

WATER LOSSES: 0.246 MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: ? 0.342 MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	+ ?	8	2.0	miles
Number of active AND inactive service connections:	+ ?	9	23	
Service connection density:	?		12	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: + ? (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure: + ? 5 60.0 psi

COST DATA

Total annual cost of operating water system:	+ ?	9		$/Year
Customer retail unit cost (applied to Apparent Losses):	+ ?	9	$3.40	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	+ ?	3		$/Million gallo ☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 47 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Billed metered
3: Customer metering inaccuracies

Appendix K

Simulation Analysis of the South Fork Stanislaus River System Report

Tuolumne Utilities District

Simulation Analysis of the South Fork Stanislaus River System

April 1999

Submitted To:

Tuolumne Utilities District
P.O. Box 3728
13144 Mono Way
Sonora, CA 95370

Prepared By:

HDR Engineering, Inc.
271 Turn Pike Drive
Folsom, CA 95630

INTRODUCTION

HDR Engineering, Inc. was retained by the Tuolumne Utilities District (TUD) to conduct an operational study of the South Fork Stanislaus River watershed. This work expands upon the 1996 study previously conducted by HDR. For background information on the study area and system components refer to HDR's April, 1996 report.

The objective of this study was to assess the South Fork Stanislaus system's response to potential increases in consumptive demand levels within TUD downstream of Lyons Reservoir, while employing an operational strategy that places top priority on maintaining Lyons Reservoir's target storage levels. To perform this analysis, a new simulation model was created. This model was used to perform a sensitivity analysis in which TUD's annual consumptive demands at Lyons Reservoir[1] were increased in successive simulation runs. Analyses were performed for two historic low flow periods: June 1, 1976 to May 31, 1978 and June 1, 1985 to September 30, 1996. This process provided insight into how the system, if operated as simulated, might respond to future demand increases during future low flow conditions.

MODEL OVERVIEW

Several changes were made to the simulation model of the South Fork Stanislaus system previously developed as part of HDR's 1996 operational study. An important aspect of the new simulation model is that its operational priorities differ from current practices. In this model, Strawberry Reservoir's primary operational objective is to meet Lyons Reservoir's minimum storage requirements. Strawberry Reservoir makes supplemental releases to meet Lyons Reservoir's requirements while Philadelphia Canal demands were considered to be secondary in order to maximize Lyons Reservoir's system yield.

Model input parameters were updated utilizing historic hydrologic data from water years 1992 to 1996. Local inflows into each reservoir were back-calculated from daily historic data on streamflow and reservoir storage. The model was further modified to calculate reservoir releases at a monthly time step and allow end-of-month storage targets to be specified for each reservoir. Several targets were incorporated into the model to track system response in each month. Table 1 provides an overview of the simulation model's parameters.

---

[1] The water available to TUD is diverted from the South Fork Stanislaus River into the Main Canal at Lyons Reservoir. "Consumptive demands" at Lyons Reservoir means the water delivered to TUD, as measured at diversions from the South Fork Stanislaus at Lyons Reservoir.

Table 1. Overview of South Fork Stanislaus Simulation Model Parameters

Model Component	Description	Value
Strawberry Reservoir Capacity	Maximum Quantity of Water Stored.	18,312 acre-feet
Lyons Reservoir Capacity	Maximum Quantity of Water Stored.	5,507 acre-feet
Lyons Reservoir Minimum Storage Target.	TUD requests free supplemental releases or purchases water from PG&E as needed to maintain levels at or above this minimum storage target.	1,200 acre-feet[1]
Strawberry Reservoir Minimum Storage Targets	Target minimum storage to reflect PG&E historic operations.	3,500 acre-feet[2]
Strawberry Reservoir Summer Storage Targets	Storage targets established to reflect PG&E historic operations.	Full pool throughout June. Uniform drawdown between July 1 and Labor Day. Three feet below full pool on Labor Day. (3 ft = 17,400 ac ft)[3]
Lyons Reservoir Demand	Combined TUD consumptive and instream flow demands on Lyons Reservoir. Spill that is used for power generation at the Phoenix Powerhouse is not assumed to be part of the demand.	The annual demand level is specified at the start of each run. Monthly demands are calculated as fixed percentages of the annual base as listed in Table 2.
Philadelphia Canal Demand	The amount of water diverted to Philadelphia Canal for power generation at the Spring Gap and Stanislaus hydroelectric projects.	0 acre-feet.[4]
Free Supplemental Supply	Strawberry Reservoir storage that can be released to Lyons Reservoir upon TUD's request. This supplemental supply is provided to TUD without charge under the 1983 Agreement. The free supplement is calculated by PG&E each spring for the current calendar year based on observed and forecasted inflows.	The annual values of available free supplemental supply values are summarized Table 3. The actual amount used is determined during the simulation.
Purchased Supplemental Water	Strawberry Reservoir storage that is purchased by TUD under the 1983 Agreement for its needs and to maintain Lyons Reservoir at or above minimum storage targets. Water is purchased on a monthly basis only after the free supplement has been fully utilized.	The amount of water purchased is determined during the simulation. It is assumed that TUD will purchase what is required in order to meet demand.
Hydrologic Record	Daily hydrologic data was provided by TUD. Local inflows into each reservoir were back-calculated from daily historic data on streamflow and reservoir storage.	June 1, 1976 to May 31, 1978 and June 1, 1985 to September 30, 1996.

[1] The minimum storage target of 1,200 AF at Lyons Reservoir was set by TUD as a practical limit for water quality deterioration (turbidity).

[2] The minimum storage target of 3,500 AF at Strawberry Reservoir was set by PG&E as a practical limit for winter maintenance flushing of the Philadelphia Canal.

[3] FERC Project 2130, Article 29 states: "Licensee shall, consistent with operational demands, maintain the maximum surface water elevation in Strawberry Reservoir during the period from June 1 to September 15 and maintain a minimum pool of about 10 acres with a depth of not less than 10 feet at all other times, except under emergency conditions."

[4] It is recognized that water that would otherwise spill below Lyons could be diverted instead to the Philadelphia Canal for power generation.

Monthly demands were calculated as a fixed percentage of the annual demand according to the demand pattern given in Table 2. Monthly demand patterns were specified by TUD and are representative of the historic monthly demand variations observed in water years 1986-1996.

Table 2. TUD Monthly Demand Patterns

Month	% of Annual Demand
October	9.9%
November	8.1%
December	7.3%
January	6.6%
February	5.7%
March	6.0%
April	6.4%
May	7.3%
June	8.8%
July	11.0%
August	12.0%
September	11.1%

Historic values for free supplemental supply available to Lyons Reservoir from Strawberry Reservoir storage were used when available. In other years, (1976, 1977, 1978 and 1985), the free supplemental supply value was calculated based on cumulative local inflows to Lyons Reservoir from January 1 to May 31 in each calendar year, using the regression relationship developed in HDR's 1996 study. Table 3 summarizes the values used in the simulation for free supplemental supply.

Table 3. Annual Free Supplement

Calendar Year	Free Supplement Available (acre-feet)	Historic or Calculated Value ?
1976	7,982	Calculated
1977	8,300	Calculated
1978	5,087	Calculated
1985	7,604	Calculated
1986	2,076	Historic
1987	8,151	Historic
1988	8,119	Historic
1989	6,471	Historic
1990	7,734	Historic
1991	7,502	Historic
1992	7,503	Historic
1993	3,577	Historic
1994	7,717	Historic
1995	1,357	Historic
1996	4,171	Historic

Analysis overview

Separate analyses were performed for June 1, 1976 to May 31, 1978, the critical period of record; and June 1, 1985 to September 30, 1996, an extended drought period. All simulation runs were begun on June 1, assuming that both Strawberry and Lyons reservoirs were at full storage capacity and that no supplemental releases had previously been made.

For each successive run, Lyons Reservoir demand was increased in 50 acre-foot increments from a base level of 15,600 acre-feet up to 37,000 acre-feet. A run was made at a 17,583 acre-foot demand level to assess the impacts of increasing existing demands by approximately 2,000 acre-feet. System response was monitored to determine the demand where the following events were observed during the simulation:

- Water purchase begins
- Strawberry Reservoir storage drops below its Summer Storage Targets
- Strawberry Reservoir fails to refill
- Strawberry Reservoir Storage drops below 3500 acre-feet
- Lyons Reservoir Storage drops below 1,200 acre-feet
- Lyons Reservoir Storage drops below 300 acre-feet

Simulation Results: 1976-1978

As shown in Figures 1 and 2 and in Table 4, all storage targets are met in both Strawberry and Lyons Reservoirs for demands up to 19,350 acre feet. Water purchase begins when demands reach 18,150 acre-feet. At demands of 19,400 acre-feet and above, Strawberry Reservoir's targeted summer storage is not maintained, first dropping below its Labor Day storage target of 17,400 acre feet in 1977. When demands exceed 26,600 acre-feet, Strawberry Reservoir fails to refill in 1977. Strawberry Reservoir drops below its minimum storage target of 3,500 acre-feet when demands reach 26,650 acre-feet. As demands increase further, Strawberry Reservoir remains below its minimum storage target of 3,500 acre feet from February to March 1977 and November to December 1977. Once Strawberry Reservoir storage drops to zero acre-feet, Lyons Reservoir storage drops below 1,200 acre-feet in the end of November 1977, at a demand level of 29,850 acre-feet.

Water purchase begins when Lyons Reservoir's demand reaches 18,150 acre-feet. As Table 5 and Figures 3 and 4 show, the amount of free supplemental water used and supplemental water purchased in each year increases with increasing demand. Conversely, Lyons Reservoir spill decreases as its demands are increased (Table 6, Figure 5).

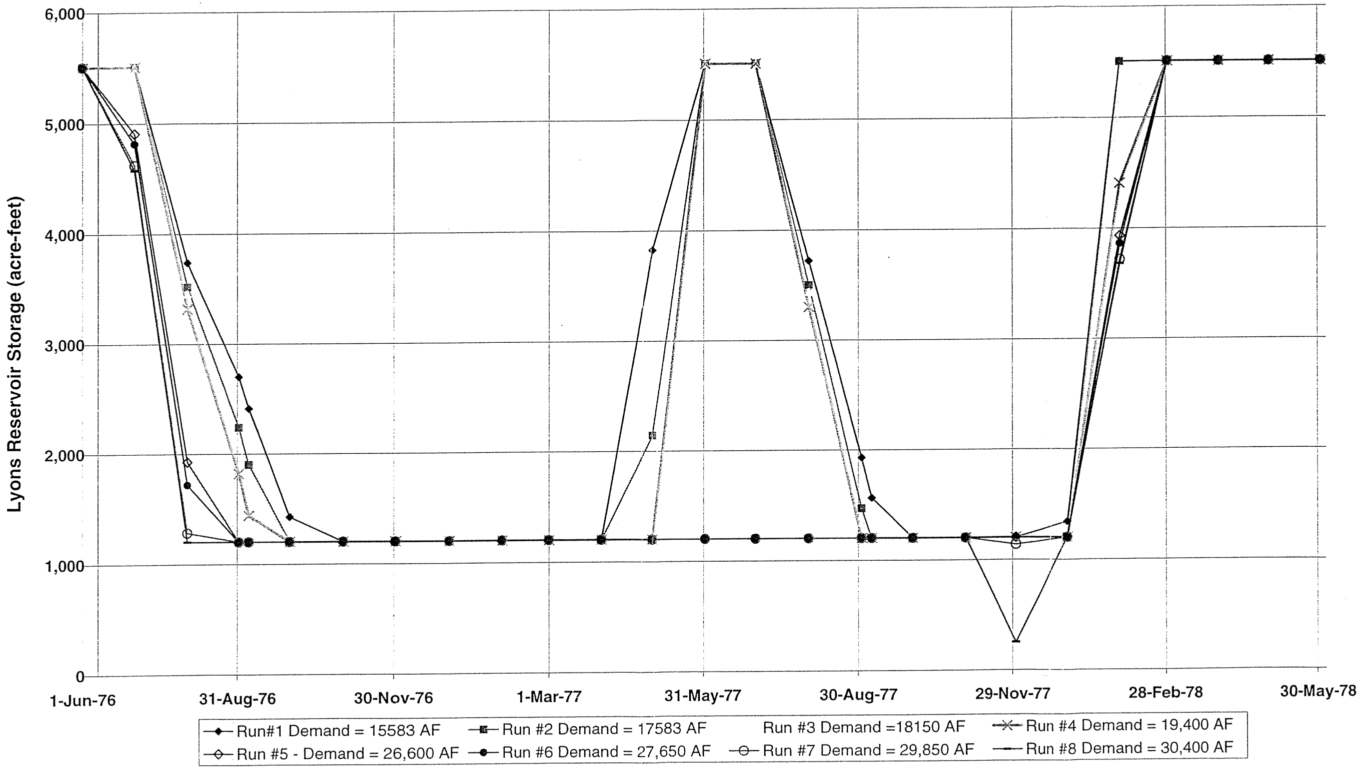


Figure 1. Lyons Reservoir Storage
South Fork Stanislaus Simulation
June 1, 1976 to May 31, 1978

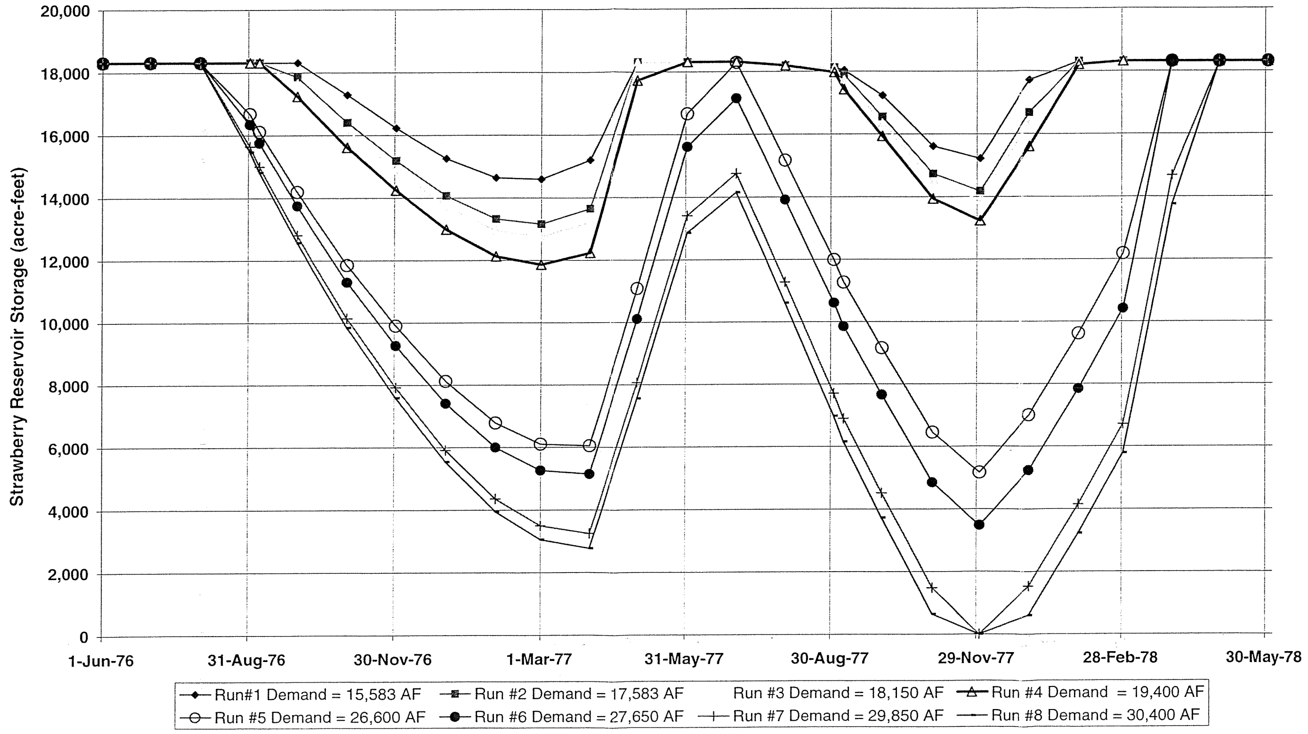


Figure 2. Strawberry Reservoir Storage
South Fork Stanislaus Simulation
June 1, 1976 to May 31, 1978

Figure 3. Free Supplement Used (acre-feet) 1976 - 1978

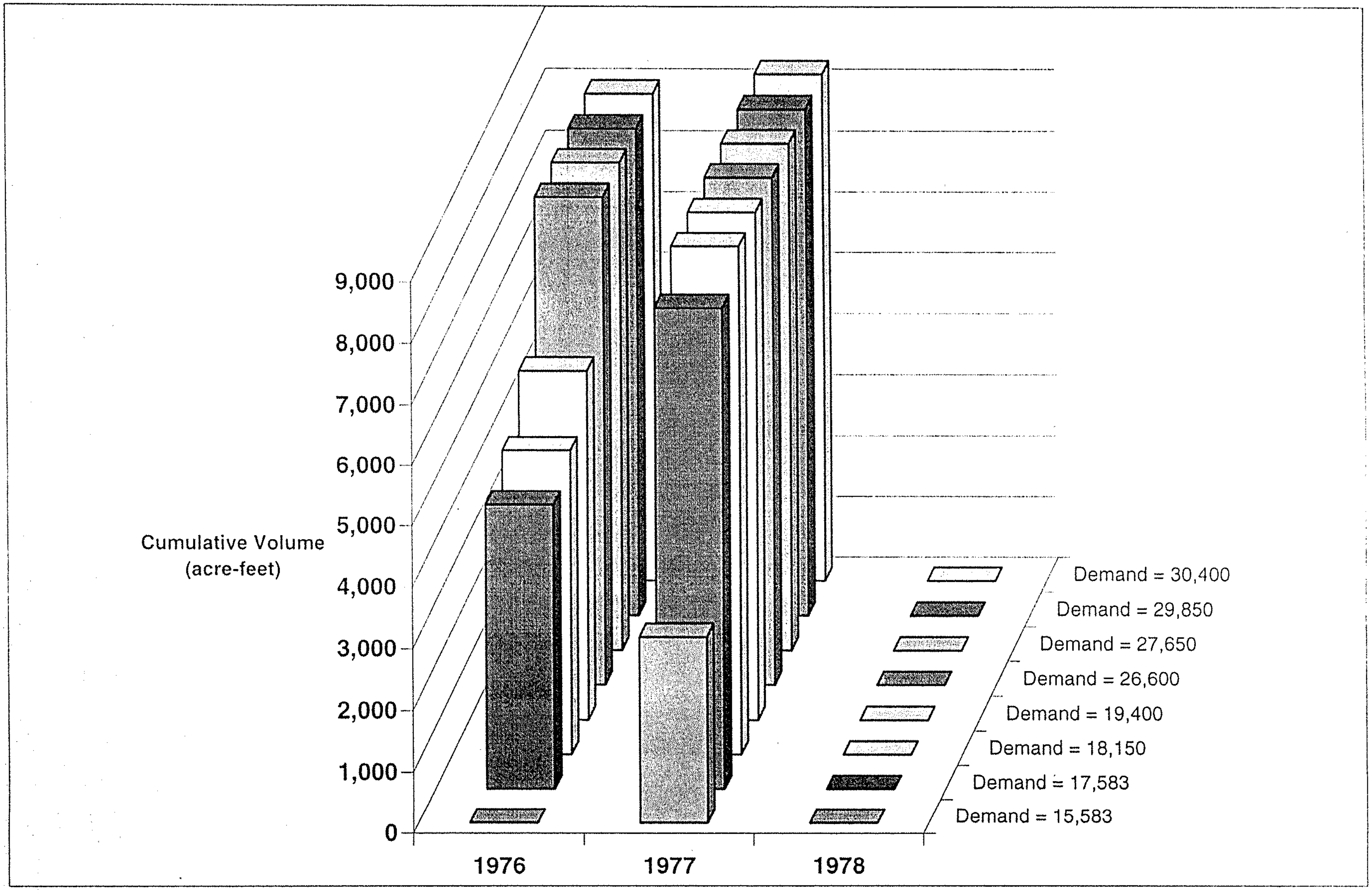


Figure 4. Water Purchased (acre-feet) 1976 - 1978

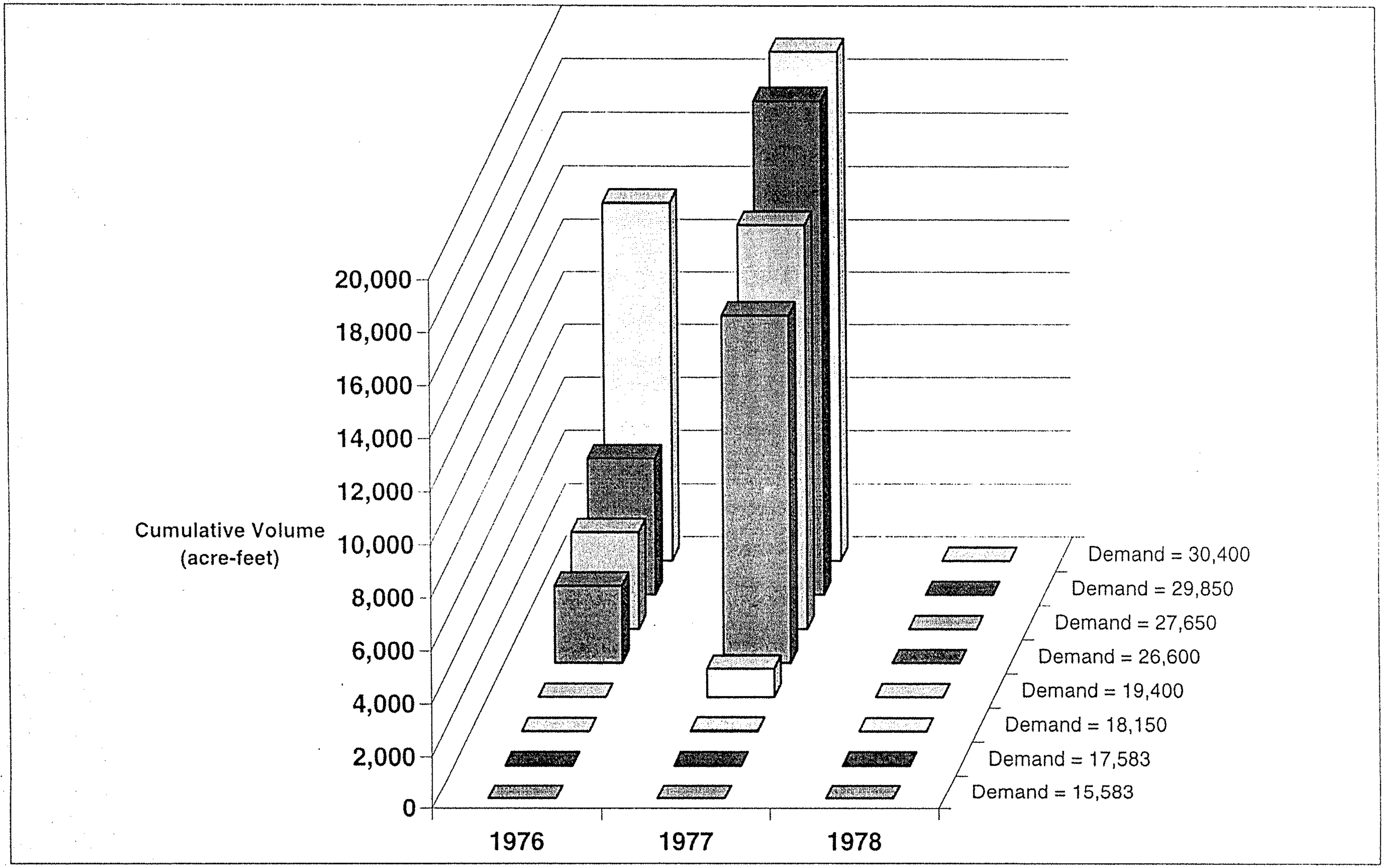
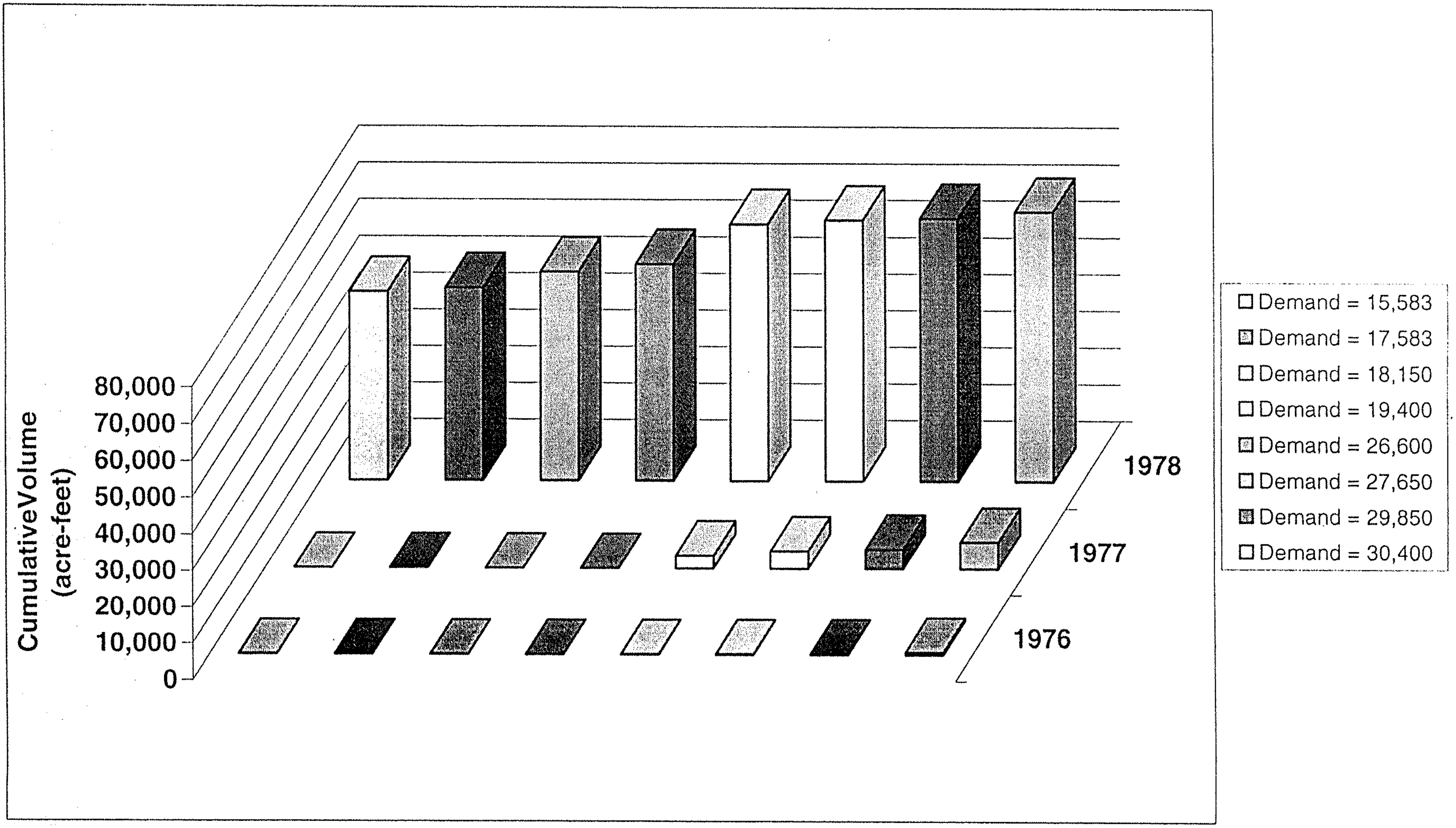


Figure 5. Lyons Spill (acre-feet) 1976 - 1978



Simulation Results: 1985-1996

Tables 7 through 9 and Figures 6 through 9 provide an overview of system performance during this extended simulation period. All targets are met until the demand at Lyons reaches 19,250 acre-feet, when Strawberry Reservoir drops below its Labor Day target of 17,400 acre feet in 1987. Water purchase begins by the end of December 1987 at a slightly lower demand level of 15,950 acre-feet. Strawberry Reservoir storage drops below 3,500 acre-feet in 1991 when Lyons Reservoir demands reaches 27,500 AF. As demands are further increased to 32,350 acre-feet, Strawberry Reservoir storage drops to zero during the simulation and Lyons Reservoir cannot maintain its minimum storage target of 1,200 acre-feet. Lyons Reservoir storage drops below 300 acre-feet when demands reach 33,600 acre feet. Strawberry Reservoir refills in every year for the entire range of demands simulated.

As was observed in 1976-78, the amount of free supplement used and water purchased in each year increases with increasing Lyons demand, while Lyons Reservoir spill decreases.

Implications for Water Supply Planning

This analysis shows that changing the operational priorities of the South Fork Stanislaus system to favor Lyons Reservoir has the potential to significantly increase the water available to meet consumptive demands at Lyons Reservoir. As TUD reviews options for meeting projected future water demands, operational changes may provide an attractive alternative.

Table 4. System Response to Lyons Reservoir Demand Increases: June 1, 1976 to May 31, 1978 Simulation

	Demand = 15,583 AF	Demand = 17,583 AF	Demand = 18,150 AF	Demand = 19,400 AF	Demand = 26,600 AF	Demand = 27,650 AF	Demand = 29,850 AF	Demand = 30,400 AF
Water is Purchased	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Strawberry Summer Storage Targets Met	Yes	Yes	Yes	No	No	No	No	No
Strawberry Refills Each Year	Yes	Yes	Yes	Yes	No	No	No	No
Strawberry Reservoir Above 3500 AC-FT	Yes	Yes	Yes	Yes	Yes	No	No	No
Lyons Reservoir above 1200 AC-FT	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Strawberry Reservoir Above 0 AC-FT	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Lyons Reservoir above 300 AC-FT	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No

Table 5. Free Supplement Used and Water Purchased: June 1, 1976 to May 31, 1978 Simulation

	Demand = 15,583 AF	Demand = 17,583 AF	Demand = 18,150 AF	Demand = 19,400 AF	Demand = 26,600 AF	Demand = 27,650 AF	Demand = 29,850 AF	Demand = 30,400 AF
June 1 – Dec. 31, 1976								
Free Supplement Used	400	4,600	5,000	5,700	8,000	8,000	8,000	8,000
Water Purchased	0	0	0	0	2,900	3,600	5,100	13,500
Jan. 1 – Dec. 31, 1977								
Free Supplement Used	3,000	7,800	8,300	8,300	8,300	8,300	8,300	8,300
Water Purchased	0	0	30	1,100	13,100	15,300	18,600	19,200
Jan. 1- May 31,1978								
Free Supplement Used	0	0	0	0	0	0	0	0
Water Purchased	0	0	0	0	0	0	0	0

Table 6. Lyons Reservoir Spill: June 1, 1976 to May 31, 1978 Simulation

	Demand = 15,583 AF	Demand = 17,583 AF	Demand = 18,150 AF	Demand = 19,400 AF	Demand = 26,600 AF	Demand = 27,650 AF	Demand = 29,850 AF	Demand = 30,400 AF
June 1 -Sept. 30, 1976	700	200	100	30	0	0	0	0
Oct. 1, 1976 - Sept. 30, 1977	7,300	5,300	4,700	3,500	0	0	0	0
Oct. 1, 1977 - May 30 1978	73,500	71,700	71,200	70,000	59,100	57,000	52,600	51,500

Table 7. System Response to Lyons Reservoir Demand Increases: June 1, 1985 to Sept. 30, 1996 Simulation

	Demand = 15,583 AF	Demand = 15,950 AF	Demand = 17,583 AF	Demand = 19,250 AF	Demand = 27,500 AF	Demand = 32,350 AF	Demand = 33,600 AF
Water is Purchased	No	**Yes**	Yes	Yes	Yes	Yes	Yes
Strawberry Summer Storage Targets Met	Yes	Yes	Yes	**No**	No	No	No
Strawberry Reservoir Refills Each Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Strawberry Reservoir above 3500 AC-FT	Yes	Yes	Yes	Yes	**No**	No	No
Lyons Reservoir above 1200 AC-FT	Yes	Yes	Yes	Yes	Yes	**No**	No
Strawberry Reservoir Above 0 AC-FT	Yes	Yes	Yes	Yes	Yes	**No**	No
Lyons Reservoir above 300 AC-FT	Yes	Yes	Yes	Yes	Yes	Yes	**No**

Figure 8. Free Supplement Used (acre-feet) 1985- 1996

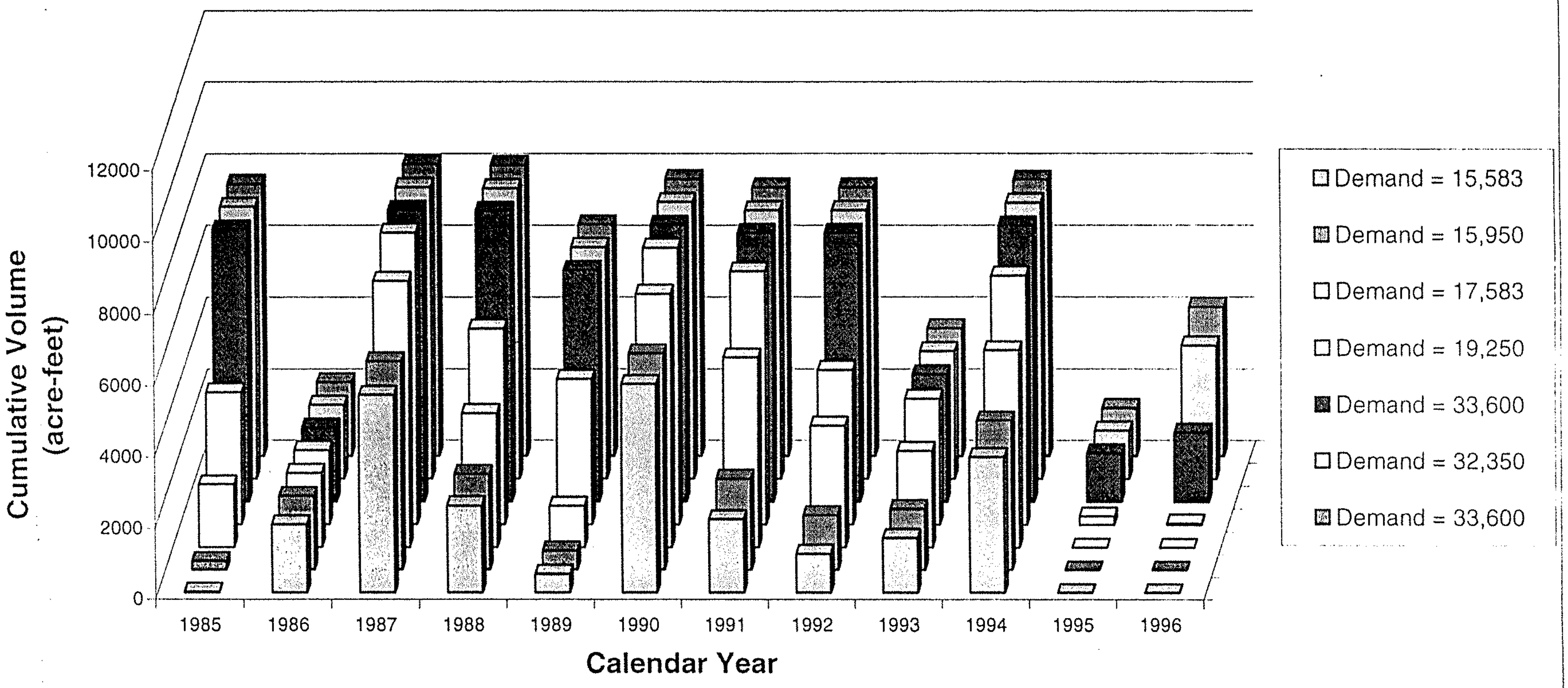


Table 8. Lyons Reservoir Spill - June 1, 1985 to Sept. 30, 1996 Simulation

	Demand = 15,583 AF	Demand = 15,950 AF	Demand = 17,583 AF	Demand = 19,250 AF	Demand = 27,500 AF	Demand = 32,350 AF	Demand = 33,600 AF
June 1, 1985 - Sept. 30, 1985	4,700	4,600	4,500	4,300	3,600	3,200	3,100
Oct. 1, 1985 - Sept. 30, 1986	143,800	143,400	141,600	139,800	130,600	125,200	123,800
Oct. 1, 1986 - Sept. 30, 1987	26,100	25,800	24,300	22,800	16,000	12,000	11,100
Oct. 1, 1987 - Sept. 30, 1988	28,600	28,300	26,600	25,000	16,200	11,000	9,600
Oct. 1, 1988 - Sept. 30, 1989	69,600	69,200	67,600	65,900	57,700	52,800	51,600
Oct. 1, 1989 - Sept. 30, 1990	36,200	36,000	34,200	32,600	24,300	19,400	18,200
Oct. 1, 1990 - Sept. 30, 1991	43,400	43,000	41,400	39,700	31,400	26,600	25,300
Oct. 1, 1991 - Sept. 30, 1992	37,400	37,000	35,200	33,300	24,200	19,700	18,600
Oct. 1, 1992 - Sept. 30, 1993	133,600	133,200	131,600	129,900	121,600	115,800	114,300
Oct .1, 1993 - Sept. 30, 1994	32,000	31,700	30,200	28,700	21,400	17,100	15,900
Oct. 1, 1994 - Sept. 30, 1995	201,100	200,600	198,600	196,600	186,400	180,500	178,900
Oct. 1, 1995 - Sept. 30, 1996	121,300	121,000	119,500	118,100	110,800	106,800	105,900

Table 9. Free Supplement Used & Water Purchased: June 1, 1985 to Sept. 30, 1996 Simulation

	Demand = 15,583 AF	Demand = 15,950 AF	Demand = 17,583 AF	Demand = 19,250 AF	Demand = 27,500 AF	Demand = 32,350 AF	Demand = 33,600 AF
June 1 – Dec. 31, 1985							
Free Supplement Used	30	300	1,800	3,700	7,600	7,600	7,600
Water Purchased	0	0	0		3,400	8,800	9,800
Jan. 1 – Dec. 31, 1986							
Free Supplement Used	1,900	2,100	2,100	2,100	2,100	2,100	2,100
Water Purchased	0	20	800	1,600	5,700	8,600	9,400
Jan. 1 – Dec. 31, 1987							
Free Supplement Used	5,500	5,900	7,400	8,200			
Water Purchased	0	0	0	700	6,700	10,900	12,000
Jan. 1 – Dec. 31, 1988							
Free Supplement Used	2,400	2,700	3,800	5,500	8,100	8,100	8,100
Water Purchased	0	0	0	0	4,500	8,300	9,300
Jan. 1 – Dec. 31, 1989							
Free Supplement Used	500	600	1,200	4,100	6,500	6,500	6,500
Water Purchased	0	0	0	0	5,700	9,100	10,000
Jan. 1 – Dec. 31, 1990							
Free Supplement Used	5,900	6,100	7,100	7,700	7,700	7,700	7,700
Water Purchased	0	0	0	500	7,400	10,800	11,760
Jan. 1 – Dec. 31, 1991							
Free Supplement Used	2,100	2,600	5,300	7,100	7,500	7,500	7,500
Water Purchased	0	0	0	0	5,800	9,200	10,000
Jan. 1 – Dec. 31, 1992							
Free Supplement Used	1,100	1,500	3,400	4,300	7,500	7,500	7,500
Water Purchased	0	0	0	0	2,300	5,300	6,300
Jan. 1 – Dec. 31, 1993							
Free Supplement Used	1,500	1,700	2,700	3,500	3,600	3,600	3,600
Water Purchased	0	0	0	0	4,100	6,400	7,100
Jan. 1 – Dec. 31, 1994							
Free Supplement Used	3,800	4,200	5,500	7,000	7,700	7,700	7,700
Water Purchased	0	0	0	0	6,800	9,600	10,500
Jan. 1 – Dec. 31, 1995							
Free Supplement Used	0	0	0	240	1,400	1,400	1,400
Water Purchased	0	0	0	0	2,400	4,400	4,900
Jan. 1 – Sept. 30, 1995							
Free Supplement Used	0	0	0	40	1,900	3,700	4,200
Water Purchased	0	0	0	0	0	0	400

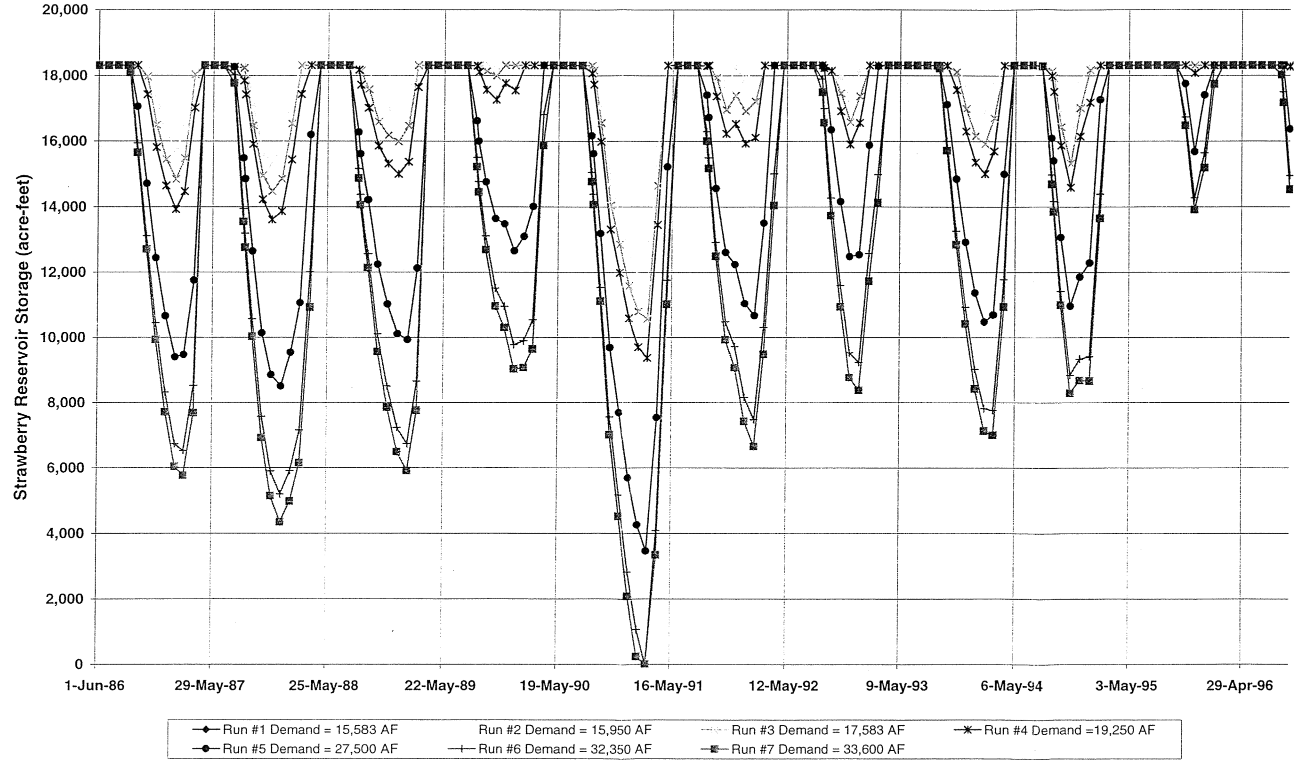


Figure 6. Strawberry Reservoir Storage
South Fork Stanislaus Simulation
June 1, 1985 to September 30, 1996

Figure 7. Lyons Reservoir Storage
South Fork Stanislaus Simulation
June 1, 1985 to September 30, 1996

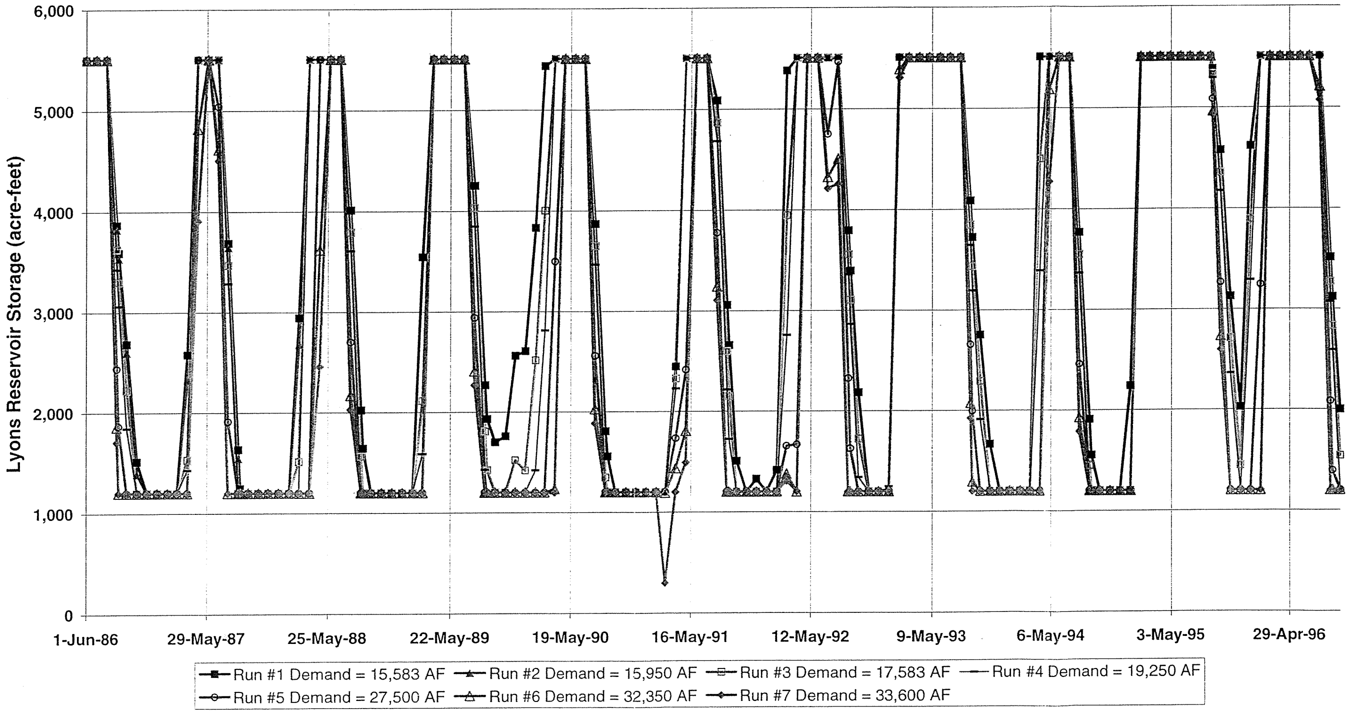


Figure 9. Water Purchased (acre-feet) 1985 - 1996

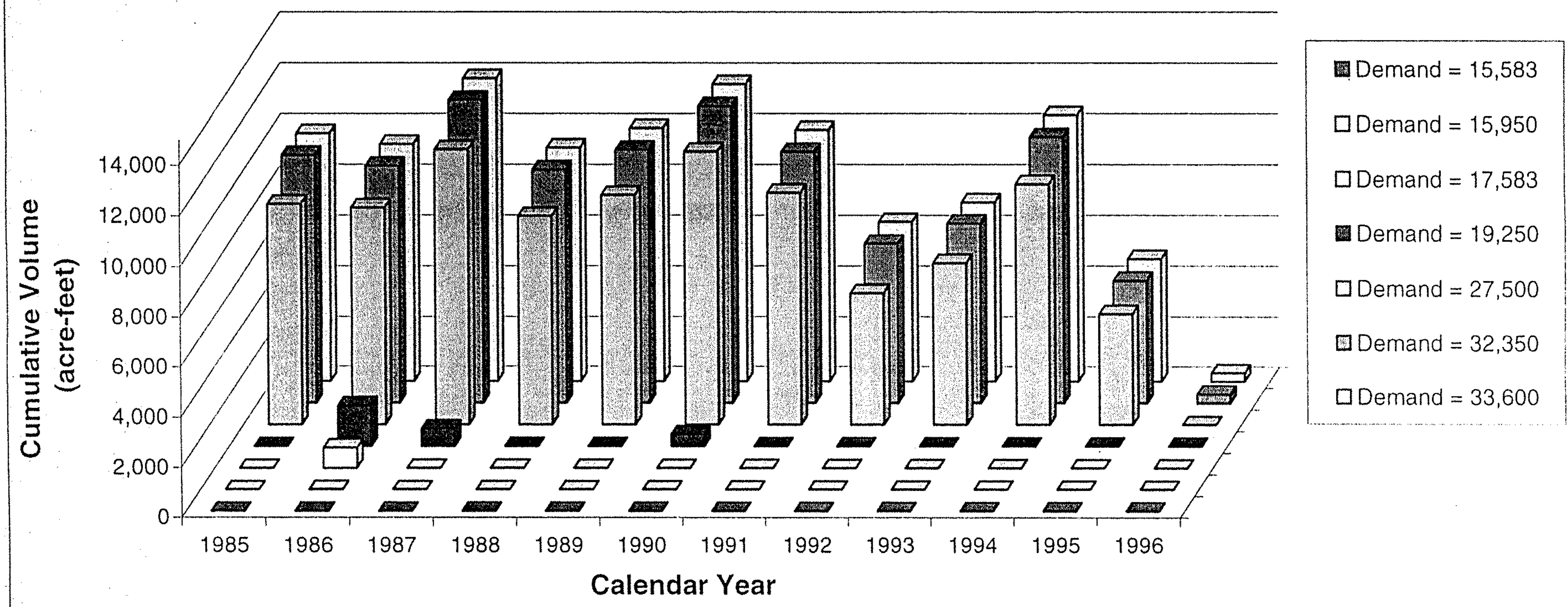
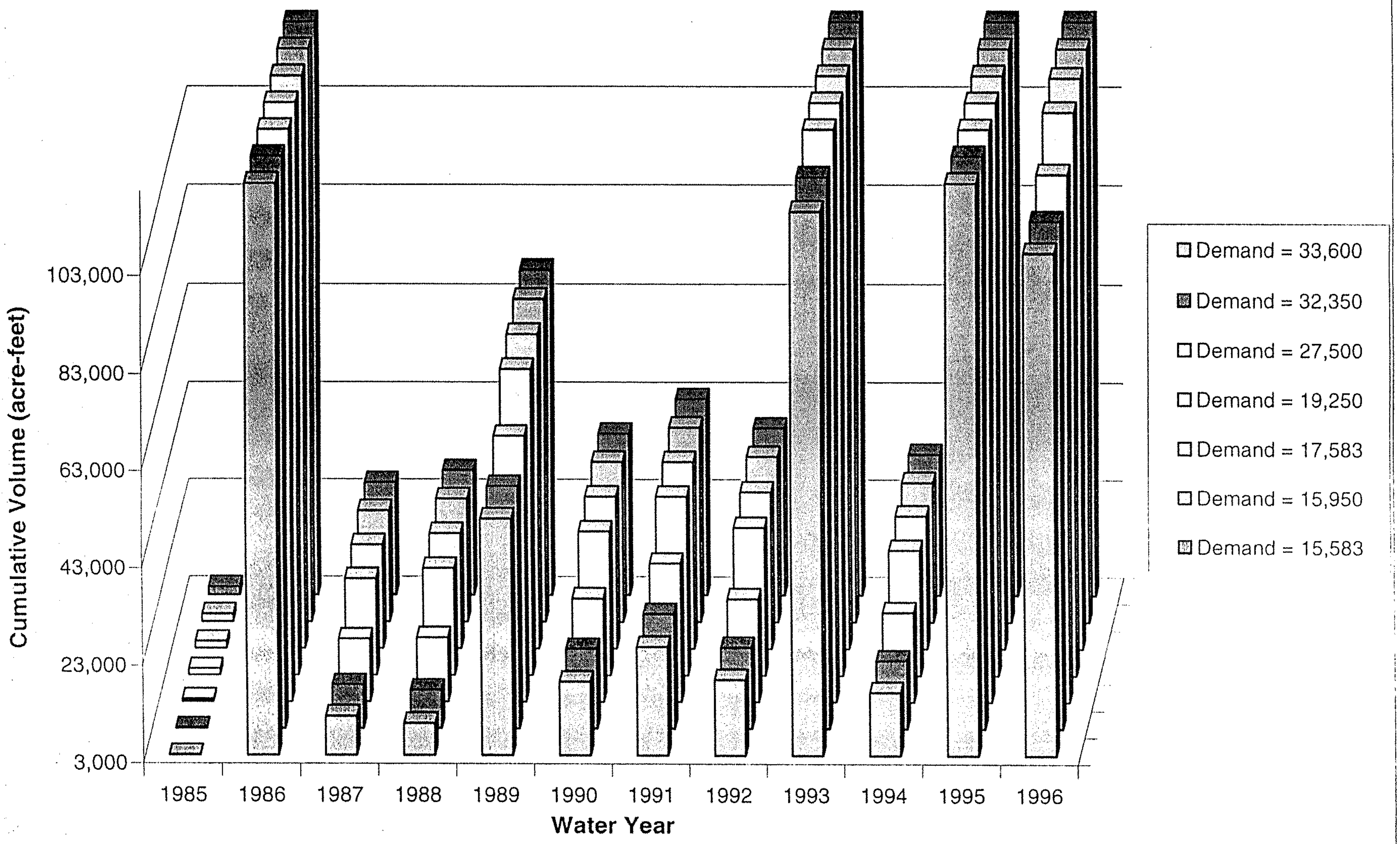


Figure 10. Lyons Spill (acre-feet) 1985 - 1996



Appendix L

TUD Water Rules and Regulations, Regulation No. 3 Water Service Charges, Regulation No. 12 Conservation, and applicable Exhibits

TUOLUMNE UTILITIES DISTRICT

WATER RULES AND REGULATIONS

Adopted: January 26, 1993

TABLE OF CONTENTS

14 RAW WATER SERVICE

15 ADMINISTRATION

EXHIBITS

REGULATION NO. 1

PURPOSE AND POLICY OF DEFINITIONS

1.01 Purpose and Policy

These Water Rules and Regulations set uniform requirements for design, methods of construction, operation and maintenance of both public and private water supply, storage and distribution facilities and water service connections served by the water system of the Tuolumne Utilities District (hereinafter referred to as “District”). Uniform application of this ordinance to all customers served by the District water system shall enable the District to comply with the water quality requirements set by the Environmental Protection Agency (EPA) and the California Department of Health Services and such other state and/or national standards of performance which may apply. This Ordinance also provides for the setting of user charges and fees for the equitable distribution of cost to all users, and the issuance of permits to certain users.

1.02 Definitions

Accessory Dwelling - A secondary dwelling with a floor space of 850 square feet or less which is located on a parcel which also has a primary residence.

Adequate and Reserve Capacity - Water mains capable of supplying, to applicant's land, potable water within the velocity and pipe size specifications set forth in the District Regulations, contained herein.

Application for Service - Written application requesting Tuolumne Utilities District service to a specific parcel of land, as indicated on a form provided by the District, together with such plans, specifications and fees as the District's Regulations shall, from time-to-time, require.

AWWA - American Water Works Association, a national association of water purveyors.

Backflow Prevention Device - Equipment used to protect the District's public water supply against actual or potential cross-connection with other sources of water supply or with sources of possible contamination.

Board - The Board of Directors of the Tuolumne Utilities District.

Bulk Usage - Water sold to a temporary customer by the truck load usually through fire hydrants, measured by a portable meter supplied by the District.

Capacity Charge - A charge required for the purpose of replacing the capacity of the District’s facilities to be used by a project or a new service where such capacity has not been previously provided by a developer.

Certificate of Lien - Written certificate of an overdue balance owing to the District by any user, duly recorded with the Tuolumne County Recorder.

Change of Use - When the primary water use changes from one classification to another, increases quantity, and/or adds multiple uses per Section 6.03.

Check Valve Assembly - A mechanical device installed on a water line to restrict the flow of water in one direction only.

Conduit - A water conveyance facility including a ditch, canal or pipeline.

Connection Fees - A charge imposed upon all applicants for service at the time service is sought from the District. "Connection fee" is a general term that encompasses a variety of one-time charges imposed upon applicants for service. A "connection fee" includes, but is not limited to, the fees charged to make the physical connection to the District's system, meter set charges, capacity charges (which compensate the District for expenses in incurred in providing existing capacity or an increase in needed capacity), and a variety of surcharges and assessments that are based upon the applicants geographical location. *See* Section 3.05 for a full description of connection fees.

Control Valve - A device used to control the flow of water in water line or in fire hydrant laterals.

Customer – Any person or entity, including wholesalers and including without limitation a parcel or property owner, or tenant, supplied or entitled to be supplied with water service by the District in accordance with established rules, regulations, rates and charges.

Disconnection – A water meter has been physically removed from the meter box; the water service lateral has been cut and capped; or other permanent method has been employed to ensure that water is not able to flow into the property. All capacity, including capacity previously provided by Developers, associated with a disconnected service line shall be permanently forfeited upon disconnection and monthly service charges shall cease upon approval by the District. Disconnection may apply to treated water and untreated water.

Discontinuance – A water meter is still physically present but a District controlled valve has been closed to prevent water from flowing to the customer.

District - Tuolumne Utilities District, a County Water District organized under Division 12 (Sections 30000 et. seq.) of the Water Code. An action of the District may be taken by either its appropriate management staff or as approved by its Board of Directors. May also be referred to as TUD.

Ditch System - Is defined as the system of canals, ditches, pipes, flumes, tunnels, reservoirs, siphons, and drainage courses commonly known as the Tuolumne Ditch System which conveys untreated water from the South Fork Stanislaus River at Lyons Reservoir to various parts of Tuolumne County, each ditch or canal consisting of the excavated portion of the canal and the fill or berm of the canal, together with such areas as are reasonably required for access to or alongside the canals for inspection, operation, cleaning, maintenance, repair, reconstruction or improvement. The right of ingress to an egress from the ditch or canal together with the rights to inspect, operate, clean, maintain, repair, reconstruct and improve the ditches and canals is based upon and was confirmed by the Acts of Congress of July 26, 1866 and July 9, 1870. As the owner of the land on which the canals are located holds title subject to this easement granted by the Federal Government, any interference with the canals or ditches or with the District's right to reasonable access to the canals, ditches, pipes, flumes, tunnels, reservoirs, siphons, and drainage courses for the aforesaid purposes would be unlawful.

Engineer - The District Engineer of the Tuolumne Utilities District.

Extension Facilities - Water supply, treatment, storage and distribution facilities of whatever type or nature which has as its purpose the improvement or expansion of existing District water service.

Final Approval - Written certification that the installed water facilities have complied with all District Regulations, has been delivered to the District as District property, and has been accepted by the District as evidenced by written correspondence from the District form dated and signed by the General Manager.

Finance Director – The Finance Director of the Tuolumne Utilities District.

General Manager – The General Manager of the Tuolumne Utilities District.

ISO - Fire demand pipe size requirements as specified by the fire suppression rating schedule published by the Insurance Service Office, edition 6-80, or current edition.

Landowner - That person who possesses an interest in real property, greater than that of leasehold interest, in land located within the geographical boundaries of the District.

Meter - The mechanical or electronic device capable of measuring the quantity of water delivered to a designated parcel.

Miner's Inch Day - A term used in water measurement. By California statue, one miner's inch flowing for one day is equivalent to 1.5 cubic feet per minute or 11.22 gallons per minute.

Monthly Fixed Charge – For every account to which water service is provided and readily available through a connection to the District's system, the monthly fixed charge a customer will pay for a baseline quantity for up to 400 cubic feet (cf) per month for treated water customers and up to 5000 cubic feet per month for metered raw (untreated) water customers

Multi-Family Water User - A customer with a water meter which serves more than one single-family residence or dwelling unit, including apartments, mobile homes and accessory dwellings,

New Service - Refers to application for metered or non-metered water service to lands not currently served by the District.

Operations Manager – The Operations Manager of the Tuolumne Utilities District.

Parcel - A piece of real property designated by the County of Tuolumne by a single assessor's parcel number.

Parcel Owner - The person or persons whose name or names appear on the Tuolumne County Tax Assessor's latest equalized assessment roll as the owner of a parcel that is receiving utility service. The owner is responsible for the payment of all rates, charges, and fees, including penalties thereon regarding such furnished services.

Plan Approval - The issuance by the District of its approval of the applicant's final plans, as evidenced by date and authorized signature in box provided on said plans.

Private Fire System - Fire suppression service in the form of a sprinkler system to a designated parcel of land.

Property Owner – *See* Parcel Owner.

Raw Water - Untreated water to be utilized for purposes other than human consumption. This water is generally provided through the District's Tuolumne Ditch System in a series canals, ditches, pipes, flumes, tunnels, reservoirs, siphons, and drainage courses to the point of delivery to the customer.

Resale Water - Raw water supplied to an individual account through a master meter which is then privately distributed to individual consumers who are not customers of the District through a distribution system not owned or operated by the District.

Secretary - The Secretary of the Board of Directors of the Tuolumne Utilities District.

Service Connections - Water facilities including a tap on a water main and the service lateral pipe from the main to and including the meter as located by the District and including the curb stop and meter box.

Service Valve - The equipment located on the District's lateral pipe to the user's property, and which is the method by which service to the affected land is controlled.

Shall and Will - "Shall" is mandatory and "Will" is permissive.

Standard Specifications and Plans of the District - This refers to the specific requirements of the District relative to plumbing facilities and equipment and includes Improvement Standards and Specifications as well as detailed drawings and all Amendments thereto and changes thereof.

Supplemental Water User – A user of raw water prior to January 1, 2016, that contracted annually with the District for water determined to be in surplus of then needed supply.

Tenant – A person who occupies land or property rented from a landlord, including without limitation a parcel or property owner. *See* Customer.

Turn-off – The act by District to turn off the water supply valve on a meter.

TUD – *See* District.

Unimproved Property - Refers to parcels of land upon which no structure requiring water service has heretofore been placed or presently exists.

Water Service – Water or water infrastructure that is provided, including but not limited to, residential, non-residential, agricultural, commercial, industrial, and raw water customers.

Water System – The District water conveyance system, including treatment plants, tanks, pumps, pipes, canals, ditches, flumes, tunnels, reservoirs, siphons, and drainage courses and any other appurtenance that exists in support of the water system. Any water system constructed or reconstructed by the District; or any private water system acquired by the District by whatever means.

Water User – The term Water User includes those types of users receiving water service as defined herein, specifically under Water Service in this section.

Wholesale Meter Service - Treated water service supplied to an individual account through a master meter which is then privately distributed to individual metered consumers who are not customers of the District through a distribution system not owned or operated by the District. Wholesale customers provide the storage and distribution components of their water system, and are regulated by the California Public Utilities Commission or are mutual water companies within the meaning of Section 2705 of the Public Utilities Code.

Wholesale Water - Treated water supplied to an individual account through a master meter which is then privately distributed to individual consumers who are not customers of the District.

REGULATION NO. 2

CONDITIONS OF SERVICE

2.01 Service Subject to Regulations

Water service will be provided to areas served by the Tuolumne Utilities District in accordance with Rules and Regulations governing said service adopted and amended from time to time by the Board of Directors.

2.02 Non-Liability of District

The District will exercise reasonable care and diligence to deliver to its customers a continuous, sufficient supply of water of good quality at the District connection to the customer's premises. However, the District is not, and will not be liable for any loss, damage or inconvenience to any person or equipment by reason of shortage, insufficiency, suspension, discontinuance, interruption in supply, increase or decrease of water pressure, or by a water quality problem.

2.03 Service Interruption

The District reserves the right at any and all times to shut off water delivery for the purpose of maintenance, making repairs, or alterations to the system. Reasonable effort will be made when feasible to give advance notice of interruption of service to all water users affected.

2.04 Access to Facilities

By applying for or receiving service from the District, each water user irrevocably licenses the District, and its authorized employees and agents, to enter upon the water user's property at reasonable times for the purpose of reading, inspecting, testing, checking, repairing, maintaining or replacing the District's meters, backflow prevention devices and other facilities.

2.05 Water Users' Responsibility for Control of Water Delivered

Title of water furnished by the District, and the risk of loss or damage resulting from its use, passes from the District to the water user at the outlet of a District valve, meter, backflow device, or double check valve assembly. Landowners retain total responsibility in instances of tenant occupancy of property. Landowner further warrants that water will be used for the purpose identified on the application for service and that water will be used in a reasonable manner consistent with all District Rules and Regulations. Water users are also responsible for all privately owned equipment, pumps, appliances, pipes, or other facilities connected to the public water supply on the discharge side of the water meter. Damage to private facilities resulting from water outages, volume or pressure variations or accumulations of line sediment, discoloration or scale formation will not be compensated by the District. It is the responsibility of the water user to protect private facilities by installation of switches, valves, sensors, or sediment traps or screens or other protective devices which may be required.

2.06 District Responsibility for Facilities

District facilities shall include only that portion of the system which the District acquires or constructs by action of the Board of Directors. The District's ownership of and responsibility for operation and maintenance of facilities shall end at the discharge side of water meters that are installed by the District, and at the underground fitting prior to the inlet side of fire sprinkler check valve assemblies. (*See* Regulation 11.02). District will be responsible to operate, maintain and replace District's water mains, pipelines and other works of the District-owned total supply, distribution and collection system. District works shall be under exclusive control and management of duly appointed District personnel and no one shall have any right to interfere with the District system in any manner.

2.07 Place of Use of Water: Resale Prohibited

Except with the prior written authorization of the District, no user shall use, or permit the use of, any water furnished by the District on any premises other than specified in the user's application for service, nor shall any user resell any water furnished by the District. An individually metered water service shall be required for each separate single family residential or commercial building, as determined solely by the District. (*See* Regulation 7.01).

2.08 Electric Grounds

No electric circuit shall be grounded to the District's facilities or to any plumbing or metal in contiguity therewith. Any person who makes, or permits to be made such a connection, will be liable for damages to the District's facilities and for personal injury resulting therefrom.

2.09 Water User's Compliance with Regulations

By applying for or receiving water service from the District, each user covenants and agrees to be bound by and to comply with all regulations of the District from time-to-time in effect.

2.10 Treated Water Pressure

2.10.1 Minimum Pressure and Booster Pumps

District will provide a minimum of 20 psig (pounds per square inch measured on a gauge) at the meter for each District user. User may, upon their own discretion, install a booster pump facility on the user side of the meter, however, all operation and maintenance shall be the responsibility of the user and the District assumes no liability for its use, condition, deterioration or damage. If the District determines that a new service will have a normal pressure of less than 20 psig at the meter, the customer will be required to sign an agreement that acknowledges such pressure prior to the District’s approval of the application.

2.10.2 Pressure Regulators Required

All applicants for new or amended water service connections may be required to install, at applicant's expense, an appropriately sized and located pressure regulating device which size and pressure set point shall be determined in the sole discretion of District and in accordance with the provisions of the plumbing code as may be amended from time to time.

REGULATION NO. 3

TREATED WATER SERVICE CHARGES AND RATES

3.01 Charge for Water Service

A monthly fixed charge for treated water service per meter size as established in Exhibit B.1 shall, irrespective of quantity used, be applied to all connections, except for master metered users.

3.01.1 Quantity Charge

A usage charge, per hundred cubic feet, shall be applied to all connections for water delivered as determined in Exhibit B.1.1.

3.01.2 Surcharges

A monthly surcharge as established in Exhibit B.3 shall be applied to all connections in the areas designated, to fund acquisition costs or special improvements needed to provide service to those areas. Where more than one existing single family residence or commercial building share a single water meter, except for master metered users, a separate surcharge shall be required for each such building.

3.01.3 Wholesale Usage - Master Meter Service

Per agreement as authorized by Board of Directors.

3.01.4 Bulk Usage from Fire Hydrant

Where bulk water usage is required, i.e. for construction purposes, the District shall charge for metering and usage as specified in Exhibit B.5

3.02 Monthly Service Charge for Privately Owned Fire Protection Systems

A monthly charge shall be paid for fire service connections to the District's water distribution system which supplies water to privately owned and maintained sprinklers and fire hydrants used exclusively for firefighting, and based on the minimum service charge for a 1" meter as specified in Exhibit B.6. Bypass lines, including meters and backflow prevention devices shall be retrofitted at the customer's expense on all fire sprinkler backflow assemblies where such bypass lines do not already exist.

3.03 Miscellaneous Services Provided

Miscellaneous services provided by the District to any person or agency shall be compensated on the basis of cost. The District may participate in joint projects or cooperative arrangements by which direct compensation is not required.

3.04 Request for Service Location, Temporary Shut Off or Turn On, and Temporary Suspension of Service

Each time the District is required to locate the customer's service connection or make a temporary shut off or turn on, a service charge may be charged, in accordance with Exhibit B.7,.

Water service shall be terminated between 8:00 a.m. and 3:00 p.m. on any business day (not a Saturday, Sunday or holiday) requested by the customer, provided that the request is received by the District not later than two business days prior to the date of termination. The customer will be responsible for the costs of all services furnished by the District prior to the suspension of his service. The District may allow a maximum six month suspension of monthly service charges for meters that have been shut-off at the request of the customer if each of the following conditions are met:

1. The service has been continuously utilized and maintained by the customer, and in an active billing status for at least one-year.
2. Any applicable monthly surcharges under Exhibit B.3 shall be charged to the customer's account and be payable during any suspension period.
3. The request is the result of a catastrophic event such as fire where the structure is uninhabitable.
4. Customer's account must be paid current to be considered for suspension of service.

Upon written request of the property owner and written agreement with the General Manager, such suspension period may be extended on a month to month basis up to a total of three (3) additional months in the event of documentable delays in reconstruction of the structure with circumstances beyond the control of the property owner.

3.05 Connection Fees

Charges for new services or change of service will be as follows:

3.05.1 Capital Reserve Charge

Every applicant for connection to the District's water system, and applicants for connections to water systems served by the District through a master meter shall be required to pay a Capital Reserve Charge in addition to any other fee, cost, reimbursement or separate agreement entered with the District. The reserve fund so established shall be used to replace capacity and facilities used up by new applicants for service upon connection to the water system and to provide for the continuous capability to serve new applicants for water service. The Board shall establish the amount from time to time as required to provide the continuous capability of serving applicants for water service.

The Capital Reserve Charge shall be computed by reference to the user classification schedule on Exhibit A as applied at the sole discretion of the District. Charges for classifications not specifically listed in Exhibit A will be based upon the most similar classification listed, or upon usage records of a similar establishment as determined by the District Engineer. The Capital Reserve Charge for one equivalent single family residence is specified on Exhibit B.9.

3.05.2 New Account Administration Fee

The new Account Administration Fee is a one-time charge for an application for service to be paid at the time of application. The purpose of this fee is to cover staff time review of the application and for new account setup. Payment of the application fee does not guarantee the application will be accepted.

3.05.3 Meter Set Fee

a. District charges for installation and setting of meter(s) shall consist of the District's actual cost as established on Exhibit B.10.

3.05.4 Service Lateral Installation Charge

The applicant shall be responsible for the costs incurred by the District for the installation of service line(s) from the existing mainline to the applicant's property. The applicant shall deposit with the District an amount equal to the District's estimate of such work. All costs in excess of the estimate shall be payable by the applicant upon completion of work. Such costs shall equal the District's actual cost of materials, labor, equipment, and any permit fees. The applicant may have the service connection line constructed by others with prior permission from the District including submission of an inspection permit application to the District . All such work shall be done by a licensed California contractor approved by the District Engineer. All work shall be inspected and approved before acceptance by the District, and any construction completed or covered up before such inspection shall not be acceptable for connection with District's distribution pipes. The actual connection to District's mainline pipe shall be accomplished by District personnel only, and under no conditions shall any other person interfere with District facilities in any way. The applicant will be charged by the District for inspection and connection to main equal to actual costs incurred for such work.

3.05.5 Service Line Relocation

The District's charges for the relocation of the District's service line and water meter from an existing site on the applicant's property to another requested location shall be equal to the District's actual costs of materials, installation, labor, equipment encroachment permit and normal overhead charges. Such relocations shall be subject to District approval.

3.05.6 Charges for Reimbursement of Oversized Facilities

Charges may include the payment of a pro rata share of previously constructed main or line extensions, when required under District reimbursement agreements as described in Regulation 8.14. Additional charges to the District for certain facilities, either proposed or previously constructed, are listed on Exhibit C.

3.05.7 Capacity Charges - Water Supply, Treatment, Storage, Transmission - Exhibit B-14

These charges are instituted to insure that all applicants pay a fair share of the cost burden to provide for essential components of water service infrastructure. They are generally established as a one-time charge levied against developments or new water accounts as a way to recover a part or all of the cost of additional system capacity, or the purchase of capacity existing within the system. Capacity Charges are not imposed upon applicants (or parcels) where sufficient water supply, treatment and storage facilities have been provided by a developer or by an assessment on those parcels to cover those costs. The amount of capacity required in any of these facilities changes periodically based on average customer water use trends, changing regulatory requirements, fire standards and other operational considerations. Under normal circumstances the District required capacity built into a developer constructed system will remain constant for a period of 10 years, therefore after a period of 10 years, applicants shall pay the prorated share of the cost of the increased capacity required to serve the property, if applicable. Capacity Charges are also applicable for service to any parcels that do not have a District water main in a street or right of way fronting the Applicant's property. The charges are specified on Exhibit B. 14.

In those areas where adequate supply, treatment, storage and transmission facilities have been provided by the District, Capacity Fees shall be charged to reimburse the District for its previous investment in the infrastructure with capacity necessary to serve the new connection(s).

In those areas where adequate supply, treatment and storage facilities have been provided by the developer or by an assessment on each parcel, water service equivalent to one single-family residence (ESFR) on each parcel, shall be allowed without payment of capacity charges. In areas where connection fee surcharges are in effect to repay loans for water treatment or storage improvements, and the surcharge amount is less than those specified on Exhibit B.14, the lower amount shall be applicable for water service for one equivalent single-family residence on an existing lot or parcel. Water service for improvements that result in more than one ESFR per parcel (i.e., due to a parcel split or duplex construction), shall require payment of commensurate capacity charges specified in Exhibit B.14. Parcels within the City of Sonora and within the town sites of Tuolumne, Columbia and Jamestown, which were in existence and are shown on the Tuolumne County Assessor's 1992 assessment maps as a separate assessor's parcel (1992 being the year in which District came into existence), shall not be subject to payment of capacity charges for one ESFR for each such parcel. If the boundaries of a lot in such town sites does not match the boundary of an assessor's parcel on the 1992 County Assessor's Map, that lot will not be credited with one ESFR and water service will be subject to payment of the capacity charge. Where property line adjustments are made that do not result in a greater number of assessor's parcels than shown on the 1992 Assessor's map, the resulting parcels may be entitled to the one ESFR credit against capacity charges. The appropriateness of the capacity charges shall be analyzed on a case-by-case basis and determined by the General Manager.

All applicable Capacity charges must be paid to the District before service will be provided. The Capacity charges shall be paid by the individual service applicant prior to the setting of any individual service meter by the District. The individual service applicant will be required to pay all Capacity charges not paid for or capacity not constructed by the developer. Where applicable, at the discretion of the District Engineer, if adequate capacity does not exist the developer will be required to either pay for or construct the necessary capacity prior to acceptance of all developer constructed facilities and prior to installation of any individual service meter.

Supply - This charge shall apply to applicants for water service, where the property involved has not been provided with water supply by previous dedication of supply, agreement or assessment. The standard charge shall be computed on an estimated average annual water demand per single family equivalent (ESFR), as determined by the District Engineer, at the rate shown on Exhibit B.14.

Treatment - This charge shall apply to new applicants for water service, where the property involved has not been provided with sufficient water treatment capacity through a previous dedication, agreement or assessment with the District. The standard charge to mitigate the cost to construct treatment capacity shall be computed on estimated maximum daily flow, as determined by the District Engineer, at the rate shown on Exhibit B.14.

Storage - This charge shall apply to new applicants for water service, where the property involved has not been previously provided with adequate water storage facilities by dedication of storage, agreement or assessment. The standard charge for mitigation of storage construction shall be computed at the rate shown on Exhibit B.14 and based on a combination of the estimated annual average daily volume consumed over a seven day period and required fire flow storage volume as determined by District's Engineer.

Transmission - This charge shall be the actual cost of construction, or reimbursement share of prior construction cost, as required in Regulation 8.

Change in Use - The foregoing charges shall also be applicable to a change of use on an existing service connection under Regulation 6.03 where such charges were payable on the existing connection.

3.05.8 Connection Fees and Capacity Charges in Specific Areas

Applicants for water service in those certain areas listed on Exhibit C shall be required to pay the specific charges in addition to the capacity charges described above.

3.06 Standby Assessments

Standby Assessments shall be calculated and levied against all parcels in any subdivision containing ten parcels or more and receiving approval by the Board of Directors after adoption of this regulation. Such assessments shall be a condition of approval of providing service to the subdivision to fund the cost of maintaining the water system and its capacity in a readiness to serve status for the benefit of unimproved parcels of land.

The District shall direct the preparation of the necessary Assessment Engineer’s Report and conduct the required election in accordance with the applicable provisions of the State Constitution. All costs associated with the preparation of the Engineer’s Report and conduct of the election, including reasonable District administrative expenses, shall be paid by the project developer. The standby fee or charge will be detailed in the Agreement between the Developer and the District. Standby Assessments shall terminate for each parcel upon application for water service and payment of applicable connection fees and charges.

New or Increased Charges, Assessments, etc.

The District may from time to time increase its rates and charges or adopt new charges, standby charges, surcharges, improvement district assessments, or other charges pursuant to the applicable provisions of law relating thereto.

REGULATION NO. 4

BILLING PAYMENTS AND MISCELLANEOUS FEES

4.01 Service or User Charges

4.01.1 Billing

A. A monthly charge for water service will be billed to a customers who:

1. Receive water service, treated or untreated, from the District; or
2. Have capacity allocated to the property, regardless of whether a service lateral or meter has been installed; or
3. Had water service discontinued or a water meter removed for any reason.

B. A customer account will be billed whether or not the property is vacant, or water is being consumed. Bills for water service will be mailed or sent via e-mail, following the reading of the meter, if one exists, to the address of the property owner or tenant. If a tenant does not pay the bill, it becomes the responsibility of the property owner. The bills are payable upon receipt and are delinquent thirty (30) days after the billing date. The owner of the property to which water service is furnished is the customer and shall be responsible for the payment of all rates, charges and fees, including penalties, thereon regarding such furnished service. Unpaid obligations shall run with the land, and shall lead to delinquency and termination of service for the residential unit or other real property involved without regard to any changes of residency or occupancy by persons different than the persons shown on District records as obligated to pay said bill. User shall be responsible to keep the District advised of the address to which bills are to be mailed. Non-receipt of a bill shall not relieve owner of any obligation to the District.

4.01.2 Billing Interval

Bills for water service or user charges shall be rendered to users at not more than bi-monthly intervals. Bills are due and payable upon presentation and become delinquent thirty (30) days thereafter.

4.02 Payment

Bills shall be due and payable on mailing, e-mail statement or presentation. Payment shall be mailed to the District at 18885 Nugget Blvd., Sonora, CA 95370, made at the District office, paid online through the District’s website, www.tudwater.com, or to a collector authorized by the District.

4.03 Returned Checks or ACH

A charge of $25.00 per occurrence shall be paid for each check or ACH tendered as a payment to the District that is not honored by the bank.

4.04 Estimated Bills

If a meter fails to register correctly or cannot be read, the bill will be based on the District's estimate of the quantity of water delivered, taking into consideration seasonal water demand and any other factors that are material and significant in arriving at a fair charge.

4.05 Prorated Bills

For bills calculated for less than a full billing period, the bill will be prorated from the first day of the billing period to the date of termination of service or from the commencement of service until the last day of the billing period.

4.06 No Vacancy Credits or Discounts

No credit or discount will be allowed or approved for any vacant properties regardless of the reason for the vacancy.

4.07 Disputed Bills

4.07.1 Review

The Notice of Delinquency shall inform the user that any disputed portion of the billing may be reviewed with the General Manager or Finance Director within thirty (30) days of the date of the Notice. The person requesting review shall send a written statement supporting the basis for dispute to the District office, attention of the General Manager.

4.07.2 Payment to Avoid Discontinuance of Service

To avoid discontinuance of service, full payment of the undisputed portion of the bill must accompany the written statement by the due date.

4.07.3 Refunds or Adjustments to Accounts

Refunds or other adjustments to a customer account shall only be considered based on an actual history of use and shall only apply to a maximum period of 12 months from the date the customer requests a refund or adjustment.

4.08 Direct Billing of Tenants

As a courtesy, property owners that rent or lease property with water service may have the billing sent directly to the tenant or tenant's agent. To accomplish this, the owner shall first complete an Owner – Water/Sewer Application, which application may be required to be updated from time to tome at the District's sole determination. The tenant is then required to complete a Tenant – Water/Sewer Application and pay the amount of the security deposit as detailed in Exhibit B.13 prior to the District changing the billing name and address. However, even if a tenant completes a Water/Sewer Application and pays the security deposit, if that tenant becomes delinquent, the property owner shall ultimately be responsible for all delinquent billings of any delinquency term including interest and penalties thereon after the tenant's security deposit has been exhausted. The property owner shall have access to information regarding the account status of their tenant upon request. If tenant becomes more than 30 days delinquent, TUD may revoke tenant billing privileges and the account will be closed in the tenant's name and billing will be placed back into the owner's name. The tenant's security deposit will be applied to the delinquent bill and any remaining monies owed will be transferred to the owner’s account. Billing will remain in property owner’s name once tenant privileges have been revoked.

4.08.1 Delinquent Notices

Delinquent notices of past due amounts shall be sent to both tenants and property owners of the property receiving water service.

4.08.2 Security Deposits

A deposit is required for all tenants that wish to establish a water account with the District. Once the application and deposit have been processed, upon moving out of the property, the deposit will be used towards the remaining portion that is owed to the District. If there is a remaining credit on the account, the tenant will receive a refund check, without interest, within 30 days of closing their account.

4.08.3 Security Deposit Amount

Equal to the Districts current bi-monthly fixed water rate as detailed in Exhibit B.9

REGULATION NO. 5

DISCONNECTION, DISCONTINUANCE, AND RESTORATION OF SERVICE

5.01 Disconnection by the District

The District reserves the right to disconnect any connection to its water distribution system and to discontinue water service for any of the following reasons, without notice unless otherwise indicated.

1. The customer fails to comply with any of the District's Rules and Regulations, after notice by mail or in person;
2. The service is being furnished without proper application;
3. There is evidence of unauthorized tampering or interference with the District's facilities;
4. The District or a State or County Public Health Officer finds that there exists a known or potential hazard to the health or safety of the customer or any water user of the District;
5. The customer fails, after notice from the District, to remove an obstruction that prevents access to the water meter;
6. Excessive or wasteful use of water as described in Section 12, after notice by mail or in person that the same be terminated.

5.02 Discontinuance of Service for Delinquent Bills

The following procedure for termination of service for nonpayment of bills shall be followed:

5.02.1 Delinquent

Unpaid water bills shall become delinquent thirty (30) days after the billing date.

5.02.2 Notice of Delinquency

If a customer’s account is not paid 35 days after the billing date (5 days delinquent), a $10 penalty and 1% interest charge will be applied to the past due balance on a monthly basis until paid. A written notice of delinquency shall be mailed to the service address and the owner of record.

5.02.3 Notice of Impending Disconnection

If a customer’s account is not paid 60 days after the billing date:

(1) A written notice of delinquency and impending termination shall be mailed to the service address and the owner of record. The written notice shall specify the date of service termination, which shall be no less than seven (7) days after the date on which the written notice is mailed. This notice shall include information on appeals (see 4.07 above), extensions, alternative payment plans, and critical compliance dates. If the mail is returned as undeliverable, then notice shall be personally

delivered to the residence.

(2) An additional penalty charge of $10 shall be applied to the past due balance.
(3) Water service shall not be discontinued while any appeal is pending.
(4) Water service shall not be discontinued for certain customers if certain conditions are met. See 5.02.4 below

5.02.04 Alternative Payment Plans

Customers more than 5 days delinquent (35 days after billing date) will be provided options for alternative payment plans to avert discontinuance of service for nonpayment. Such plan can include payment deferral, amortization agreements, or alternative payment schedules. In addition, customers that demonstrate certain public assistance, care provider certificates and income levels are eligible for deferred or alternative payment plans and will not have their water disconnected if they enter into a deferred or alternative payment plan and remain in compliance with that plan. Customers can inquire about payment options by calling the District office at (209) 532-5536

5.02.05 Landlord-Tenant Relationships

Customers who are tenants and whose account becomes delinquent due to the failure of the dwelling owner to keep the account current, will be notified of any impending disconnection at least 10 days prior to disconnection, and will have the option to become directly billed for District services, without being required to pay any amount which may be due on the delinquent account.

5.02.6 Service Discontinuance – Service Charges

When water service is discontinued for non-payment, the meter shall be placed in the locked-off position. Service charges listed in Exhibit B.7.2, B.7.3, and B.7.4 shall apply. After a sixty (60) day period, if the delinquent bill is not paid or the dwelling at the service site is vacant, the account may be subject to a property lien which will be filed with the County Recorder’s Office and the meter shall be removed. The customer or property owner continues to be responsible for the minimum monthly service charges and without limitation any surcharges, penalties and interest accruing to the service connection up to and after the time when the meter is turned off. When the meter is removed, the customer or property owner also continues to be responsible for the minimum monthly service charges and all surcharges, penalties and interest accruing to the service connection up to and after the time the meter is removed.

5.02.7 Interest and Penalties

A delinquent account shall continue to accrue interest from the delinquent date at the rate of 1% per month until the past due amount, plus interest and penalties, is paid in full. However, customers that demonstrate certain public assistance and income levels will not have interest accrue against their delinquent account.

5.03 Disconnection by Customer from Water System Prohibited

Once a service line is extended to a parcel, the customer may not disconnect the service under any circumstances and the property owner shall be responsible for the bi-monthly service charges related thereto. No refunds of connection or capacity fees shall be allowed. Capacity shall not be allowed to be transferred amongst parcels except through the conditions of approval contained in a development agreement for a subdivision which development agreement is issued by the District.

5.03.1 Exception for Certain Types of Development, Redevelopment or Demolition Projects

At the sole discretion of the General Manager an exception may be granted under this section for existing service lines not utilized by a development, redevelopment or demolition project. Customers must submit a District Disconnection Request form along with copies of any applicable permits issued by local agencies prior to consideration by the District. In cases where the project does not require a permit, such as in certain demolition projects, a site inspection by the District shall be required. An approved disconnection requires customers to remove, at their expense, the unneeded service line(s) at the main or another location determined by the District Engineer. All capacity, including capacity previously provided by Developers, associated with a disconnected service line shall be permanently forfeited upon disconnection and monthly service charges shall cease upon final approval by the District. Once disconnected, if service is desired at the property in the future, owner shall submit a new service application along with payment of the current connection and/or capacity fees applicable at time of application.

5.03.2 Exception for Accounts with No Usage History for a Period of Ten Years or More

At the sole discretion of the General Manager an exception may be granted under this section for existing service lines where it can be determined, to the District's satisfaction, that service has not been utilized for a period of ten years or more and there is no structure on the property. Customers must submit a District Disconnection form along with documentation demonstrating the property has not been occupied for at least ten years. A site inspection by the District may be required. An approved disconnection requires customers to remove, at their expense, the unneeded service line(s) at the main or another location determined by the District Engineer. All capacity, including capacity previously provided by Developers, associated with a disconnected service line shall be permanently forfeited upon disconnection and monthly service charges shall cease upon approval by the District. Once disconnected, if service is desired at the property in the future, owner shall submit a new service application along with payment of the current connection and/or capacity fees applicable at time of application. This exception shall not apply to commercial properties and will be evaluated on a case-by-case basis for residential properties located within a subdivision where water mains were previously constructed to serve the parcel in question.

5.04 Certificate of Lien for Delinquent Water Charges

When water service has been discontinued as provided for in Regulations 5.01 and 5.02 above, and when the General Manager or the Finance Director has determined that the recovery of the amount due may be uncertain, then the General Manager or the Finance Director shall cause to be filed with the County Recorder a Certificate of Lien, setting forth the amount of the delinquent charges, including any interest and penalties therein, the name and address of the person(s) liable therefor, and the same shall therefor become a lien upon all real property owned by such person(s) in accordance with Section 31701.7 of the Water Code.

5.05 Placing Unpaid Charges on the County Tax Rolls

The amount of any charges for water service requested in writing by the owner of the property that are delinquent and unpaid for sixty (60) days or more on or before July 1, shall upon notice being given to the owner thereof be added to and become a part of the annual taxes upon such property, and shall constitute a lien on that property as of the same time and in the same manner as general taxes upon such property, all as provided for in Sections 31701.5-31701.6 of the

Water Code; provided that in such cases, the District Controller shall furnish to the County Board of Supervisors and the County Auditor a statement of such delinquent and unpaid charges on or before August 10 of that year.

5.06 Unlawful Acts

The District will cause the prosecution of all violations of Sections 498, 624 and 625 of the Penal Code of the State of California and all Ordinances and Regulations which make the interference with the orderly supply of water to the District users a crime.

5.07 Drawing Water From Fire Hydrants

No person, other than authorized fire district personnel shall open, or draw water from, any fire hydrant connected to the District's distribution system without prior specific authorization of the District. First violators of this section who withdraw water without authorization shall receive a warning and instruction on proper procedure. Upon second violation, violators shall be $500 and prohibited from utilizing district bulk facilities for a period of three months. Subsequent violations by the same entity shall be prohibited from utilizing district facilities for a period of one year and shall be fined $1000 per offense.

5.08 Damage to District Facilities

The user, by applying for water service from the District, covenants and agrees that, in addition to any right of remedy available to the District by law, he shall pay to the District its cost for repairing or replacing any of the District's facilities damaged as a result of construction or other work or activities on the user's property.

5.09 Unauthorized Service Connections

No person shall cause a service connection to be made without prior authorization of the District, and every person who does so shall be guilty of a misdemeanor. Such person may be required to pay a penalty for the unauthorized service connection equal to twice the estimated user’s charges in effect during the period of time such unauthorized service connection was made and used and twice the Connection Fee in effect at the time connection is authorized. Such unauthorized connections may be disconnected by District at such person’s expense, until such service connection is authorized and the penalties and other charges or fees are paid. The payment penalties as provided herein may be reduced to 25% of the user charges and then-applicable Connection Fee provided such person makes application and pays all charges and fees within ten (10) working days of written notification that such service connection is unauthorized and provided that the connection is not in violation of any other provisions contained herein or as provided by law.

5.10 Tampering with District Facilities

No person other than those designated and authorized by the District, shall open any water valve covers or tamper with such covers in any manner, operate any District owned water valves, hydrants, standpipes or other appurtenances.

No person other than those designated and authorized by the District, shall enter any District facilities, such as any water storage tank, chlorinator site or spring.

No person shall maliciously, willfully or negligently break, damage, destroy, deface any structures, appurtenance or equipment which is a part of the District’s water system. No person without previous written authorization from the District shall uncover, make any connection with, opening into, use, alter, or disturb any public water main, service or appurtenance thereof.

The cost of repairing any damage resulting from tampering with District Facilities will be billed to the responsible party and shall include, without limitation, the cost of labor, materials and equipment.

Any of the foregoing actions which are misdemeanors under the California Penal Code shall be referred to the District Attorney for prosecution.

5.11 Water Misuse

No customer shall knowingly permit leaks or waste of water. Where water is wastefully or negligently used on a customer's premises, the District may discontinue the service.

REGULATION NO. 6

SERVICE CONNECTIONS
REQUIREMENTS FOR NEW CONNECTION OR CHANGE OF USE

6.01 Application for Service and Payment of Fees

1. No service shall be granted or continued unless the present owner of the affected parcel of land has filed an application and paid the appropriate connection fees as outlined in Section 3.05 of Regulation No. 3.

2. Application for treated water service shall be made in writing on forms provided by the District, and signed by the legal owner of the subject property.

3. Applications for treated water shall be supported by plot maps, assessor's parcel number, construction type and number of living or service units, plans of water distribution, date the service is to begin, the name and billing address of the owner, and where deemed necessary by the District the domestic water requirements in gallons per day.

4. In areas where the District also provides sewer service, the applicant shall be required to apply and pay connection fees for both treated water and sewer service simultaneously.

6.02 Treated Water Service Connections

No new service connection shall be connected to the District's treated water distribution system unless there exists a District water main in a street or right of way or easement adjacent to the Applicant's property and opposite the proposed location of the Applicant's service. The main shall have adequate capacity and pressure to provide safe and reliable water service for domestic and fire protection use as solely and conclusively determined by the District. The District, in determining the adequacy of the existing facilities, will take into consideration all factors such as the water requirements of the project to be served by a new connection, the flows required for fire protection and whether such use of the water will significantly impair service to the existing District customers. Should the determination reveal that the District's existing facilities are inadequate to serve a new connection, the new service or services shall not be allowed to connect into the system unless and until the Applicant provides such adequate extension and improvements, including additional water supply, treatment, storage and distribution system, and/or pays capacity charges as required by the District. The location, capacity and design of such extensions and improvements shall be determined solely and conclusively by the District as outlined in Section 8.

Service will be connected, provided the following conditions are fulfilled:

1. The land to be served is within the geographical boundaries of the Tuolumne Utilities District, and within or adjacent to an area being served or servable by the District.

2. The District possesses, or is provided by the applicant, with an adequate water supply including treatment and storage facilities, and distribution pipe system, to provide such service.

3. Service to such property will be supplied upon filing of an application as further defined in Regulation 6.01.

4. Payment of applicable fees and charges.

6.03 Change of Use

In those cases where the parcel has been improved since the original service installation causing any of the following conditions to exist, the parcel owner must file an application for service and submit fees as described in Regulation 6.01 hereof.

1. The improvement requires an increase in water pressure or quantity to serve the subject property and adds another user classification to the applicant's service or converts the service to a new user classification as listed on Exhibit A.

2. The improvement requires increased water pressure or quantity in order to satisfy the Tuolumne County fire suppression standards as more specifically described in Section 9 thereof.

3. The improvement changes property use including parcel splits, additional buildings, or other possible multiple use divisions requiring separate water hookup for each unit

6.04 Capacity Charge Determination Period for Business Entities

Subject to a written agreement with the District, a bonafide business entity registered as such with the State of California may opt to deposit its capacity fee as calculated by the District and the District will monitor the actual water usage of the applicant for a period of at least one (1) year, or longer, as determined by the District, and if justified will adjust the capacity fees in accordance with actual use at the conclusion of the monitoring period. In no event will the capacity fee be adjusted lower than the amount of a capacity fee that would be due for a use of one (1) ESFR. The provision of this Section shall not apply to residential developments.

REGULATION NO. 7

METERS

7.01 Number of Meters

A service connection and meter shall be established for each separate single family residential or commercial building on each parcel, unless otherwise determined by the General Manager. Service to accessory dwellings may not require separate meters as determined by the General Manager. When a parcel or building receiving water service through one connection is subdivided into smaller lots, parcels or units, then the existing service connection shall be deemed appurtenant to the parcel or building unit upon which it is situated or most immediately adjacent, and additional meters shall be required for each lot, parcel or unit. The District reserves the right to limit the number of houses or buildings, or the area of the land under one ownership, to be supplied by one service connection. A service connection shall not be used to supply adjoining property of a different owner or to supply the property of the same owner on opposite sides of a public street or alley.

7.02 Location of Meters

The location of meters shall be installed in accordance with District's applicable standard Details and Specifications at a convenient location approved by the District.

7.03 Size of Meter

With District approval, the Applicant may determine the size of the meter for each service connection compatible with provisions of the American Waterworks Association Standard as revised at the date of the application.

7.04 Change of Size

The meter will be replaced by a meter of different size upon the request of the user with District approval or as required by a change of usage. The applicant shall be responsible for all costs associated with the meter installation and any upgrades to the service lateral, as required, including, but not limited to the cost of the meter, plus additional connection fees, administrative, labor and overhead charges.

7.05 Meter Reading

7.05.1 Measurement of Water Supplied

All treated water supplied by the District will be measured by means of water meters installed, owned and maintained by the District, with the exception of bypass meters on fire sprinkler system check valve assemblies as described in Sections 9 and 11. The cubic foot is the unit of measure, and the amount charged for service shall be based on the current rates established by the District. At the District’s discretion, it may install meters for raw water supplied to customers receiving that service and the same provisions of this section will apply to any metered raw water service.

7.05.2 Frequency of Meter Reading

District will attempt to read meters on a monthly or bi-monthly basis. As it is not always possible to read meters at equal intervals, the period between reading dates may vary. Special readings will be made on commencement and termination of service as required by special circumstances.

7.05.3 Meters that Cannot be Read

Where a meter cannot be read because of an obstruction or adverse weather conditions, the billing for that period will be estimated, in accordance with the provisions of section 4.04 of these Water Rules and Regulations, and the water user will be notified and shall correct the condition.

7.06 Testing Meters

The District will test the accuracy of any meters upon the written request of the customer. If a meter is found to be working improperly, it will be repaired or replaced by the District. The customer shall be allowed one test per year per at no cost to the customer. A service charge, in accordance with exhibit B.11, for each additional test requested by the customer shall be borne by the customer when it is determined that the meter is operating within +/- 1.5% of actual flow.

REGULATION NO. 8

EXTENSION OR IMPROVEMENT OF FACILITIES

8.01 Scope of Regulation

When water is requested for property within the District which does not abut an adequate District water main, an extension or improvement of the District's system shall be required. Extensions or improvements shall include facilities to provide water supply, treatment, storage and distribution as determined solely by the District. Provision of the required elements or payment of in-lieu fees as determined by the District for any element of service not physically constructed or supplied, shall be addressed by agreement between the District and the developer and shall, in all cases, require approval by District Board of Directors. Water service includes fire hydrant installations throughout the Scope of this Regulation.

8.02 Application

An extension or improvement of facilities shall be initiated by completing an application and depositing an application fee with the District, as described in Regulation 8.09. The application must be signed by the property owner. The application shall become null and void:

1. Three (3) months after the date of the application unless an extension has been granted or improvement of facilities agreement has been signed by the Board of Directors and the developer.

2. Eighteen (18) months after the date of the executed agreement unless construction has been completed, and accepted by District. A maximum twelve (12) month extension of time may be granted upon request of the developer and approved in writing by the General Manager.

8.03 Project Approval

Extension or improvement of facilities applications shall be reviewed by the District Engineer or District Engineer's designate. If further information is required, the developer's Engineer or the District Engineering Department at the developer's expense, will prepare the additional information needed. The property owner shall sign the extension or improvement of facilities agreement which incorporates the requirements of the District. The agreement shall be placed on the Board of Director's Agenda accompanied by a staff recommendation, and if authorized, the President and Secretary of the Board shall sign the Agreement.

No additional work shall be commenced until the agreement has been signed by all parties.

8.04 Environmental Review Charge

Unless any required environmental processing has been done by the County or another agency, the District may determine that an initial study or environmental impact report is required for a proposed extension facility necessary to serve a developer's land. The developer shall be responsible for the costs of preparing such a study and/or report, including associated costs incurred by the District for overhead, preparation, and hearings.

8.05 Design, Installation and Ownership of Extension of Facilities

The character and design of the extension or improvement of facilities required to serve any parcel of land shall be determined solely by the District. The developer shall have the facilities designed by a qualified registered civil engineer. All costs associated with facilities design and installation shall be borne by the developer. Design of the facilities shall be in accordance with good engineering practice and not less than the District's Minimum Design Standards. Improvement plans shall be approved by the District Engineer. The facilities shall be installed in accordance with the approved plans and specifications and the District's Standard Plans and Specifications as they exist at the time of approval.

Unless installed by the District, the developer shall have the facilities installed by an experienced, licensed contractor approved by the District. District reserves the right to waive this requirement at its discretion.

All construction materials such as pipe, valves, fittings, concrete, sand, asphalt, etc., shall be supplied in accordance with Standard District Specifications. The District reserves the right to construct, with its own personnel or by contract, taps on existing mains, extensions involving complicated connection to, or interference with the District's existing facilities or other unusual facilities. The developer may be required to furnish an irrevocable letter of credit, bond or other acceptable surety to insure payment for construction of any facilities for which the District assumes responsibility. Upon completion, inspection and acceptance by the District, the facilities shall be owned and operated by the District as part of its water system.

8.06 Sizing of Facilities and Minimum Pressure

Pipeline sizing shall be in accordance with the following:

1. The normal minimum pipeline size for water shall be eight (8) inches (except as provided below).

2. The District Engineer or his designate may require larger or allow smaller pipeline size, if in his opinion, a larger size is needed or a smaller pipeline size would be appropriate.

3. Each new distribution system that expands the existing system service connections by more than 20 percent or that may otherwise adversely affect the distribution system pressure shall be designed to provide a minimum operating pressure throughout the new distribution system of not less than 40 pounds per square inch at all times excluding fire flow.

8.07 Location of Facilities

The extension or improvement of facilities shall be located only on land owned by the District in fee, in streets with an acceptable encroachment permit, existing public utilities easements, or in an easement granted to the District. The location is subject to the District's approval of alignment, accessibility and safety of the facilities. The developer shall convey or grant to the District without cost such land and/or easements the District determines necessary for the facilities. The District may also require an easement for future extensions. Land shall be conveyed to the District, free and clear of liens or encumbrances except encumbrances of record that are acceptable to the District. Easements shall be granted in a form satisfactory to the District. The pipeline shall abut all parcels served. An easement shall be granted to District along the entire length of the developer's parcel except in cul-de-sacs, dead-end roadways or other situations where the District determines that the pipeline may terminate and remote service be provided.

8.08 Land Right Schedule

The developer shall provide all land, easements and rights-of-way to the District prior to District acceptance of facilities.

8.09 Payment of Costs

The developer shall pay the District's actual costs as specified in Exhibit D including, but not limited to: Engineering analysis, designs, plan review or preparation of environmental impact documents, hearings, review or preparation of improvement plan, construction inspection, as-built drawings, project management and usual overhead expenses allocated to such work. The developer shall deposit District's estimate of engineering review, inspection, and project administrative costs prior to performance of any work by the District. Upon completion of the work, if the amount deposited with the District is less than actual costs, the difference shall be paid to the District prior to the commencement of service. Any amount deposited in excess of actual cost will be refunded.

8.10 Inspection and Notice of Completion

The District Engineering Department shall inspect the construction of all facilities to be owned and operated by the District. The District will not accept or provide service through a facility which has not been inspected, is satisfactory to and is accepted by the District Engineering Department.

8.11 Acceptance of Facilities

Upon completion of the construction, final inspection and approval by the District Engineering Department, submission of as-built drawings acceptable to the District and payment of any outstanding monies due, the project shall be accepted by the District Engineering Department. The District shall then issue proof of service to the County Building Department. The facilities shall be owned, operated and maintained by the District except as otherwise specified in an agreement.

8.12 Warranty Responsibilities

For a period of two (2) years from the date of acceptance by the District, the property owner shall warrant for the repair of all defects, leaks or failure occurring in the facilities, which are, as determined by the District, due to negligence in the manufacture and/or installation of the facilities and not due to improper operation of the system by the District or its agents, acts of a third party or acts of God. Failure by the property owner to pay for any of the repairs described above after being billed by the District may result in a discontinuance of service.

The developer, or the developer's representative, shall submit a two (2) year warranty surety bond, (in form acceptable to the District), certificate of deposit, or irrevocable letter of credit, in an amount established by contract with the District.

8.13 Documentation of Project Costs

The developer shall provide the District with copies of all invoices for materials, equipment, labor and District costs for construction of the portion of the project that is to be deeded to the District. Those invoices shall be marked "PAID" and signed by the developer or his authorized agent, or at Districts' option an estimate may be prepared at the developer's expense either by the District or by a registered professional engineer establishing the best possible value of the project for accounting, warranty and other purposes.

8.14 Cost Reimbursed by the District

Reimbursement of documented project costs to a developer for extension or improvement of permanent facilities, when other users later benefit from such facilities, shall be subject to a reimbursement agreement. It shall be the intent of this regulation to provide a fair and equitable return to the original developer provided others within an area designated by the District make use of the extended or improved facilities within a ten year period following completion of construction. The District will collect and disburse funds for repayment of verified project costs under the conditions set forth below.

1. The District shall be under no obligation to make any reimbursement payment whatsoever, except as outlined in this section. All questions as to the meaning of any portion of this section shall be as interpreted by the District.

2. Reimbursable facilities must be constructed in accordance with District's standard specifications from plans submitted and approved prior to construction, inspected by the District during and after construction and the costs must be documented to District's satisfaction.

3. Any applicant within an Area of Benefit designated by the District who requires service through facilities or improvements constructed by others pursuant to a reimbursement agreement and who did not contribute to the cost of construction or required in-lieu fees, shall pay a pro rata reimbursement fee prior to service being supplied, including an Administrative Fee of 3% or $250, whichever is greater. An area of benefit which identifies parcels having access to the constructed facility or improvement shall be determined by District's Engineer and a map of the area shall be attached as Exhibit A to the reimbursement agreement. In no case shall reimbursement exceed the documented cost of construction less the proportionate share of the project utilized by the original developer. Reimbursement payments required of future applicants for service within the area of benefit shall be based solely upon parcel area according to the following formula:

Developer's		Verified Construction		Area of
Payment		<u>Cost (dollars)</u>		Applicant's
Obligation	=	Total Area of Benefit	x	Parcel
(dollars)		(acres)		(acres)

   Where extensions are constructed in subdivisions, reimbursement amounts may be based on the number of lots within the area of benefit instead of acreage.

4. On an annual date specified in the reimbursement agreement, the District will disburse collected reimbursement funds to the developer without interest. Developer shall keep the District informed of any change of mailing address. If the developer is an entity of more than one individual, District shall disburse funds to a designated escrow account and shall have no responsibility or liability for the further distribution of such funds.

5. The developer's rights to reimbursement funds shall not be transferable or assignable without the express written consent of the District Board of Directors.

6. Any expense for collection, enforcement, disbursement, litigation or any other reason connected with administration of a reimbursement agreement which exceeds the

administration fee cited in paragraph four (4) above, may be deducted from reimbursement funds collected by the District before disbursement of the remainder of such funds to the developer.

7. The District will not administer reimbursement from the developer's own existing or proposed parcels or from parcels to be acquired by the Developer.

8. Parcel owners within the area of benefit will not be required to connect to the developer's extension if an alternate route is preferable in the sole opinion of the District.

REGULATION NO. 9

FIRE SERVICE

9.01 Conditions of Service

The District will provide water service for fire hydrants and other facilities used exclusively for fire protection, at such pressures and at such rates of flow, as are available from time to time from the District's operation of its storage, transmission, and distribution facilities. The District shall not be liable for any damage in any manner arising out of the non-availability of adequate water flows or water pressure, at any hydrant or facility used for fire protection.

9.02 Public Fire Hydrants

1. Public fire hydrants may, at the District's option, be installed and connected to the District's mains when requested by the public fire protection entity having jurisdiction, or when required as a condition to the issuance of a building permit or the acceptance by the County Board of Supervisors of a subdivision plat.

2. When a hydrant is installed on an existing main and the construction is to be performed by the District, the applicant shall deposit with the District the estimated cost of labor, materials, engineering, inspection and usual overhead expenses in the installation of the hydrant assembly, hydrant lateral, control valve and the connection to the District facilities.

3. A hydrant may be installed by the applicant with District approval. The installation shall be performed at applicant's expense, by a contractor holding a Class A or C34 license. The applicant shall deposit, prior to installation, the estimated cost of District inspection, engineering and usual overhead expenses

4. The type of hydrant shall be determined by the District and the site location shall be jointly determined by the District and the responsible public fire protection entity, excluding those hydrants that are installed by the District for the District's sole use as a means of flushing the District's water mains.

5. All installed fire hydrants shall be for the sole use of the appropriate fire district for the suppression of fire and for other obvious protection emergency use. The only exception to this rule is the permitted use, granted by the District, to contractors for construction water, or fire districts for the testing of hydrant flows.

6. All new fire hydrants shall belong to and be maintained by the District with the exception of private fire hydrants which are installed under agreement with the District. Fire hydrants shall be installed within a permanent easement granted to the District or in an existing Public Right of Way. The District will bear the expense of performing hydrant maintenance resulting from normal wear and tear when such conditions are reported by the responsible agency or when otherwise brought to the attention of the District.

7. The hydrant design, corrected for inlet and outlet velocity head shall not exceed the permissible head loss based on the American Water Works Association, (AWWA) Standards as amended from time to time: ANSI/AWWA C502-80 for dry-barrel fire hydrant, Table 4.

8. For hydrants designed or intended to deliver more than 1,000 g.p.m., the permissible head loss shall not exceed 5 psi when discharging at the design or intended rate of flow. The Applicant's engineer shall furnish to the District all the test data, design drawings, flow charts, specifications and findings for all hydrants that are specifically designed to flow above 1,000 g.p.m. All information submitted to the District shall comply with the AWWA Standards as described in Section 7 above.

9.03 Private Commercial Fire Protection System

In order to operate a private fire protection system the applicant shall fulfill the following conditions:

1. The land to be served is within the geographical area of the Tuolumne Utilities District and within an area served or servable by the District.

2. The Applicant's land has been annexed to the District and has become subject to any bonded indebtedness of the District.

3. The District possesses an adequate supply of water capable of serving a private fire system.

4. The private fire commercial suppression system is for the sole and exclusive benefit and use of the Applicant and is located entirely within Applicant's property.

5. The said private fire suppression system will be connected to an isolated service to be used exclusively for the suppression of fire or for the testing of the fire prevention system.

6. The type and location of the said private fire suppression system has been approved by the responsible fire protection agency.

7. The Applicant assumes full responsibility for all maintenance and repair of the said system from the underground fitting prior to the inlet side of the backflow preventer.

8. The size and design of the service connection, backflow preventer and cold water fire service type meter shall be subject to approval by the District and shall comply with all applicable ISO standards and requirements.

9. The backflow preventer with the bypass meter shall be furnished by the Applicant and installed in compliance with the District's Standards and Specifications.

10. In the event that water is taken through an existing commercial fire service connection for any other use than firefighting or testing, the District reserves the right to disconnect such a system, or in the alternative, to require the installation of an upgraded detector check valve assembly at the expense of the Applicant upon whose land the system is installed.

11. An application for service is required on forms provided by the District, and signed by the legal owner of the subject property.

12. The applicant will be required to maintain a current billing status and pay service charges as described in Exhibit B. 6.

13. Applicants for new commercial fire service connections will be required to install and maintain a backflow preventer as described in Section 11.

REGULATION NO. 10

TEMPORARY SERVICE

10.01 Installation and Payment

Except for construction water services described in §10.03, other temporary water service shall be limited to ninety (90) days, after which capacity fees shall be required. Service which does not require installation of a permanent connection shall require the installation of a meter, payment of a total estimated cost of installing and removing the connection and a reasonable security deposit for the meter. Service charges for any temporary service installed pursuant to this section shall be determined in accordance with the rates established by this ordinance.

10.02 Service Through Fire Hydrants

Temporary service for water used in construction shall be provided at locations approved by the District through portable meters furnished by the District. The District shall require, as a condition to such service, the payment of a reasonable security deposit for the meter and service charges and rates as specified in Exhibit B.5. Existing customers who have active water service accounts and are current with their account balances may be issued temporary hydrant meters without initial payment of a security deposit. Once a hydrant is checked out at the District office, a customer is required to return the hydrant within 48 hours of the original date it was checked out. If not returned within 48 hours, a security deposit ,as set forth in Exhibit B.5, will be charged to their account.

10.03 Temporary Construction Service

A temporary service shall be allowable for active commercial construction projects or residential developments of at least five (5) units, and that have not been dormant for more than thirty (30) days, up to the time of issuance of a final inspection or certificate of occupancy at which time the property owner shall be responsible to fully pay all associated capacity fees related to the water service and shall establish a monthly water service in accordance with the then current rates as established by the District.

10.04 Temporary Emergency Connection

Requests for temporary emergency connection to the District water system must demonstrate a serious health and safety related emergency and must be approved by the General Manager. Applicants for emergency connection shall be responsible to pay all costs related to that connection, including without limitation design, construction, in-lieu capacity, connection, and monthly rates in accordance with the then current rate schedule adopted by the District. Multiple requests for the same emergency connection may require permanent connection to the District's water system at the discretion of the General Manager.

REGULATION NO. 11

BACKFLOW PREVENTION AND CROSS-CONNECTION CONTROL

11.00 General

A backflow device is a precautionary device approved by the State Water Resources Control Board, Division of Drinking Water and the University of Southern California (USC) Hydraulic Research Section that provides protection from hazards getting back into the District's treated water system. Such types of hazards could be a separate irrigation system on a property, a business that uses chemicals, a property with a sewage lift station, or an unknown potential. All of the proceeding hazards are considered "high hazard" situations and require what is known as a reduced pressure backflow device. Reduced pressure (RP) backflow devices have a reduced zone in the center of the device with two independent working check valves that prevent water from flowing back into the water system. This device is required per State Health Code Title 17.

11.01 Purpose

1. To protect the public potable water supply, provided by the Tuolumne Utilities District (District), from the possibility of contamination or pollution by isolating within the customer's internal distribution system(s) or the consumer's private water system(s) such contaminants or pollutants which could backflow into the public water system; and,

2. To promote the elimination or control of existing cross-connections, actual or potential, between the consumer's in-plant potable water system(s) and non-potable water system(s), plumbing fixtures and industrial piping systems; and,

3. To provide for the maintenance of a continuing Program of Cross-Connection Control this will systematically and effectively prevent the contamination or pollution of all potable water system.

11.02 Responsibility

The General Manager who oversees the Operations Manager shall be responsible for the protection of the public potable water distribution system from contamination or pollution due to the backflow of contaminants or pollutants through the water service connection. The Operations Manager will oversee the backflow prevention and cross-connection control program at the District. If, in the judgment of the Operations Manager, an approved backflow prevention assembly is required (at the customer's water service connection) for the safety of the water system, he (the Operations Manager) or his designated agent shall give notice in writing to said customer to install such an approved backflow prevention assembly(s) at specific location(s) on his premises. The customer shall immediately install such approved assembly(s) at the customer's own expense. Failure, refusal or inability on the part of the customer to install, have tested, and maintain said assembly(s) within thirty (30) days shall constitute a ground for discontinuing water service to the premises until such requirements have been satisfactorily met. The District has the option to have the assembly(s) tested at the customer's expense.

The District's ownership of and responsibility for operation and maintenance of facilities shall end at the discharge side of water meters that are installed by the District, and at the underground fitting prior to the inlet side of the fire sprinkler check valve assemblies. If there is an underground valve on the District's side of the fire sprinkler check valve assembly within 40′ of the assembly, the District's responsibility shall end at the underground valve.

11.02.1 Chain of Command:

General Manager
Operations Manager
Water Master
Distribution Foreman/Cross-Connection Specialist
Administrative Coordinator
Utility Worker/Tester
Utility Worker/Tester

11.03 Definitions

Approved

Accepted by the Operations Manager as meeting an applicable specification stated or cited in this ordinance, or as suitable for the proposed use.

Auxiliary Water Supply

Any water supply on or available to the premises other than the purveyor's approved public water supply will be considered as an auxiliary water supply. These auxiliary waters may include water from another purveyor's public potable water supply or any natural source(s) such as a well, raw water ditch, gray water, spring, river, stream, harbor, etc. These waters may be contaminated or polluted or they may be objectionable and constitute an unacceptable water source over which the water purveyor does not have sanitary control.

Backflow

The reversal of the normal flow of water caused by either back pressure or backsiphonage.

Backflow Preventer

An assembly or means designed to prevent backflow.

a. **Air Gap**

The unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe or faucet supplying water to a tank, plumbing, fixture, or other device and the flood level rim of said vessel. An approved air-gap shall be at least double the diameter of the supply pipe, measured vertically, above the overflow rim of the vessel; and in no case less than one inch.

b. **Reduced Pressure Principle Assembly**

An assembly of two independently acting approved check valves together with a hydraulically operating, mechanically independent differential pressure relief valve located between the check valves and at the same time below the first check valve. The unit shall include properly located test cocks and tightly closing shut-off valves at each end of the assembly. The entire assembly shall meet the design and performance specifications as determined by a laboratory and a field evaluation program performed by a recognized testing agency which has demonstrated their competency to perform such tests to the State Water Resources Control Board, division of Drinking Water for backflow prevention assemblies. The assembly shall operate to maintain the pressure in the zone between the two check valves at an acceptable level less than the pressure on the public water supply side of the assembly. At cessation of normal flow, the pressure between the two check valves shall be less than the pressure on the public water supply side of the device. In case of leakage of either of the check valves, the differential relief valve shall operate to maintain the reduced pressure in the zone between the check valves by discharging to the atmosphere. When the inlet pressure is two pounds per square inch or less, the relief valve shall open to the atmosphere. To be approved, these assemblies must be readily accessible for in-line testing and maintenance and be installed in a location where no part of the assembly will be submerged.

c. **Double Check Valve Assembly**

An assembly of two independently operating approved check valves with tightly closing shut-off valves on each end of the check valves, plus properly located test cocks for the testing of each check valve. The entire assembly shall meet the design and performance specifications as determined by a laboratory and field evaluation program performed by a recognized testing agency which has demonstrated their competency to perform such tests to the State Water Resources Control Board, Drinking Water Division for backflow prevention assemblies. To be approved, these assemblies must be readily accessible for in-line testing and maintenance.

d. **Detector Check Valve Assembly**

A double check valve assembly (S*ee* c. above) designed for fire sprinkler systems, which includes a bypass line with a separate backflow prevention device and a meter for registering low flows.

Backpressure

The flow of water or other liquids, mixture or substances under pressure into the distribution pipes of a potable water supply system from any source or sources other than the intended source.

Backsiphonage

The flow of water or other liquids, mixture or substances into the distribution pipes of a potable water supply from any source other than its intended source caused by the reduction of pressure in the potable water supply system.

Contamination

Means an impairment of the quality of the potable water by sewage, industrial fluids or waste liquids, compounds or other materials to a degree which creates an actual or potential hazard to the public health through poisoning or through the spread of disease.

Cross Connection

Any physical connection or arrangement of piping or fixtures between two otherwise separate piping systems, one of which contains potable water and the other non-potable water or industrial fluids of questionable safety, through which, or because of which, backflow may occur into the potable water system. This would include any temporary connections, such as swing connections, removable sections, four way plug valves, spools, dummy section of pipe, swivel or change-over devices or sliding multiport tube.

Cross Connection - Controlled

A connection between a potable water system and a non-potable water system with an approved backflow prevention assembly properly installed and maintained so that it will continuously afford the protection commensurate with the degree of hazard.

Cross Connection Control by Containment

The installation of an approved backflow prevention assembly at the water service connection to any customer's premises where it is physically and economically infeasible to find and permanently eliminate or control all actual or potential cross-connection within the customer's water system; or, it shall mean the installation of an approved backflow prevention assembly on the service line leading to and supplying a portion of a customer's water system where there are actual or potential cross-connections which cannot be effectively eliminated or controlled at the point of the cross-connection.

Degree of Hazard

The term is derived from an evaluation of the potential risk to public health and the adverse effect of the hazard upon the potable water system.

a. Hazard - Health

Any condition, device or practice in the water supply system and its operation which could create, or in the judgment of the Operations Manager, may create a danger to the health and well-being of the water customer.

b. Hazard - Plumbing

A plumbing type cross-connection in a customer's potable water system that has not been properly protected by an approved air-gap or approved backflow prevention assembly.

c. Hazard - Pollution

An actual or potential threat to the physical properties of the water system or to the potability of the public or the customer's potable water system but which would constitute a nuisance or be aesthetically objectionable or could cause damage to the system or its appurtenances, but would not be dangerous to health.

d. Hazard - System

An actual or potential threat of severe damage to the physical properties of the public potable water system or the customer's potable water system or of a pollution or contamination which would have a protracted effect on the quality of the potable water in this system.

Industrial Fluids System

Any system containing a fluid or solution which may be chemically, biologically or otherwise contaminated or polluted in a form or concentration such as would constitute a health, system, pollutional, or plumbing hazard if introduced into an approved water supply. This may include, but not be limited to: Polluted or contaminated waters; all types of processed waters and "used waters" originating from the public potable water system which may have deteriorated in sanitary quality; chemicals in fluid form, plating acids and alkalines, circulating cooling waters connected to an open cooling tower and/or cooling towers that are chemically or biologically treated or stabilized with toxic substances; contaminated natural waters such as from wells, springs, streams, rivers, bays, harbors, seas, irrigation canals or systems, etc.; oils, gases, glycerin, paraffin's, caustic and acid solutions and other liquid and gaseous fluids used in industrial or other purposes or for fire-fighting purposes.

Operations Manager

The Operations Manager or his designated agent is vested with the authority and responsibility for the implementation of an effective cross-connection control program and for the enforcement of the provisions of this ordinance.

Pollution

Means the presence of any foreign substance (Organic, inorganic, or biological) in water which tends to degrade its quality so as to constitute a hazard or impair the usefulness or quality of the water to a degree which does not create an actual hazard to the public health but which does adversely and unreasonably affect such waters for domestic use.

Water - Non-potable

Water which is not safe for human consumption or which is of questionable potability.

Water - Potable

Any water which, according to recognized standards, is safe for human consumption.

Water - Service Connection

The terminal end of a service connection from the public potable water system; i.e., where the Water Purveyor loses jurisdiction and sanitary control over the water at its point of delivery to the customer's water system. If a meter is installed by the District at the end of the service connection, then the service connection shall mean the downstream end of the meter. There should be no unprotected takeoffs from the service line ahead of any meter or any backflow prevention assembly located at the point of delivery to the customer's water system. Service connection shall also include water service connection from a fire hydrant and all other temporary or emergency water service connections from the public potable water system.

Water - Used

Any water supplied by a Water Purveyor from a public potable water system to a customer's water system after it has passed through the point of delivery and is no longer under the sanitary control of the Water Purveyor.

Water Well or Well

A water well is any artificial excavation constructed by any method for the purpose of extracting water from, or injecting water into the underground.

Well Inactive or Well Standby

A well not routinely operating, but capable of being made operable with a minimum effort.

11.04 Requirements for Backflow Prevention Devices

11.04.1 Water System

The water system shall be considered as made up of two parts: the utility system and the customer system.

a. Utility System

The utility system shall consist of the source facilities and the distribution system; and shall include all those facilities of the water system under the complete control of the District, up to the point where the customer's system begins.

1. Source

The source shall include all components of the facilities utilized in the production, treatment, storage, and delivery of water to the distribution system.

2. Distribution System

The distribution system shall include the network of conduits used for the delivery of water from the source to the customer's system.

b. Customer's System

The customer's system shall include those parts of the facilities beyond the termination of the utility distribution systems which are utilized in conveying utility-delivered domestic water to points of use.

11.04.2 Policy

a. Service

No water service connection to any premises shall be installed or maintained by Tuolumne Utilities District unless the water supply is protected as required by State laws and regulations as described in Title 17 - Public Health Regulations

Relating to Cross Connections and this Water Ordinance. Service of water to any premises shall be discontinued by Tuolumne Utilities District if a backflow prevention assembly has been removed, by-passed or an unprotected cross-connection exists on the premises. Service will not be restored until such conditions or defects are corrected.

b. Inspection

The customer's system shall be open for inspection at all reasonable times to authorized representatives of Tuolumne Utilities District, the State Water Resources Control Board, Division of Drinking Water, or the Tuolumne County Department of Environmental Health to determine whether cross-connections or other structural or sanitary hazards, including violations of these regulations exist. When such a condition becomes known, the Operations Manager shall deny or immediately discontinue service to the premises by providing for a physical break in the service line until the customer has corrected the condition(s) in conformance with the State statutes relating to plumbing and the water supplies and the regulations adopted pursuant thereto.

c. Surveys

1. District has determined specific industries that may pose an actual or potential backflow hazard to the public water supply. These industries are identified from lists of industries where cross-connections are likely to be found, as provided by the State of California, and the University of Southern California, Foundation for Cross-Connection Control and Hydraulic Research. From these lists, specific consumers in the District service area shall be identified by directories, mailing lists, associations and business licenses.

2. Survey

When possible, a request to survey the premises shall be made and a date and time agreed upon. Should the request to survey be denied, letters shall be sent directing installation of the appropriate backflow assembly based on knowledge of the specific industry.

Whenever a property is sold or transferred, an office survey will be required of the new property owners. An office survey will also apply towards a change in name or ownership, or changes of use to a District customer account.

During the office survey many factors are considered to determine if the consumer is or could be a potential hazard to the public water supply.

These include:

- Types of water on-site
- Uses of water on-site
- Types of water using equipment
- Condition of water using equipment
- Complexity of plumbing on-site, and the potential for alterations of that system
- Storage and use of hazardous materials on-site

All the factors found and recorded during the survey shall be considered in the determination of backflow prevention requirements.

Each consumer requiring a backflow prevention assembly shall be notified by letter. The consumer shall be informed of their responsibility to provide backflow protection and the type of backflow assembly required in accordance with Title 17 of the California Administrative Code.

Should it be determined that the consumer does not require a backflow prevention device, they shall be notified in person that no such assembly is required at this time.

d. Installation of Backflow Assemblies

Backflow prevention assemblies shall be installed in accordance with Section 7603, Title 17 of the California Administrative Code and District's approved schematics, any deviation from these drawings shall have written TUD approval.

1. Air-Gap Separation (AG)

The Air-Gap Separation shall be located as close as practical to the user's connection and all piping between the user's connection and the receiving tank shall be entirely visible unless otherwise approved by District in writing.

2. Double Check Valve Assembly (DC)

A double check valve assembly shall be located directly behind the meter and shall be installed a minimum of twelve inches (12") above grade and not more than thirty-six inches (36") above grade in a manner where it is readily accessible for testing and maintenance unless otherwise approved by District in writing.

3. Reduced Pressure Principle Backflow Prevention Assembly (RPP)

A reduced pressure principle backflow prevention assembly shall be located directly behind the meter and shall be installed a minimum of twelve inches (12") above grade and not more than thirty-six inches (36") above grade measured from the bottom of the device and with a minimum of twelve inches (12") side clearance in a manner where the assembly is readily accessible for testing and maintenance unless otherwise approved by the District in writing.

In no case shall a cut, tee, or tap be made between the user's meter and the backflow prevention assembly.

Any deviation of installation from the diagrams and descriptions provided, shall have written approval of the District prior to installation.

All backflow prevention assembly installations shall be initially inspected by the District to ensure with the requirements of the State Water Resources Control Board, Division of Drinking Water and the District.

e. Conditions Requiring Backflow Prevention Assemblies

An approved backflow prevention assembly shall be installed on each service line to a customer's water system at or near the property line or immediately inside the building being served; but in all cases, before the first branch line leading off the service line wherever the following conditions exist:

1. In the case of premises having an auxiliary water supply which is not or may not be of safe bacteriological or chemical quality and which is not acceptable as an additional source by the State Water Resources Control Board, Division of Drinking Water, the public water system shall be protected against backflow from the premises by installing an approved backflow prevention assembly in the service line appropriate to the degree of hazard.

2. In the case of premises on which any industrial fluids or any other objectionable substance is handled in such a fashion as to create an actual or potential hazard to the public water system, the public system shall be protected against backflow from the premises by installing an approved backflow prevention assembly in the service line appropriate to the degree of hazard. This shall include the handling of process waters and waters originating from the utility system which have been subject to deterioration in quality.

3. In the case of premises having (1) internal cross-connection that cannot be permanently corrected or controlled, or (2) intricate plumbing and piping arrangements or where entry to all portions of the premises is not readily accessible for inspection purposes, making it impracticable or impossible to ascertain whether or not dangerous cross-connections exist, the public water system shall be protected against backflow from the premises by installing an approved backflow prevention assembly in the service line.

4. In the case of premises having a fire sprinkler system, the public water system shall be protected against backflow from the premises by installing an approved backflow prevention assembly in the service line.

f. Type of Protection Assemblies Required

The minimum types of backflow protection required to protect the community water supply at the user's water connection to premises with varying degrees of hazard are also given in Table 1.

The type of protective assembly required under subsection 'I' shall depend upon the degree of hazard which exists as follows:

1. In the case of any premises where there is an auxiliary water supply as stated in subsection 11.04.2 "e" "1" of this section and it is not subject to any of the following rules, the public water system shall be protected by an approved air-gap separation, or an approved reduced pressure principle backflow prevention assembly.

2. In the case of any premises where there is water or substance that would be objectionable but not hazardous to health, if introduced into the public

water system, the public water system shall be protected by an approved double check valve assembly.

3. In the case of any premises where there is any material dangerous to health which is handled in such a fashion as to create an actual or potential hazard to the public water system, the public water system shall be protected by an **air-gap separation** or an approved **reduced pressure principle** backflow prevention assembly. Examples of premises where these conditions will exist include sewage treatment plant, sewage pumping stations, chemical manufacturing plants, hospitals, mortuaries, and plating plants.

4. In the case of any premises where there are "uncontrolled" cross-connections, either actual or potential, the public water system shall be protected by an approved **air-gap separation** or an **approved reduced pressure principle** backflow prevention assembly at the service connection.

5. In the case of any premises where, because of security requirements or other prohibitions or restrictions, it is impossible or impractical to make a complete in-plant cross-connection survey, the public water system shall be protected against backflow from the premises by either an approved **air-gap separation** or by an approved **reduced pressure principle** backflow prevention assembly on each service to the premises.

6. In the case of premises having a fire sprinkler system, the public water system shall be protected against backflow from the sprinkler system by an approved **detector check valve assembly**. If an anti-freeze material is used in the sprinkler system, the detector check assembly shall have reduced pressure principle backflow prevention on both the main line and the bypass line.

g. Approval of Backflow Prevention Assemblies

Any backflow prevention assembly required herein shall be a model and size approved by the State Water Resources Control Board, Division of Drinking Water. The term "Approved Backflow Prevention Assembly" shall mean an assembly that has been manufactured in full conformance with the standards established by the American Water Works Association entitled:

> AWWA C506-84 Standards for Reduced Pressure Principle and Double Check Valve Backflow Prevention Devices

and have met completely the laboratory and field performance specifications for the Foundation for Cross-Connection Control and Hydraulic Research of the University of Southern California established by:

> Specifications of Backflow Prevention Assemblies
> Section 10 of the most current issue of the
> MANUAL OF CROSS-CONNECTION CONTROL

Said AWWA and FCC&HR Standards and Specifications have been adopted by the Tuolumne Utilities District. Final approval shall be evidenced by a "Certificate of Approval" issued by an approved testing laboratory certifying full compliance with the said AWWA standards and FCC&HR specifications.

The following testing laboratory has been qualified by Tuolumne Utilities District to test and certify backflow preventers:

Foundation for Cross-Connection Control
and Hydraulic Research
University of Southern California
University Park
Los Angeles, CA 90089-0231

Testing laboratories other than the laboratory listed above will be added to an approved list as they are qualified by the State Water Resources Control Board, Division of Drinking Water.

Backflow prevention devices which may be subjected to backpressure or back siphonage that have been fully tested and have been granted a Certificate of Approval by said qualified laboratory and are listed on the laboratory's current list of "Approved Backflow Prevention Assemblies" may be used without further test or qualification.

h. Installation of Backflow Prevention Devices

1. Backflow prevention devices shall be installed in a manner prescribed in Section 7603, Title 22 of the California Administrative Code. Location of the devices should be as close as practical to the user's connection. The District shall have the final authority in determining the required location of a backflow prevention device.

aa. Air gap separation (AG) - the air gap separation shall be located on the user's side of and as close to the service connection as is practical. All piping from the service connection to the receiving tank shall be above grade and be entirely visible. No water use shall be provided from any point between the service connection and the air gap separation. The water inlet piping shall terminate a distance of at least two (2) pipe diameters of the supply inlet, but in no case less than one (1) inch above the overflow rim of the receiving tank.

bb. Reduced pressure principle backflow prevention device (RP) - The approved reduced pressure principle backflow prevention device shall be installed on the user's side of and as close to the service connection as is practical. The device shall be installed a minimum of twelve inches (12") above grade and not more than thirty-six inches (36") above grade measured from the bottom of the device and with a minimum of twelve inches (12") side clearance. The device shall be installed so that it is readily accessible for maintenance and testing. Water supplied from any point between the service connection and the RP device shall be protected in a manner approved by the District.

cc. Double check valve assembly (DC) - The approved double check valve assembly shall be located as close as practical to the user's connection and shall be installed above grade, if possible, and in a manner where it is readily accessible for testing and maintenance. If a double check valve assembly is put below grade it must be installed in a vault such that there is a minimum of six inches (6") between the bottom of the vault and the bottom of the device so that the top of the device is no more than a maximum of eight inches (8") below grade, so there is a minimum of six inches (6") of clearance between the side of the device with the test cocks and the side of the vault, and so there is a minimum of three inches (3") clearance between the other side of the device and the side of the vault. Special consideration must be given to double check valve assemblies of the "Y" type. These devices must be installed on their "side" with the tests cocks in a vertical position so that either check valve may be removed for service without removing the device. Vaults which do not have an integrated bottom must be placed on a three inch (3") layer of gravel.

dd. Detector check valve assembly. (DCA) The approved detector check valve assembly shall be installed above grade and housed within an approved enclosure. The assembly shall be located where it is readily accessible for testing and maintenance. The enclosure shall allow easy access. The assembly and its installation shall conform to the District's detail drawing.

i. Initial Testing

For new backflow preventer installations that have been in service for less than 60 days, the initial test shall be performed by District personnel at no expense to the customer-user. In cases where the device(s) has been in service for longer than a 60 day period prior to initial testing, the customer-user will assume responsibility for having the device tested. The initial test for commercial, industrial, or institutional fire system detector check valve assemblies shall be performed by a certified tester at the applicant's expense prior to receiving service.

j. Annual Testing

It shall be the duty of the customer-user at any premises where backflow prevention assemblies are installed to have certified inspections and operational tests made at least once per year. In those instances where the Operations Manager deems the hazard to be great enough he may require certified inspections at more frequent survey intervals. These inspections and tests shall be performed, at customer-user expense, by individuals approved and certified by District. It shall be the duty of the Operations Manager to see that these tests are performed as outlined under the Districts' Cross-Connection Program. The customer-user shall notify District in advance when the tests are to be undertaken so that an official representative may witness the tests if so desired. These assemblies shall be repaired, overhauled, or replaced within 7 days at the expense of the customer-user whenever said assemblies are found to be defective. All presently installed backflow prevention assemblies which do not meet the requirements of this section but were approved devices for the purposes described herein at the time of installation and which have been properly maintained, shall, except for the inspection and maintenance requirements under subsection "h" be excluded from the requirements of these rules so long as the Operations Manager is assured that they will satisfactorily protect the utility system. Bypass lines, including meters and backflow preventers, shall be retrofitted at the customer's expense where they do not already exist. Whenever the existing device is moved from the present location, requires more than minimum maintenance, or when the Operations Manager finds that the maintenance constitutes a hazard to health, the unit shall be replaced by an approved backflow prevention assembly meeting the requirements of this section.

k. Approved Certified Testers

No person shall test or shall make reports on backflow prevention assemblies as required in Title 17 of the California Administrative Code, unless such person has been approved by the District. In order to ensure that the testing of backflow prevention assemblies is performed by technically competent individuals who are personally responsible and, if other than self-employed, are employed by person and or/organizations which are also responsible, the District authorized to require backflow prevention testers to show evidence that such person possess a current valid Backflow Prevention Testers Certificate issued by the American Water Works Association (AWWA) or the Northern California Backflow Prevention Association (NCBPA) for any persons who will perform such tests; and provide current valid calibration certifications dated within the previous 24 months for any differential pressure gauges to be used for the purpose of testing backflow prevention assemblies.

1. The District may conduct written examinations to determine the competency of any person desiring to test, repair and make reports on backflow prevention assemblies hereinbefore described. Those persons who have successfully completed such examination, and who have been determined by the District to be competent to test, repair and make reports on backflow prevention assemblies shall be placed on the approved Tester List.

2. District shall compile and annually update a list of the names, business addresses and telephone numbers of all approved testers and shall make the current version of the list available to customers.

3. District may require an approved tester to (1) demonstrate backflow prevention assembly testing procedures in the field and (2) provide advanced notice to District of scheduled backflow prevention assembly testing, installation or repair work so that it may be observed by District.

4. District may revoke approval of an individual tester and remove them from the list of approved testers if the individual tester, or their employee(s), fail or refuse to comply with District’s policies and procedures for testing backflow prevention assemblies.

l. Test Reporting

The District shall be furnished a record of each test within 10 working days of test completion. All test records shall be submitted on District issued forms.

m. Discontinuance of Water Service

The District may discontinue water service to any customer-user if a required backflow prevention assembly is not properly installed and is not tested annually in accordance with the provisions herein, or is removed or altered by customer-user. **In the event of a discontinuance in service, the customer will still be responsible for all applicable monthly service charges.** The District has the right to perform testing on a backflow prevention assembly that was not tested annually or is suspected to not be functioning correctly and charge the customer-user the TUD hourly labor rate as shown in Exhibit _D.3.

n. Abandonment of Wells

In order for the District to consider a well abandoned, the well must be properly abandoned in accordance with Tuolumne County specifications as outlined in the Tuolumne County Well Ordinance, as that ordinance may be amended from time to time. .

In all other cases, if the customer/user chooses not to abandon the well in accordance with this section (n), the District will consider the well as a functioning well with the potenial to cross-contaminate the public water supply and the required backflow preventation assembly must be properly installed and tested in accordance with the provisions herein.

TABLE 1

TYPE OF BACKFLOW PROTECTION REQUIRED

Degree of Hazard	Minimum Type of Backflow Prevention
1. Sewage and Hazardous Substances	
a. Premises where the public water system is used to supplement the reclaimed water supply.	AG
b. Premises where there are wastewater pumping and/or treatment plants and there is no interconnection with the potable water system. This does not include a single family residence that has a sewage lift pump. An RP may be provided in lieu of an AG if approved by the health agency and the District.	AG
c. Premises where reclaimed water is used and there is no interconnection with the potable water system. An RP may be provided in lieu of an AG if approved by the health agency and the District.	AG
d. Premises where hazardous substances are handled in any manner in which the substances may enter a potable water system. This does not include a single family residence that has a sewage lift pump. An RP may be provided in lieu of an AG if approved by the health agency and the District.	AG
e. Premises where there are irrigation systems into which fertilizers, herbicides, or pesticides are, or can be, injected.	RP
f. Water meters that are solely used for irrigation service.	RP
g. Premises where a booster pump is used to increase pressure. An AG may be provided in lieu of an RP if approved by the District.	RP
2. Auxiliary Water Supplies	
a. Premises where there is an unapproved auxiliary water supply which is interconnected with the public water system. An RP may be provided in lieu of an AG if approved by the District.	AG
b. Premises where there is an unapproved auxiliary water supply and there are no interconnections with the public water system.	RP

TABLE 1 (continued)

TYPE OF BACKFLOW PROTECTION REQUIRED

Degree of Hazard	Minimum Type of Backflow Prevention
3. Fire Protection Systems (Commercial)	
a. Premises where the fire sprinkler system or privately-owned fire hydrants are directly supplied from the public water system.	DCA
b. Premises where the fire system is supplied from the public water system and interconnected with an unapproved auxiliary water supply. An RP may be provided in lieu of an AG if approved by the District.	AG
c. Premises where an anti-freeze material is used in the fire sprinkler system.	
4. Residential Fire will be determined per system	RPA
5. Dockside Watering Points and Marine Facilities	
a. Pier hydrants for supplying water to vessels for any purpose.	DC
b. Premises where there are marine facilities.	RP
6. Premises where entry is restricted so that inspections for cross connections cannot be made with sufficient frequency or at sufficiently short notice to assure that cross connections do not exist	RP
7. Premises where there is a repeated history of cross connections being established or re-established	RP

REGULATION NO. 12

CONSERVATION

12.01 General

It is the District's Policy to take reasonable and prudent measures to conserve all natural resources and to adopt and implement a conservation program. It is further the District's policy to take reasonable and prudent measures to conserve water and energy in the operations and development of the District.

12.02 Specific Concerns

The District shall:

1. Develop pricing structures to encourage conservation of water, if authorized by state law.

2. Promote, through public relations, a public consciousness of the need to conserve water.

3. Assist customers to optimize efficient use of water.

4. Maintain facilities in a manner that optimizes water conservation to the extent feasible.

5. Design facilities with conservation of water and energy in mind.

6. Construct facilities to conserve or retrieve water and energy.

7. Seek to halt all illegal use of water.

12.03 Water Conservation Programs to be Activated in Phases

The District shall have the power to restrict use of District water during any shortage or other emergency, upon the making of any findings or the taking of any other actions that may be authorized or required by law, including, without limitation, Sections 350-358 and 31026-31029 of the Water Code, or as set forth by that certain 1983 Purchase Agreement between the District, as successor entity, and Pacific Gas and Electric Company, for the provision of water. The District may activate water conservation restrictions in phases, more particularly set forth as follows:

12.03.1 Phase I - Ongoing Water Education and Management

The following measures constitute ongoing Phase I water conservation programs or restrictions and may be subject to enforcement, as applicable:

a. Education programs including County Schools programs.

b. Ultra-low flow toilet rebate program. Subject to funding, water customers of the District shall be eligible to receive a $45.00 conservation rebate, up to a maximum of three toilets per residential customer account, and with no maximum for a commercial business, for the replacement of toilets that were designed to use in excess of 3.0 gallons per flush, with District approved low-flow models using 1.6 gallons per flush or less. Participants must register a purchase receipt for each rebate and authorize District inspection of the completed replacement before payment shall be made.

c. Promotion of water-saving landscaping.

d. Community education programs;

   i. Offer water conservation tips in TUD newsletter, emails, etc.

   ii. Demonstrations (Xeriscape Garden, Home Improvement Event)

   iii. Seminars

   iv. Video library

   v. Public speaking

e. Requirement of low-flow fixtures in new developments.

f. Water audit and retrofit programs.

   i. Low flow showerhead distribution

   ii. Water conservation kit distribution

g. Implementation of Demand Management Measures outlined in the then current Urban Water Management Plan.

h. Meter and/or flow control for all customer accounts and plant production activities.

i. Maintain tiered water rates for treated water if allowed by state or federal law.

j. Prohibit wasteful use of water.

k. Review for accuracy water measuring and/or metering devices.

l. Raw water customers shall be required to design, construct, operate and maintain irrigation water systems in such a manner as to contain and put to beneficial use all delivered water.

m. A metered account shall not be converted to an unmetered account.

n. It is desirable that all properties served by raw water measured by the miners inch have on site storage equipped with an automatic shutoff device. Minimum storage for property receiving winter raw water should equal seven (7) days of usage (300 cubic feet).

12.03.2 Phase II - Conservation Measures: State and/or Restrictions During Drought Years

The District may impose Phase II water conservation restrictions based on any of the following:

A. Immediately upon the completion of the February 1st snow survey of the South Fork of the Stanislaus River a forecast of anticipated annual yield will be undertaken and rated as a percent of normal. When such forecast, or any subsequent survey, projects a water runoff into Lyons yielding less than 50% of normal, the District Board of Directors shall find that a threat of an emergency or shortage exists and the following measures shall be implemented:

   1. Public awareness of general water supply conditions and the District notifies media outlets

   2. Advanced warning of potential water use restrictions for all water customers

B. In the event that the State of California issues a State of Emergency, or State regulatory authorities pass regulations imposing water restrictions, due to severe drought conditions, this section shall self-operate and the District and its customers will adhere to the requirements imposed by those declarations or regulations.

12.03.3 Phase III – Critical Water Years – Water Restrictions

Immediately upon the completion of the February 1st snow survey of the South Fork of the Stanislaus River a forecast of anticipated annual yield will be undertaken and rated as a percent of normal. When such forecast, or any subsequent survey, projects a water runoff into Lyons yielding less than 30% of normal the District Board of Directors shall find that a threat of an emergency or shortage exists and the following measures shall be implemented: A public hearing shall be held during which customers shall have the opportunity to be heard to protest against the declaration of the water shortage emergency condition and to present their respective needs to the Board.

Following a public hearing the Board of Directors may implement Phase III conservation measures whenever it determines that the amount of available water supply may be less than 30% of normal run-off or that water supply is restricted due to circumstances beyond the District’s control.

The District shall proclaim through resolution the specific conservation measures needed to address the water supply shortage and that those measures shall remain in effect until projected water availability exceeds projected demand for both the short and long term period.

System Wide – In addition to those measures taken in Phase II

1. Increase public awareness:

   District to hold additional landscape and irrigation seminars; prepare radio announcements, newspaper articles and ads; and send notices to Tuolumne County teachers, school boards, local businesses, restaurants, community service groups, Chamber of Commerce, Board of Supervisors, Board of Realtors, Building Department, etc., stressing the need to conserve water and request methods of support.

Due to a water shortage the District will institute a District wide system reduction goal which would apply to all water customers.

Treated Water Accounts

1. Reduction in water usage:

   District to initiate public outreach to all water customers advising of low water year and requesting reduction from previous year's usage if possible, and containing information on conservation methods as well as advising customers of the financial impact.

   Determine system reduction goals (a function of projected runoff weighed against previous years usage or of another specified time period) and update as conditions warrant and approved by the Board of Directors.

   Any single family equivalent using 800 cubic feet of water per billing cycle or 400 cubic feet per month has met the reduction goal and is not subject to further conservation.

Landscape Maintenance:

2. Limited outdoor irrigation is requested with the use of buckets or properly maintained irrigation drip systems. Outdoor watering will be limited to 10 minutes per cycle for spray systems and no longer than 30 minutes per cycle for drip systems. Property addresses ending in an even number shall confine their outside usage to Tuesday, Thursday and Saturday, those with an odd number shall confine their outside usage to Wednesday, Friday and Sunday. All irrigation shall occur between the hours of 7 p.m. and 10 a.m. No watering on Mondays.

   New construction service applications shall be granted upon condition that water shall be used only for interior purposes. Any landscaping requiring the use of water shall be delayed until repeal of Phase III restrictions.

Non-Essential Water Use:

3. Washing of cars, boats, trailers, equipment or other vehicles by hose or by use of water directly from faucets or outlets connected to the public water supply is prohibited.

   a) Water use which results in water running onto driveways, gutters, streets, adjoining property, and/or any other water runoff if prohibited.

4. Washing of sidewalks, walkways, driveways, patios, parking lots, graveled areas, tennis courts or other hard-surfaced areas, including commercial establishments, by hose or by use of water from faucets or other outlets connected or syphoned from the public water supply is prohibited unless it is needed for public health or sanitation purposes only.

5. Use of water in decorative fountains, recreational ponds and the like shall be limited to the minimum necessary to preserve aquatic life if present.

6. Use of water from hydrants for construction purposes or any other purposes other than firefighting.

7. Dust control, earth compaction, and other construction use of raw or potable water is limited to specific times and locations determined by the District. All users of this water must contact the District for times and location of water availability. Use of water at any other time or location is subject to a $500 fine per occurrence and possible prohibition of water use.

Raw Water Accounts - Water Restrictions:

1. Due to the water shortage, no supplemental water contracts will be fulfilled.

2. District to mail special notices to all raw water customers advising of low water year and requesting water reduction.

3. All water accounts shall be reduced to an amount equal to the system wide reduction goal. Outdoor watering will be limited to 10 minutes per cycle for spray systems and no longer than 30 minutes per cycle for drip systems. Property addresses ending in an even number shall confine their outside usage to Tuesday, Thursday and Saturday, those with an odd number shall confine their outside usage to Wednesday, Friday and Sunday. All irrigation shall occur between the hours of 7 p.m. and 10 a.m. No watering on Mondays.

Resale Service - Treated and Raw Water:

District to mail notices advising of low water year and requesting a reduction in individual water use. Notice to include copy of District's Conservation Policy along with a request to implement similar action. All resale accounts will be required to reduce their water use to the system wide reduction goal.

Excessive water usage is prohibited and is defined as:

i. Allowing plumbing system leaks, including sprinkler and drip systems, to remain un-repaired for seven (7) calendar days following notification by the District.

ii. Without reasonable cause, water usage in excess of the reduction goal based on the prior year's usage or other targeted base year during the same month of the year.

iii. Anyone who violates the District Water Rules and Regulations shall be subject to Sections; 5.07, 5.12, 14.08 or 14.09 of the Water Rules and Regulations and up to a $500 penalty.

12.03.4 Phase IV – Emergency Water Restriction

Due to the immediate nature of a water shortage or outage emergency, the District will;

1. Immediately notify appropriate media outlets, and post local road signage notifying the public of the current water use restrictions.

2. Hold a public hearing, as soon as feasible, during which customers shall have the opportunity to present their comments to the Board.

Following a public hearing the Board of Directors may implement Phase IV measures whenever water supply has been disrupted either for individual water system(s) or for the District's system as a whole. Specific water reduction goals will be set by Board resolution.

The District shall proclaim through resolution that a state of emergency exists and shall remain in effect until water supply has been restored.

System Wide or by individual Water System(s) - In Addition to those Measures Contained within Phase II and III;

The District shall determine emergency water restriction goals based upon water supply and estimated time until water can be restored.

1. Landscape/outdoor watering by hose or by use of water directly from faucets or outlets connected to the public water supply shall be strictly prohibited.
2. New construction services shall not be started until after the repeal of Phase IV restrictions.
3. Excessive water usage is prohibited and shall be remedied by restriction of the customer's service to life line water delivery rates by a device installed by the District or discontinuance of water service until the excessive usage is remedied, or the Board of Directors repeals the Phase IV water restrictions, and the payment of a $500 penalty. Excessive water usage under Phase IV is defined as water usage in excess of 10% above the water reduction goal.

Raw Water (Metered) Domestic Accounts:

If water is available (flowing in the ditch), usage shall be limited to life maintenance, the watering of livestock and any crop irrigation. Water use which results in water running onto driveways gutters, street, adjoining property, and/or any other water runoff is prohibited. Water usage shall not be above the water reduction goal.

Agriculture Water Accounts:

1. All agriculture water accounts shall be reduced to an amount equal to the system wide reduction goal.
2. Raw water domestic accounts which are not metered will be restricted by the District to the extent possible to meet the system-wide reduction goal.
3. All interruptible and supplemental accounts may be terminated
4. Agricultural (irrigation/stock watering) water rate accounts:

   All "agricultural (irrigation/stock watering) water rate" accounts shall be reduced by the System Wide Reduction Goal.

Resale Service - Treated and Raw Water:

1. Mandatory reduction in percent of usage equal to District's reduction goal. Resellers shall restrict all outside water usage within their areas.

12.04 Enforcement

In addition to, and/or exercise of, any and all lawful remedies, violations of this section shall result in the following penalties:

First Violation:

Customer would receive a phone call or written warning about excessive water use from the District that a further violation will result in possible water restrictions and imposing of fines.

Second Violation:

After initial contact regarding the first violation, if a second violation is recorded a restrictor may be installed and an **$80** charge will be billed to the customer's account. The customer will need to show proof that they have reduced their water use before the restrictor is removed.

Third Violation:

A $500 penalty may be charged to a customer upon a third violation of not reducing to the mandatory water reduction. The customer may also be billed a field call out charge as explained in Exhibit B of the Water Rules and Regulations. If the customer continues to violate water restrictions they may have their water discontinued for excessive water use.

12.05 Variances

Variances may be granted from any of the above regulations by the General Manager upon application in writing stating in detail the circumstances meriting special consideration. All variances granted by the General Manager shall be reviewed by the Water Committee. Appeals of decisions by the General Manager may be taken to the Board of Directors.

12.06 Low Water Use Plumbing Fixtures Required

All applicants for new water service connections for new construction shall be required to furnish proof of installation in residential, commercial and/or industrial buildings, ultra-low flow toilets with a maximum tank size or flush capacity of 1.6 gallons and shower heads with a maximum flow capacity of 2 gallons per minute.

12.07 Water Conserving Landscape Requirements

All applicants for new or amended water service connections for governmental, public, commercial or industrial premises shall be required to utilize California native plant materials or approved low water demand plant materials in landscaping designs.

REGULATION NO. 13

INCORPORATION OF PRIVATE WATER WELLS

13.01 General Requirements

13.01.1 Responsible Parties

This Policy shall apply to any developer, sub-divider, individual, or other Applicant, (Applicant), who plans to construct and transfer to the District, a new or existing water well. The Applicant shall be the property owner of record of the parcel on which the well under consideration is or will be located.

13.01.2 Agreement

The District and the Applicant shall execute an agreement for installation, testing, evaluation, and transfer of the well and appurtenances prior to the commencement of any work on a new well or remedial work on an existing well.

13.01.3 Permits, Easements and Related Costs

The Applicant shall obtain all necessary local, county and state permits and shall arrange for inspection and pay any necessary fees and deposits. Applicant shall obtain all permanent and temporary easements necessary for the purpose of installation, operation, maintenance and removal of said facilities, and said easements shall be in a form approved by the District and shall be recorded and submitted to the District prior to acceptance of the facilities. Title insurance for transferred easements and/or real property may be required as determined by the District.

13.01.4 Well Construction Standards

All facilities to be transferred to the District shall be constructed in accordance with the requirements of the following documents:

a. Tuolumne County Well Ordinance Adopting Chapter II and Appendices A and B of Water Well Standards, Bulletin 74-81, December 1981 and Bulletin 74-1, Cathodic Protection Well Standards, March 1973, Ord. 1472, 1986.

b. Tuolumne Utilities District Standard Specification and Drawing for Well Pump house.

c. Tuolumne Utilities District Standard Specification for Telemetry Equipment.

d. Water Well Standards: State of California, Dept. of Water Resources Bulletin 74-81.

All water wells to be transferred shall have a separate wellhouse which houses mechanical and electrical equipment. All such wells shall be equipped with telemetry equipment which monitors well operating parameters and transmits information to the District telemetry control center. The cost of providing the well pump house and the telemetry equipment in accordance with District standards shall be borne solely by the Applicant.

13.01.5 Plans and Specifications for Transferred Facilities

The Applicant shall provide the District with a site map showing well facilities in relationship to property boundaries and easements along with any interconnecting pipelines to District owned distribution systems. The map shall indicate the method of pump control in relation to water levels in the system water storage tank using either telemetry equipment or control wire. The map, along with specifications for pumps, valves, controls, and meters to be used, shall be submitted to the District for approval prior to construction or refurbishment of a well. All such drawings and specifications shall be prepared by a licensed Civil Engineer in the State of California. Prior to acceptance of the facilities by the District such drawings and specifications shall be revised to indicate accurate as-constructed conditions.

13.01.6 Groundwater Supply Evaluation Requirements

It shall be the responsibility of the Applicant to perform tests, pay fees and submit plans as required by District's Groundwater Supply Evaluation Requirements. Applicant shall provide the District with a complete and detailed plan and schedule for well testing prepared by a qualified, licensed Professional Geologist or Engineer for the determination of production capacity and water quality. The well test plan must be reviewed and approved by the District prior to starting the test procedure. Water produced by the well must be analyzed by a registered laboratory and meet water quality standards specified in Title 22 of the California Code. A qualified Professional Geologist, chosen by the District, shall utilize the well test data to determine the Rated Water Production Capacity of the well and other significant factors affecting the well's ability to provide an acceptable water supply. The "Maximum Safe Yield" of the well to be transferred shall be determined by dividing the Rated Water Production Capacity established by the well test, by a safety factor determined by the District. The safety factor used to calculate Maximum Safe Yield shall be determined by appropriate physical parameters and direction by federal or state officials and/or the Board of Directors. The design flow rate of the well shall not exceed its Maximum Safe Yield. Once all factors of water quality, quantity, facility construction and production capacity are established and completed, the Board of Directors shall determine whether the well is acceptable and transferable as a qualified water supply.

13.01.7 Transfer of Overlying Groundwater Rights

If the water well(s) under consideration for transfer is to serve as a "stand alone" or sole supply for a subdivision or parcel development, the Applicant shall be required to transfer to the District the overlying groundwater rights of the property comprising the subdivision or parcel. All parcels sold within the subdivision or which result from a parcel split, regardless of size, shall be prohibited with recorded deed restrictions from drilling wells for private water supply. The District may require the abandonment of other water wells that exist within the subdivision or parcel development. In instances where the well(s) is not a sole supply, (supply is composed of groundwater and surface water components), the District may require that parcels zoned smaller than RE-2, and parcels of any size within a zone of influence which is determined to have a probable adverse impact on production capacity of publicly owned well(s), shall be prohibited with recorded deed restrictions from drilling wells for private water supply. In subdivisions or parcel developments supplied solely by surface water sources, overlying groundwater rights shall be transferred to the District by recorded deed restrictions on parcels zoned smaller than RE-2.

13.01.8 Contingency Plan and Warranties

Applicant shall provide the District with a contingency plan in case the transferred well fails to produce 100% of the required water supply at some time in the future. The contingency plan shall include the conceptual design of an alternate or replacement water supply and estimated cost of construction. This contingency plan shall be included in the conceptual presentation made to the Board of Directors and shall require Board approval as a part of the facilities agreement. Surety (in the form of a bond, letter of credit, or cash deposit) may be required of the applicant for the full or partial estimated cost of the alternative water supply. The surety will be used to ensure water production of the well facility for a period of three years from date of acceptance. Additional surety, (in a form acceptable to the District) in the amount established by contract shall be required to ensure against failure due to faulty materials, poor workmanship or defective equipment for a period of one year following the date of acceptance.

13.01.9 Well Disinfection

Well disinfection will be required in the event of failure to conform with Title 22 of the California Code of Regulations, Chapter 15, Article 3 - Primary Standards - Bacteriological Quality. Disinfection shall be performed in accordance with Appendix C of the Water Well Standards: State of California, at the Applicants expense.

13.01.10 Water Treatment Facilities

Provisions for housing hypochlorination equipment and for chlorine injection have been considered in the District Standard Specification and Drawing for Well Pump house. The installation of chlorination equipment and controls will be required of the Applicant and at the Applicants sole expense. Dependent on results of water quality testing, other water treatment equipment may be required to be installed by, and at the expense of, the Applicant. Special attention shall be given to the tested levels of iron and manganese. If such levels are greater than 80% of the maximum contaminant levels listed in Title 22 of the California Code of Regulations, Chapter 15, Article 8 - Secondary Drinking Water Standards, water treatment equipment designed to reduce such levels shall be provided by the Applicant, subject to District approval.

13.01.11 Policy Modifications, Alterations

This policy shall not be retroactive to any existing agreement. The District reserves the right to make any modifications or alterations to, or to discontinue, the foregoing policy, or to make exceptions thereto from time to time, as the circumstances may so justify, all as the District shall in its sole discretion determine.

13.01.12 Indemnification

Applicant and any successors, assigns, or heirs shall indemnify Tuolumne Utilities District (in writing) against any and all claim for loss or damage, personal injury, or death resulting from, or arising out of the construction or evaluation of said facilities, the products used or material furnished; including, but not limited to attorneys' fees and court costs, in a form acceptable to the District. The requirement for such indemnification shall terminate upon written acceptance of the water well and appurtenances by the District.

13.01.13 Enlargement of Facilities

If, in the District's opinion, the groundwater source(s) has a capacity greater than that which the Applicant intends or is obligated to provide, the District may require installation of enlarged facilities. Provisions for reimbursements or compensation for the Applicant's additional costs shall be covered under agreement between the District and the Applicant.

13.01.14 Insurance

Applicant shall provide a comprehensive builders risk and public liability insurance policy at an amount established by contract to cover construction and testing activities for wells and related appurtenances under consideration for transfer. Said policy shall be satisfactory to District as to form and amount of coverage and shall be placed with a carrier or carriers licensed to do business in the State of California. This policy shall name the District as an additional named insured and shall cover Applicants contractual liability to District hereunder. A certificate of insurance shall be delivered to the District which shall include a statement that thirty (30) days written notice shall be given by the carrier to District prior to any cancellation of, or material change in, said policy.

13.01.15 Assignment

Neither the well transfer agreement nor any of the Applicants rights under it shall be transferable or assignable without the express written consent of the District, prior to the completion and acceptance of the construction, testing and evaluation of the water well and related appurtenances and payment of necessary fees required by Applicant.

13.01.16 California Environmental Quality Act

Documentation shall be provided to show compliance with the requirements of CEQA. Determination must be made if the Applicant's "project" is exempt or not exempt from the CEQA process. If the project is not exempt, a determination must be made as to whether the environment is significantly affected. The County of Tuolumne is normally the "lead agency" which makes such determinations relative to parcel and subdivision developments. The District will make such determinations if the Applicant's project does not involve the County approval and review process. The payment of any fees relating to the preparation of CEQA documents, mitigation, or to other public agencies such as the California Department of Fish and Game, shall be the Applicant's sole responsibility.

13.01.17 Acceptance

Acceptance of the water well and appurtenances to be transferred will be contingent on District approval of the well evaluation and rated well production capacity; of the construction of the well and appurtenances and of all documents and payment of necessary fees required by the Agreement to affect a complete transfer of ownership. The responsibilities of maintenance, operation and ownership by the District shall commence upon acceptance of the facilities in writing by the District. Nothing in this policy shall constitute or be deemed a sale, to or exchange of, facilities or property with the District.

13.02 Work Performed by District

1. The District will review and approve all drawing and specification submittals and well test plan prior to construction, refurbishment, or testing. All expenses incurred by the District, including overhead and fringe costs, in reviewing submittals and data will be borne by the Applicant.

2. The District will inspect the construction of facilities and startup of equipment. The District will witness the well pump test on a periodic basis. All expenses incurred by the District, including overhead and fringe costs, in inspecting the work will be borne by the Applicant.

3. The District Board will review the results of the well test and evaluation reports to determine acceptance or rejection of the application.

4. The District shall provide applicant an estimate of total cost for plan review, inspection and other reimbursable charges that may be incurred on the project. Applicant shall be fully informed and billed on a regular basis during progressive steps to project completion.

13.03 Work Performed by Applicant

1. The Applicant shall furnish all labor, materials, and service required for the complete installation of the water well and appurtenances. It is the intent of these specifications that the work performed shall result in a complete operating system in accordance with approved plans and specifications.

2. The Applicant shall retain the services of a licensed Civil Engineer or other approved professional to perform the well test, water quality tests, recovery test and prepare a summary report.

3. District shall retain the services of a licensed professional Geologist to perform the well evaluation in accordance with District Groundwater Supply Evaluation Requirements. Applicant shall reimburse the District for costs incurred in evaluation of well test data obtained in paragraph 2 (above).

4. The Applicant shall acquire all permits required for the construction and testing of the well and appurtenant facilities including but not limited to:

   Tuolumne County Health Department Well Permit
   Tuolumne County Building Department Building Permit

5. The Applicant shall execute all deeds necessary for the complete transfer of the well and appurtenances and water rights to the District.

13.04 Procedure

13.04.1 Application

The Applicant shall make an application for the purpose of transferring an existing well or constructing and transferring a new well.

13.04.2 Presentation

The Applicant shall make a conceptual presentation to the District Board of Directors for comment covering the size, location, estimated cost, and extent of the facilities to be transferred. Also, the Contingency Plan shall be presented and discussed.

13.04.3 Agreement

The District and the Applicant shall execute an agreement covering the construction, testing, evaluation and transfer of the facilities.

13.04.4 Deposit

The Applicant shall deposit with the District an amount established by the District Engineer to cover the cost of administrative services and estimated inspection costs as determined by the District from time to time.

13.04.5 Plans and Specifications

Plans and specifications and other documents for the proposed facilities shall be submitted to the District for approval.

13.04.6 District Review

Within fifteen (15) calendar days after submission of said plans, specifications and documents to the District, or revisions thereto, the District shall give approval, conditional approval, or disapproval of the documents submitted.

13.04.7 Well Test and Evaluation

Well testing and evaluation commences after District approval of well test plan submitted under 13.04.5 above.

13.04.8 Termination

Unless Applicant submits the well test plan and commences work within 180 days from the date the agreement is executed, the District may, at its sole discretion, terminate the agreement by giving Applicant written notice of said termination. Upon termination by the District, all funds deposited, less actual costs incurred, including overhead and fringes, shall be refunded to Applicant by the District prior to the date of said termination.

13.04.9 Risk

All risk of loss and damage to said facilities is assumed by the Applicant until the facilities are completed and accepted by the District in writing.

13.04.10 Cost

Upon completion of the construction and testing of the well and appurtenances by the Applicant, the District will compute its total cost of providing inspection services. If the total actual cost is less than the estimated deposit collected, the District will refund the difference to the Applicant. If actual cost exceeds the estimate, Applicant will reimburse costs incurred by the District, prior to transfer of ownership of the facilities.

13.04.11 Warranty Bond

Following completion of construction and testing of the well and appurtenances, Applicant shall furnish the District with surety for contingencies and warranties as provided in Article 13.01.8.

13.04.12 Ownership and Operation

Upon completion of installation of facilities, well testing and evaluation and installation of any water treatment equipment, and acceptance thereof by the District, all right, title and interest in and to, said facilities shall become and thereafter remain, the property of the District. Such facilities shall thereafter be operated and maintained by the District and shall be merged with, and be part of, the District water system.

REGULATION NO. 14

RAW WATER SERVICE

14.01 Raw Water Service

It is the intent of the District to offer potable water to its customers. The District's historic ditch conveyance system services many purposes including supplying water to the District's water treatment plants; serving agricultural customers; offering recreational opportunities; contributing to a wetland and water quality enhancement and offering wildlife habitat.

14.01.1 Existing Service

Raw water service may be granted where a measuring device exists to serve the property requesting service and the District's requirements are met as stated in these regulations.

14.01.2 New Service

Raw water service may be granted provided the applicant meets the District's general requirements as stated elsewhere in these regulations and:

1. Water is available in the District's ditch or raw water pipe.

2. The size of the service is approved by the District; and

3. The applicable District connection charges have been paid.

The District shall install the measuring device at the sole expense of the applicant. If the property to which the water is to be applied is not adjacent to a District ditch or raw water pipe, a recorded easement for conveying water across other affected properties must be obtained by the property owner requesting water service, and a copy of the easement must be provided to the District.

Raw water service for residential properties will be approved only if there is an alternate source of potable water to the property, such as public treated water service or an approved groundwater well.

14.01.3 Raw Water Service Not for Human Consumption

Raw water service is not provided for or intended or offered for human consumption including drinking, cooking or bathing. Any such use shall constitute a misuse of the water and will be grounds for the District's discontinuance or disconnection of such water delivery. The District shall have no liability for any illness, injury or harm resulting from such use of water.

14.02 Responsibilities of Raw Water Customers

Water must not be used wastefully. Any customer may be refused water until conditions causing waste of water or injury to others is remedied. Customers shall not place any obstructions, diversions or foreign materials into the raw water system. Including but not limited to petroleum products, hazardous waste, liquids or toxic materials.

All orders for irrigation service from the District's ditch system or shut off are to be placed through the District's phone (209-532-5536), between the hours of 7:00 a.m. and 11:00 a.m., weekdays only. Orders for delivery or shut-off must be made at least twenty-four (24) hours before the delivery or shut-off is to be made.

14.02.1 Customer Conduit System

Customer Responsibilities

Before water is turned into a conduit not owned by the District, the conduit shall be in proper condition to receive water. All such conduits must be kept free from weeds and other obstructions and shall be of sufficient capacity and be properly constructed and maintained to carry the head of water applied for without danger of breaks, overflow, or undue seepage. If said conduit is obstructed or not maintained, the Operations Manager may refuse or shut off the delivery of water thereto. The Operations Manager may order any such conduit cleaned, repaired, and reconstructed if necessary, before water is made available. Failure to comply with the order of the Operations Manager shall relieve the District of any liability or responsibility for not delivering water. Nothing herein shall be construed as an assumption of liability on the part of the District, its Directors, officers or employees for any damages occasioned by reason of improper construction, maintenance, or use of any private conduit or by reason of permitting the flow of water or turning water therein. The District is not responsible for maintenance of conduits it does not own.

District Cleaning, Etc.

The District's cleaning, repair and maintenance of its ditch system may require the removal of material from the canal and re-depositing it on or along the berm-side.

14.02.2 Customer Pipe System

1. Responsibility. All water facilities on the water customer's side of the meter or vent riser are the responsibility of the customer. In cases where the customer has a day tank, pump, or other related facilities on the District's side of the meter, the customer shall be responsible for the operation, maintenance and liability of these facilities. The District is not responsible for loss of water or damage that might be caused by excessive pressure, loss of pressure or any lack or failure of any District conduits, valves, regulators or other facilities. It is the customer's responsibility to install and maintain safety devices to protect against hazards.

2. Customer Facility Repairs. The District assumes no responsibility for any repairs beyond the water customer's meter or other measuring device. Responsibility for making on-the-spot repairs to privately owned systems rests with the water customer.

14.03 Pumping From District Ditch or Water Pipe

Pumping from a District Ditch is strictly prohibited except by permit issued at the sole discretion of the District.

A. Any applicant for a permit to pump directly from the ditch shall submit plans and specifications for the proposed installation to the District. Irrigation customers pumping water from District facilities shall be responsible for any damage to their pump(s) resulting from the absence of water in said facilities. All private pumps should be equipped with low-water cut out switches (pressure, float, etc.).

14.04 Customer Private Pipelines

A water measuring device/meter will be installed by the District on District's facility at the point where the private line is attached. Near the measuring device, a valve will be installed by the District to allow for water to be turned off in the event of a pipeline breakage. If the private line is not attached, a water box would be installed. In gravity flow situations, a vertical pipe riser shall be installed to act as a vent mechanism to maintain a gravity flow condition. Said vent pipe shall not be closed or sealed in any way. New private lines shall not serve more than one party. It is recommended that private parties using one existing common pipeline have a maintenance agreement, which includes a response plan in the event of breakage. In the event of breakage, water loss is charged to the customers. Therefore, it is incumbent upon customers receiving District water through their privately owned pipelines to keep them in good repair, have a rapid response plan in case of breakage, and have an agreement among them that clearly spells out who is responsible for liability.

14.05 Control of District Facilities

No fence shall be built, or trees or vines or other obstruction placed in or on any District canal or pipeline right of way or easement, or on other property belonging to the District without written permission of the District. Any permitted fence shall require a main gate to be installed for access by District personnel. Meters and vent pipes must not be obstructed by structures, planting of trees, shrubs and other vegetation. Suitable access for the meter reader shall be maintained by the property owner. If, after notice to the property owner, the obstruction is not removed, the District may remove the obstruction or the meter at the expense of the property owner, who shall pay such cost upon billing. Easements and rights of way for District canals, ditches, pipelines, and access trails include sufficient width on either side of said canal, ditch, pipeline and berm to accommodate necessary equipment and personnel. The District's operations require that unobstructed access along the canal and berms be maintained by the District in order to inspect, maintain, clean and operate the canal, and to safely and efficiently transport equipment and personnel. Crossings or culverts are allowed to be constructed within the District's right of way. All crossings or culverts shall be at the expense of the interested landowners and to the District's specifications. District encroachment permits for such work shall be obtained from the District prior to commencing such work.

The District may shut off water at any time for making repairs or improvements or for other purposes. Except in the case of an emergency or disruptions in service beyond the District's control, the District will attempt to give a minimum 48-hour notice by telephone to customers who might be affected by the temporary absence of water in a ditch. The annual ditch outage notice will include the beginning time and estimated length of the shut off. Except for routine maintenance (e.g., repair of minor leaks, ditch cleaning by hand or with a small backhoe, repairing existing flumes, repairing existing siphons, etc.), customers will be notified by telephone, mail, or publication in the local newspaper a minimum of three days in advance when major repair or improvement projects are planned for raw water system facilities within the boundaries of their property. The notification will inform owners of the extent of the work proposed. Outages may last seven or more consecutive days and it is recommended that a ditch customer have adequate storage for a minimum of a fourteen-day water supply.

Only District employees have authority to open, close, or adjust diverting valves and gates in District works. Diverting gates, valves and meters may be equipped with locks, and the keys shall be under the control of the District. The operation and control of the works of the District are under the exclusive management and control of the General Manager and no person other than authorized District employees shall do any of the following:

1. Change, disturb or tamper with any District works or make any opening therein or change any setting of control devices.

2. Place, construct or install any opening, take out pipe, siphon, pump, culvert, bridge, dam wall or other obstruction or structure in any District conduit or works, without the express approval of the Operations Manager or the ditch tender in charge.

3. Take or divert water from District works or from conduits supplied by the District without permission of the Operations Manager or ditch tender in charge.

4. Use a District conduit as an irrigation service ditch.

14.06 Untreated Supplemental Water Accounts

Supplemental Water is that quantity of untreated raw water estimated annually to be in excess of the District's otherwise anticipated water delivery requirements. Effective January 1, 2016, Supplemental Water is not available to new users. Any new users will obtain raw water as either a metered or unmetered raw water user. All users of supplemental, metered, or unmetered raw water are subject to the terms and conditions of the Water Rules and Regulations which may be amended from time to time.

Supplemental Water may be available annually to grandfathered Supplemental Water Accounts meeting the criteria listed below for a time span from April 15th to October 15th, or such other timeframe authorized by TUD. Supplemental Water is not intended, nor is it offered or provided, for human consumption including drinking, cooking or bathing. Any use of Supplemental Water for these purposes shall constitute a misuse of Supplemental Water and will be considered grounds for the immediate and permanent discontinuance or disconnection of such water delivery.

The availability and delivery of Supplemental Water shall have the lowest priority for delivery as compared against other classes or types of waters delivered by the District. Supplemental Water availability and delivery shall not interfere with or impair the availability and distribution of higher priority water supplies furnished by the District. The availability of Supplemental Water shall be determined in the sole and absolute discretion of the District.

The District does not guarantee the delivery of Supplemental Water to the applicants, but will make reasonable effort to deliver the amounts of water which it estimates to be available. The delivery of such water to an applicant in one or more years does not guarantee nor represent any assurance that the District will determine that such water will be available in following years. The District, its agents, and employees shall not be held responsible for any claim of damage, injury or death arising out of or in connection with the delivery or failure of delivery of water, including Supplemental Water, or the failure to deliver water in amounts and/or at flows less than those agreed upon or requested. Nor shall the District, its agents or employees be responsible for any claim of damage, injury or death arising out of or in connection with the control, custody, conveyance, distribution or use of such water beyond the point of delivery as defined herein.

The District shall endeavor, by posting on the District's website and/or by other means determined by the District, to notify public users on or about April 15th of each year of the availability of Supplemental Water as determined or estimated by the District. Such notification shall include an estimate of the amount and timing of availability of such water for the remainder of the irrigation season.

Supplemental Water shall only be made available to Grandfathered Supplemental Water Customers who have met the following criteria:

1. Customers that have on file with the District an executed Application and Annual Agreement for Supplemental Water Service (hereinafter Application) prior to December 31, 2015.

2. Customers that have put the allocated quantity of Supplemental Water to beneficial use at least one season in three not counting years where water was unavailable due to conditions imposed by the District and that were beyond the customer's control.

3. Customers that have maintained continuous payment of supplemental water account without delinquency exceeding six months.

Effective December 31, 2015, the following properties identified by Assessor Parcel Number are grandfathered by operation of this provision to qualify to receive Supplemental Water if available in each year, subject to each of the conditions, restrictions and limitations hereinbefore described in this Section 14.06.

Ditch Supplementals as of 1/1/2016

Ditch	Outlet No.	APN	Amount
Algerine		59-290-17	1 MID
Algerine		59-290-60	1 MID
Algerine		59-290-63	1 MID
Algerine		96-200-18	1 MID
Phoenix	Spillway	52-060-48	41 AF
Phoenix	G	59-070-73	60 MID
San Diego	F-67	32-090-27	1/2 MID
Section IV	D-86	40-100-27	3/4" Meter
Shaws Flat	H-76	33-160-87	60 AF
Shaws Flat	H-48	33-230-02	1/2 MID
Shaws Flat	G-14	44-090-10	1 MID
Shaws Flat	H-94	44-192-04	3/4" Meter
Shaws Flat	H-160	44-380-21	1 MID
Soulsby Low	D-39	89-160-12	60 AF
Soulsby Low	D-102	89-260-20	1/2 MID
Table Mt	I-26	39-350-12	1 MID
Table Mt	I-121	39-350-19	1/2 MID
Table Mt	I-9 C	58-020-31	1/2 MID

The point of delivery for water delivered from the District's distribution system to the Applicant shall be at the Applicant's normal conveyance point or as identified on a map attached to the application, or as otherwise specified or approved by the District. Applicant will be responsible for conveyance; custody and control of all water passing beyond the District's point of delivery. Applicant will be responsible for compliance with all laws, ordinances, and regulations, applicable to the conveyance, use, custody and/or control of Supplemental Water beyond the point of delivery. All costs of connecting to District's point of delivery, including mainline extensions and measuring devices shall be borne by the water customer. By making Supplemental Water available, the District shall not be obligated to construct, add or extend any facilities to provide delivery of said water other than the service connection and related facilities at the point of connection, all at the sole cost of the applicant.

All water made available by the District shall be provided individually through measuring device(s) as determined necessary by the District at the sole cost of Applicant. The District shall attempt to locate such device(s) as near to the point of delivery as it determines practical. Final determination of type and location of such measuring device(s) shall be at the sole discretion of the District. The District shall take ownership of such measuring device(s) upon their installation and shall thereafter be solely responsible for their maintenance and replacement.

The price for the delivery of Supplemental Water is set forth in Exhibit B.

14.07 Agricultural Use of Raw Water

1. Agricultural use of raw water is subject to the existing conveyance capacity and water availability. This water is to be only used for Agricultural purposes.

2. Agricultural purposes are defined as those Qualifying Uses for Commercial Agriculture included in Rule 8A of the Tuolumne County Regulations for Implementing the California Land Conservation Act (Resolution 106-04). For any questionable use, the District, in consultation with the Tuolumne County Agricultural Commissioner, will determine if the water is or is not for agricultural purposes. Commercial agriculture shall not include general landscaping improvements or property beautification or recreation facilities on private property.

3. All new water services shall be metered.

4. The Water Supply Capacity fee for agricultural use of raw water shall be as shown in Exhibit B.14. The minimum Water Supply Capacity fee for establishment of a raw water service for agricultural purposes shall be based on the provision of 10 acre-feet of raw water per irrigation season. Additional supply capacity may be purchased in 10 acre-foot blocks.

5. The service shall be paid in accordance with Exhibits B.2.1 and B.2.2 based on meter size and consumptive use.

6. Agricultural use of raw water is available from April 15th to October 15th.

7. Water may be available outside of the dates listed above, at the sole discretion of the District, for previously existing account holders of at least 12 months continuous duration at the then prevailing rates, plus additional costs incurred by the District to provide the water. For purposes of this section a new account holder is considered to have held an active account for less than 12 months.

8. All current and future District monthly base and water consumptive rates shall apply.

9. Water purchased for agricultural purposes cannot be converted to any other use in the future.

10. Raw water purchased for agricultural purposes shall be set aside for such agricultural uses, subject to availability of supply and the District’s authority to adopt and amend rules and regulations for the distribution of the available water supply.

11. At the District’s request, the purchaser of the raw water must prove the water is being used for an approved agricultural purpose as specified in Section 14.07. If at any time

the water is no longer being used for an approved agricultural purpose, the District may request payment of the current full water supply capacity fee (minus the amount already paid) or the service may be terminated.

14.08 Conversion of Unmetered Raw Water Accounts to Metered Raw Water Accounts

It is the District's intent, over time, to convert unmetered raw water accounts to metered raw water accounts. All raw water services established after January 1, 2016 shall be metered. The conversion of current unmetered raw water services to metered water services will be undertaken by the District at its sole and absolute discretion.

Conversion from water service based on miner's inches to a service based upon meter size will be determined in accordance with the following table:

Miner's Inch Contract	Acre-Feet per Irrigation Season	Acre-Feet per Year	Constant Flow Rate (gpm)	Recommended Meter Size based on 24 hr/day Constant Flow assuming a minimum 2 psi static pressure at meter*
0.50	4.5	9.0	5.6	1"
1.00	9.1	18.1	11.2	1.5"
1.50	13.6	27.1	16.8	1.5"
2.00	18.1	36.2	22.4	1.5"
2.50	22.7	45.2	28.1	1.5"
3.00	27.2	54.3	33.7	2"
3.50	31.8	63.3	39.3	2"
4.00	36.3	72.4	44.9	2"
4.50	40.8	81.4	50.5	3"
5.00	45.4	90.5	56.1	3"

*The meter size required will be determined by the District Engineer on a case-by-case basis.

14.09 Unlawful Acts - Ditch System

No person shall cause any damages or injury to works of the District or shall allow, participate or permit any of the following to be done:

a. Permitting livestock, poultry, or waterfowl to go on or in District conduits.

b. Burning or otherwise injuring or destroying works of the District.

c. Dumping or flowing into District conduits rubbish, soil, filth, or other substances that would pollute or impede the flow of water therein.

d. Erecting signs, fences or other structures on or across or otherwise obstructing District rights-of-way without written permission of the District.

e. Shutting off or reducing the flow of water from a District conduit into a private conduit or field without giving reasonable prior notice of such proposed action to the General Manager or ditch tender in charge.

f. Grading on ditch banks, or any grading near the ditch that may undermine the integrity of the ditch or cause subsequent erosion that may affect the ditch.

Such persons shall pay to the District all costs incurred by District in repairing the damage or removing the obstructions described above.

Under the Penal, Water, and Health and Safety Code Sections set forth below; it is unlawful to do any of the following without authority of the District:

a. Take water from a District conduit with intent to defraud.

b. Disturb any facility for the control of measurement of water.

c. Cause to be emptied or placed into any District conduit any rubbish, filth or pollutant, or obstruction to the free flow of water.

d. Willfully and maliciously cut, break, injure, or destroy any bridge, dam or District conduit.

14.09.1 California Penal Codes

The following sections of the California Penal Code, as they may be amended from time to time, are incorporated into these rules and regulations by this reference.

<u>Section 347 Penal Code:</u>

“(a) Every person who willfully…places any poison or harmful substance in any spring, well, reservoir, or public water supply, where the person knows or should have known that the same would be taken by any human being to his or her injury, is guilty of a felony punishable by imprisonment in the state prison...”

<u>Section 498 Penal Code:</u>

“(b) Any person who, with intent to obtain for himself or herself utility services without paying the full lawful charge therefore, or with intent to enable another person to do so, or with intent to deprive any utility of any part of the full lawful charge for utility services it provides, commits, authorizes, solicits, aids, abets any of the following shall be guilty of a misdemeanor:

1. Diverts or causes to be diverted utility services, by any means whatsoever.

2. Prevents any utility meter from accurately performing its measuring function by tampering or by any other means.

3. Tampers with any property owned by or used by the utility to provide utility services.

4. Makes or causes to be made any connection with or reconnection with property owned or used by the utility to provide utility services without the authorization of consent of the utility.

5. Uses or receives the direct benefit of all or a portion of utility services with knowledge or reason to believe that the diversion, tampering, or unauthorized connection existed at the time of that use, or that the use of receipt water otherwise without the authorization or consent of the utility."

Section 588 Penal Code:

"Every person who...sprinkles, drains, diverts or in any manner permits water from any sprinkler, ditch, canal, flume, or reservoir to flow upon or saturate by seepage any public highway, which act tends to damage such highway or tends to be a hazard to traffic thereon, shall be guilty of a misdemeanor."

Section 592 Penal Code:

"(a)"Every person who shall, without authority of the owner or managing agent, and with intent to defraud, take water from any canal, ditch, flume or reservoir used for the purpose of holding or conveying water for manufacturing, agricultural, mining, irrigating, generation of power, or domestic uses is guilty of a misdemeanor."

Section 594 Penal Code:

"Every person who maliciously commits any of the following acts with respect to any real or personal property not his or her own is guilty of vandalism."

(a) Defaces with graffiti or other inscribed material
(b) Damages
(c) Destroys

Section 607 Penal Code:

"Every person who willfully and maliciously cuts, breaks, injures, or destroys, or who, without the authority of the owner or managing agent, operates any gate or control of, any bridge, dam, canal, flume, aqueduct, levee, embankment, reservoir, or other structure erected to create hydraulic power, or to drain or reclaim any swamp, overflow, tide, or marsh land, or to store or conduct water for mining, manufacturing, reclamation, or agricultural purposes, or for the supply of the inhabitants of any city or town, or any embankment necessary to the same, or either of them, or willfully or maliciously makes, or causes to be made, any aperture or plows up the bottom or sides in such dam, canal, flume, aqueduct, reservoir, embankment, levee, or structure, with intent to injure or destroy the same is guilty of vandalism under Section 594. Nothing in this section shall be construed so as to in any manner prohibit any person from digging or removing soil from any water course, reclamation ditch, or drainage ditch for the purpose of mining."

Section 624 Penal Code:

"Every person who willfully breaks, digs up, obstructs, or injures any pipe or main for conducting water, or any works erected for supplying buildings with water, or any appurtenances or appendages connected thereto, is guilty of a misdemeanor."

Section 11418 Penal Code:

"(b)(3) Any person who uses a weapon of mass destruction in a form that may cause widespread damage to or disruption of the food supply or 'source of drinking water'…shall be punished by imprisonment in the state prison."

Section 116985 Health and Safety Code:

No person shall allow any water closet, privy, cesspool, or septic tank, or carcass of any dead animal, or any offal of any kind, to remain in or upon the borders of any stream, pond, lake, or reservoir within the boundaries of any land owned or occupied by him or her, in a manner that the drainage from the water closet, privy, cesspool or septic tank, or carcass, or offal, may be taken up by or in the stream, pond, lake, or reservoir, if water is drawn therefrom for the supply of any portion of the inhabitants of this state.

Section 116990 Health and Safety Code:

No person shall keep any horses, mules, cattle, swine, sheep, or live stock of any kind, penned, corralled, or housed on, over, or on the borders of any stream, pond, lake, or reservoir, in a manner that the waters become polluted, if water is drawn therefrom for the supply of any portion of the inhabitants of this state.

Section 116995 Health and Safety Code:

No person shall cause or permit any horses, cattle, sheep, swine, poultry, or any kind of livestock or domestic animals, to pollute the waters, or tributaries of waters, used or intended for drinking purposes by any portion of the inhabitants of this state.

14.10 Unlawful Acts - Phoenix Reservoir

Swimming, bathing, and other water body contact activities, washing of clothes, or the use of motorized boats, or houseboats is prohibited in or at Phoenix Reservoir. This prohibition is in accord with state law provisions that includes the following:

a. No person shall bathe, except as permitted by law, or wash clothes in any stream, pond, lake, or reservoir from which water is drawn for the supply of any portion of the inhabitants of this state, or by any other means foul or pollute the waters of any such stream, pond, lake, or reservoir. (*See* Health and Safety Code § 117000 and 117010.)

b. Every person who violates, or refuses or neglects to conform to the regulations prescribed by the Department of Health for the prevention of the pollution of springs, streams, rivers, lakes, wells, or other waters used or intended to be used for human or animal consumption, is guilty of a misdemeanor. (*See* Health and Safety Code § 117015.)

c. Violation of these regulations may be enjoined by any court of competent jurisdiction at the suit of any person whose supply of water for human or animal consumption or for domestic purposes is or may be affected, or by the Department of Health. (*See* Health and Safety Code § 117030.)

d. Anything done, maintained, or suffered, in violation of any of the provisions of these regulations is a public nuisance, dangerous to health, and may be summarily abated as such. (*See* Health and Safety Code § 117035.)

REGULATION NO. 15

ADMINISTRATION

15.01 Appeals to the Board of Directors

Any rule, regulation, finding, or requirement which is enforced upon a customer, applicant or other person or entity doing business with Tuolumne Utilities District may be appealed to the Board of Directors for dispensation or waiver of the subject requirement. The appeal or request may first be addressed at a Board Committee meeting depending on the issue and then forwarded to the full Board for resolution if needed. The appeal shall, in all cases, be submitted according to the following described procedure:

1. All appeals shall be submitted in writing within 30 days after the party has been made aware of the rule, regulation, finding, or requirement for hearing at a regularly scheduled meeting of the Board of Directors.

2. The appellant must specifically include the following information in the notice of appeal:

    a. The identity of the appellant and their interest in the decision.

    b. The nature of the decision or condition appealed from.

    c. A brief statement of the reasons why, in the opinion of the appellant, the decision or conditions imposed were unjustified or unappropriated.

    d. A statement of appellant's goal or desired outcome of proposed Board action regarding the appeal.

EXHIBIT A

WATER SERVICE USER CLASSIFICATION SCHEDULE

The Board of Directors may make revisions to this Exhibit from time to time.

User Classification	Usage Factor
Single Family Residence	1.0
Accessory Dwelling	0.8
Apartment	
Each unit with washer	1.0
Each unit without washer	0.8
Apartment Complex with central laundry facility	0.6/machine
Mobile Home	
Each unit with washer	1.0
Each unit without washer	0.8
Mobile Home Park with central laundry facility	0.6/machine
Motels and Hotels	0.25/room
Rooming House	0.25/room
Bed and Breakfast	0.25/room
Campgrounds	
Overnight and trailer w/central facilities	0.2/space
RV w/individual hookup	0.3/space
Barber Shops	0.3/station
Beauty Shops	0.3/station
Service Station with Restrooms	2.0
Self-Service (no restroom)	0.8
Recreational Vehicle Dump Station	2.0/station
Automobile Repair Shop	1.0
Mortuary	0.4/employee
Bakeries, Catering Service	0.3/employee
Restaurants	
Walk-in	0.07/seat
24 hour	0.09/seat
Drive-in, Short Order	0.09/seat
Bars, Card Rooms, Casinos, Taverns	0.1/seat
Bowling Alley	0.1/alley
Theaters, Indoor	
(Based on maximum seat capacity)	0.02/seat
Laundries and Laundromats	0.6/machine
Cleaners	
Plant w/office	0.1/employee + 1.0/machine
Fire station	0.2/employee
Offices, including	0.1/employee
Accountants	
Attorneys	
Engineers	
Other (Insurance, Real Estate, etc.)	
Dentist	0.5/chair
Physician Office or Clinic	1.0/office or M.D.

EXHIBIT A (continued)

WATER SERVICE USER CLASSIFICATION SCHEDULE

User Classification	**Usage Factor**
Retail Stores, including	0.1/employee
Clothing	
Building Supply, Hardware, Appliance	
Furniture	
Real Estate	
Warehouse	
Drug Store	
Pet Shops	
Other Retail Stores	
Public Swimming Pools	2.5/pool
Car Wash, Self-serve	3.0/stall
Food Markets	0.1/employee
w/garbage grinders	4.0
Public Buildings	0.1/employee
Schools	0.07/enrollment
Meeting Halls and Churches	0.01/seat
Fairground Complex	4.0
Restroom Buildings	1.0/toilet
Hospitals	0.8/bed
Long Term Care Facilities	0.3/bed
Industrial Building, Assembly, etc.	Per calculations of Estimated Usage
Minimum Usage Factor For all Classifications	0.8

EXHIBIT B

WATER SERVICE CHARGES AND RATES

B.1 Charge For Treated Water Service

The following rates and charges shall be effective as indicated below.

B.1.1 Monthly Fixed Charges - Meter Size: Minimum Monthly Fixed Service Charges

Meter Size	Effective 1/1/2016	Effective 1/1/2017	Effective 1/1/2018	Effective 1/1/2019	Effective 1/1/2020
5/8 or 3/4 - inch	$47.50	$52.50	$56.50	$60.50	$64.50
1 - inch	$47.50	$52.50	$56.50	$60.50	$64.50
1 1/2 - inch	$76.00	$84.00	$90.40	$96.80	$103.20
2 - inch	$109.25	$120.75	$129.95	$139.15	$148.35
3 - inch	$242.25	$267.75	$288.15	$308.55	$328.95
4 - inch	$337.25	$372.75	$401.15	$429.55	$457.95
6 - inch	$593.75	$656.25	$706.25	$756.25	$806.25
8 - inch	$907.25	$1,002.75	$1,079.15	$1,155.55	$1,231.95

B.1.2 Consumption – Quantity Rates

Treated Water Service

Quantity Rates Monthly Per 100 Cubic Feet	MONTHLY QUANTITY CHARGE				
	Effective 1/1/2016	Effective 1/1/2017	Effective 1/1/2018	Effective 1/1/2019	Effective 1/1/2020
Tier 1 — Up to 400 cu. ft. cu. ft.	$0.00	$0.00	$0.00	$0.00	$0.00
Tier 2 — Over 400 cu. ft.	$2.50	$2.75	$3.00	$3.20	$3.40

B.1.3 Wholesale Treated Water Service Customers

Those Wholesale Treated Water Service Customers under existing contract(s) shall be required to pay under the terms and conditions of their respective contracts.

B.2 Charge for Raw (Untreated) Water Service

The following rates shall be effective as indicated below. The rate structure for metered raw (untreated) water service consists of a monthly service charge based on the size of the water meter plus a quantity charge for all metered consumption of water. Included with the monthly fixed raw water rate charge is up to 5,000 cubic feet of water. The rate structure for unmetered raw (untreated) water service consists of a minimum Monthly Fixed Service Charge based on each ½ Miner's Inch under contract plus a quantity charge for each Miner's Inch Day (MID) per month of water requested. Included in the Monthly Fixed Charge is up to 2 Miner's Inch Days. The minimum monthly fixed service charge is billed on a 12 month basis.

B.2.1 Metered Raw Water Customers Monthly Fixed Charges

Meter Size: Minimum Monthly Fixed Service Charges

Meter Size	MONTHLY FIXED CHARGE				
	Effective 1/1/2016	Effective 1/1/2017	Effective 1/1/2018	Effective 1/1/2019	Effective 1/1/2020
5/8 or 3/4 -	$15.00	$20.00	$25.00	$30.00	$35.00
1 - inch	$15.00	$20.00	$25.00	$30.00	$35.00
1 1/2 - inch	$24.00	$32.00	$40.00	$48.00	$56.00
2 - inch	$34.50	$46.00	$57.50	$69.00	$80.50
3 - inch	$76.50	$102.00	$127.50	$153.00	$178.50
4 - inch	$106.50	$142.00	$177.50	$213.00	$248.50
6 - inch	$187.50	$250.00	$312.50	$375.00	$437.50
8 - inch	$286.50	$382.00	$477.50	$573.00	$668.50

B.2.2 Quantity Rates

Monthly Quantity Per 100 Cubic Feet	MONTHLY QUANTITY CHARGE				
	Effective 1/1/2016	Effective 1/1/2017	Effective 1/1/2018	Effective 1/1/2019	Effective 1/1/2020
Up to 5,000 cu. ft.	$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.00
Over 5,000 cu. ft.	$ 0.25	$ 0.28	$ 0.30	$ 0.32	$ 0.34

B.2.3 Unmetered Raw Water – MID* Rates

*Miner's Inch Day (MID) – A term used in water measurement. By California statute, one miner's inch flow in for one day is equivalent to 1.5 cubic feet per minute or 11.22 gallons per minute.

B.2.4 Minimum Monthly Fixed Service Charges

Per Miner's Inch Per Month	Effective 1/1/2016	Effective 1/1/2017	Effective 1/1/2018	Effective /1/2019	Effective 1/1/2020
First 1/2 miner's inch of contract	$15.00	$20.00	$25.00	$30.00	$35.00
Additional capacity, per 1/2 miner's inch	$6.00	$9.00	$12.00	$15.00	$18.00
Per Miner's Inch Day	**Quantity Rates Per Day**				
Up to 2 MIDs per month	$0.00	$0.00	$0.00	$0.00	$0.00
Over 2 MIDs per month	$5.00	$5.50	$6.00	$6.40	$6.80

B.2.5 Special Quantity Amounts Due to Prior Agreements with Pacific Gas & Electric

Subject to the pertinent Rate Schedule(s) above, those raw water customers having a fixed monthly allotment of water per month prior to receiving quantity charges with Pacific Gas and Electric that is currently recognized by contract with the District shall continue to receive such monthly quantity amounts before incurring MID charges. Such customers shall maintain an active agreement for raw water service with the District indicating the amount of the monthly allocation. Nothing in this section shall be construed to relieve such customer(s) of the Minimum Monthly Service Charge. In the event an agreement lapses or the customer is in violation of the agreement for more than one (1) year, or otherwise fails to make payment to the District, the District reserves the right render any allotment null and void.

B.3 Treated Water Surcharges and/or Assessments

The surcharges listed below are for a 3/4" meter treated water service. Surcharges for meters larger than 3/4" will be based upon the same increase factors for monthly service charges for larger meters. In areas where water systems are interconnected, more than one of the surcharges listed below may apply.

Service Area	Charge Per Month
Big Hill	$17.19
Crystal Falls	$2.00
Cedar Ridge	$7.38
Columbia	$2.11
Curtis Creek	$36.14
Gibbs Ranch	$2.80
Monte Grande	$17.79
Monte Grande - Curtis Creek Interconnection	$26.99
Oak Garden	$3.95
Upper Basin (Brentwood, Lakewood, Confidence)	$2.88
Ponderosa System	$6.50
Railbed Road	$6.30
Railbed Road with Backflow Preventer	$11.97
Scenic View/Scenic Brook	$7.77
Soulsbyville	$4.50
Valle Vista	$10.00
Sugar Pine	$10.08
Wards Ferry Ranches	$25.66

B.4 Wholesale Usage - Master Meter

Same as B.1.1 except where there is a special agreement as authorized by Board of Directors.

B.5 Bulk Usage from Fire Hydrant

Type of Service	Meter Size - 2 "	Meter Size - 1"
Meter Rental Charge per Day	$5.00	$2.00
Usage per 100 Cubic Foot ($5.00 minimum charge)	$5.00	$5.00
Meter Deposit	$1,550.00	$500.00
Administration Fee per Rental	$35.00	$35.00

B.6 Service Charge for Privately Owned Fire Protection Systems

Based on Meter Size. *See* B.1.

B.7 Request for Service Location, Temporary Shut Off or Turn On

Each time the District is required to locate the customer's service connection or make a temporary shut off or turn on, a service charge may be charged, in accordance with the following provisions, shall be paid by the user. These charges will not apply when there is an emergency request by the customer due to a leak.

B.7.1 Service charge with a minimum notice of two (2) full work days and with the location or shutoff to be accomplished between 7:00 a.m. and 4:00 p.m. on a regular day (not including 6-month maximum suspensions).	No Charge
B.7.2 Service charge with less than the required minimum notice and with location or shutoff to be accomplished between 7:00 a.m. and 4:00 p.m. on a regular day.	$50.00
B.7.3 Service charge with the location or shutoff to be accomplished between 4:00 p.m. and 7:00 a.m.	$130.00
B.7.4 Service charge with the location or shutoff on Saturday, Sunday or District Holiday.	$130.00
B.7.5 Unlawful Acts Charge	$150.00
B.7.6 Meter Removal Fee	$80

B.8 New Account Administration Fee

The New Account Administration Fee is a one-time charge to a new connection for water service to be paid at the time of application that covers staff time involving information data input and account management.	$240.00

B.9 Capital Reserve Charge

The Capital Reserve Charge shall be used to establish a capital reserve fund that shall be used to replace capacity and facilities used by new applicants for service upon connection to the water system and to provide for the continuous capability to serve new applicants for treated water service. The capital reserve fund would specifically be used to replace equipment and facilities that reach the end of their useful life and to construct improvements necessary to maintain service and capacity in water treatment, storage, transmission, distribution, pumping facilities, and control systems as periodically needed in each of the service areas within the District's jurisdiction.	$985.00

The Capital Reserve Charge shall be computed by reference to the user classification schedule attached as Exhibit A, applied according to the factors indicated at the sole discretion of the District. The fee stated herein is equivalent to a Factor of 1.0.

B.10 Treated Water Meter Set Charge

Meter Type	Installation of Meter and Valve Only	If New Box and Lids are Also Required
¾ inch meter	$380.00	$564.00
1 inch meter	$510.00	$689.00
1 ½ inch meter	$655.00	$821.00
2 inch meter	$892.00	$1,058.00
3 & 4 inch meters	Actual Cost	Actual Cost

Customers will be billed the "actual cost" for meters and boxes on new raw (untreated) water services regardless of meter size.

B.11 Meter Accuracy Tests

Customers requesting meter tests shall be charged $ 50.00 for all tests beyond one test per year.

B.12 Service Line Charge	Actual Cost
B.13 Security Deposit Amount	$ 80.00
B.13.a Lien Fee	$ 15.00
B.13.b Notary Fee	$ 10.00

B.14 Capacity Charges

Water Capacity Charges shall be collected and placed in a fund to construct improvements to any of the water systems described above for the purpose of increasing supply, treatment, storage, or transmission capacity used up by new connections to the water systems. The charges are uniform to all systems and are collected and used to construct improvements as needed in any individual water system. For one equivalent single-family residence, the capacity charge shall be calculated on an estimated usage based upon a ten year average from the District's consumption records for residential systems. These charges are applied as described below:

Application criteria: Water capacity charges apply to all applicants for water service whose parcels to be served are located where sufficient water supply, treatment, and storage facilities have not been provided through previous improvement as described in Regulation 3.05.6. For raw water service, only the supply component described below shall apply:

Supply	$846 per treated water ESFR or $2,860 per acre-foot, *See* Exhibit E.1. For all new raw water services to agricultural irrigation customers as set forth in Section 14.07, the supply capacity fee shall be $318 per acre-foot, with a 10 acre-foot per year minimum. Additional water supply capacity may be purchased in 10 acre-foot blocks. Agricultural irrigation service will be turned off during the non-irrigation season (October 16th through April 14th). The water supply capacity for all new raw water services, except as described above for agricultural irrigation, will be available in 5 acre-foot blocks with a 5 acre-foot per year minimum.
Treatment	$1,597 per ESFR, *See* Exhibit E.2.
Storage	$3,034 per ESFR, *See* Exhibit E.3.
Transmission	Actual Cost.

Capacity charges to be indexed to a 3-year running average of the Engineering News and Record 20-cities construction cost index and adjusted each fiscal year with an annual cap of 3.5%. The General Manager will implement the fee increase on July 1st annually.

B.15 Water Connection Fees

Description of TUD Water Systems to Which the Foregoing Charges are Applicable.

The water systems serving treated water referred to herein are all located within the boundaries of and under the jurisdiction of the Tuolumne Utilities District. Uniform rates, fees, and charges apply to each and every system except as otherwise noted. Water systems currently serve the communities and surrounding areas of Sonora, Jamestown, Cuesta Serena, Valle Vista, Volponi Acres, Sonora Water Company through a master meter, Columbia, East Sonora, Cuesta Center, Lambert Lakes, Tuolumne, Cedar Ridge, Crystal Falls, Mono Vista, Willow Springs, Camp Sunshine, Ranchos Poquitos, Soulsbyville, Comstock Ranch, Sonora Meadows through a master meter, Oak Garden Estates, Lakewood Park, Brentwood Park, Goldmont Forest, Sonora Vista, Confidence, Forest Vista Estates, Meadowbrook, Sugar Pine, Peaceful Pines, Oak Haven, Apple Valley, Scenic View and Scenic Brook Estates, Phoenix Lake Park, Ponderosa Hills, Muller and Mira Monte through a master meter, Gibbs Ranch and Rancho Sonora Estates, Monte Grande, Big Hill, Mono Village, Curtis Creek Ranch area, and Wards Ferry Ranches. Other communities that could be transferred to or acquired by the District in the future that would be subject to these rates, fees, and charges include, but may not be limited to, Alpine Acres, and Last Chance Water Company Service areas.

Raw water is provided to the following resale customers: Twain Harte Community Services District, Twain Harte Valley Mutual Water District, Mi Wuk Mutual Water Company, Last Chance Water Company, Peppermint Creek Mobile Home Park, Pulpit Rock Water Company, Sawmill Flat Water Association, and Oneta Estates Water Association.

<u>Purpose and Use</u>

The purpose of the rates, fees, and charges stated herein are for meeting operation and maintenance expenses, purchasing or leasing supplies, equipment, or materials, meeting financial reserve needs, and for obtaining funds for capital improvements necessary to maintain service to all customers within the District's existing service areas. The capital improvements include water storage tanks, treatment facilities, water distribution and transmission facilities, and pumping facilities, including related electrical and telemetry control systems.

EXHIBIT C

ADDITIONAL CONNECTION CHARGES IN SPECIFIC DISTRICTS

Area / Subdivision		**Charge Per Equivalent Single Family Residence**
C.1	Upper Basin - Crystal Falls Interconnection Reimbursement:	$1,067.00
C.2	Christian Heights Supply and Storage Fee:	$1,620.00
C.3	Cedar Ridge Capital Improvement Loan:	$1,000.00
C.4	Columbia Capital Improvement Loan:	$990.00
C.5	East Sonora Distribution System Charge:	Varies*
C.6	Big Hill Road Pipeline Extension Reimbursement:	Varies*
C.7	Valle Vista Pipeline Extension Reimbursement:	Varies*
C.8	East Sonora Interconnection Reimbursement:	$563.00
C.9	Columbia Airport Crossing Pipeline Extension Reimbursement:	Varies*
C.10	Cuesta Center Interconnection Reimbursement:	$617.00
C.11	Twain Harte Interconnection Reimbursement:	Varies*
C.12	Oakhaven Interconnection Reimbursement:	$2,000.00
C.13	Monte Grande – Crystal Falls Interconnection Reimbursement:	$335.00

* Refer to lists, maps or resolutions in Engineering files.

EXHIBIT D

PROJECT ADMINISTRATIVE CHARGE, ENGINEERING, INSPECTION AND CONSTRUCTION DEPOSITS AND LABOR AND EQUIPMENT RATES[1]

D.1 Labor Deposit Schedule

	Inspection and/or Hot Tap		**Mainline Projects[3]**			**Development Projects[3]**		
	Lateral Inspection	Hot Tap and/or Inspection	≤300 lf[4]	>300 lf ≤1200 lf	>1200 lf	≤4 ESFR[5]	>4 ESFR ≤30 ESFR	>30 ESFR
Project Admin. Charge[2]	$80	$80	$150	$200	$250	**$100**	**$300**	$500
Engineering Labor Deposit[1,6]	$0	$0	$300	$400	$600	$600	$900	$1,100
Inspection Labor Deposit[1,7]	$105	$205[10]	$300	$500	$700	$1,100	$2,100	$4,100
DEPOSIT AMOUNT	**$185**	**$285**	**$750**	**$1,100**	**$1,550**	**$1,800**	**$3,300**	**$5,700**

D.2 Construction Deposit[1,9]

Construction deposits are required for all projects where District construction staff and equipment are requested by the applicant to construct and/or repair facilities including, but not limited to, service laterals, hydrants, mainlines and sewer cleanouts. Construction deposit charges are determined by District Engineering Department staff on a case by case basis and shall be paid prior to commencing construction of facilities. An estimate of typical project costs may be provided prior to the initiation of construction. In addition to estimated labor and material costs, the construction deposit shall include a minimum project administrative charge of $240.

D.3 Labor Rates

Engineering Labor Rate[6]	$130 per man hour
Inspection Labor Rate[7]	$105 per man hour
Flow Analysis Modeling Labor Rate[8]	$105 per man hour
Construction and Hot Tap Labor Rate[9]	$100 per man hour

D.4 Equipment Rates

Camera Truck Equipment	$35 per hour plus $100 per man hour
Mini Cam Equipment	$35 per hour plus $100 per man hour
Flush Truck Equipment	$60 per hour plus $100 per man hour
Vacuum Truck Equipment	$60 per hour plus $100 per man hour
Vac-Con	$115 per hour plus $100 per man hour

---

[1] *Deposits paid are credited to the charges incurred. Expended time will be rounded to the nearest ½ hour. Any funds collected but not used will be refunded and any incurred charges*

---

[1] The General Manager shall update labor and equipment rates annually.

will be billed monthly toward the deposit. If the charges incurred exceed the deposit during the course of construction, another deposit in the same amount as the first is required from the applicant. For larger projects this could occur several times.

[2] *Project administration charge is a one-time charge paid at the time of application that covers staff time involving assistance to the applicant regarding District procedures, agreement preparation, agenda scheduling and accounting.*

[3] *For the purposes of this fee structure, should both off-site mainline extension and on-site development both apply, charges for both project classifications shall apply.*

[4] *For hydrant and fire sprinkler system connections requiring a lateral installation the deposit charge for a <300ft mainline project shall apply.*

[5] *ESFR: Equivalent Single Family Residential connection. For the purposes of this fee structure, in certain cases, lots or parcels may be substituted for the ESFR to determine the deposit charge amount for development projects.*

[6] *Engineering labor includes CEQA review, plan reviews, easement review, and project management.*

[7] *For actual time expended on construction site facility inspections. Inspection charge deposits will be paid prior to commencing construction of facilities and any additional inspection or testing charges will be billed monthly through project completion and acceptance by the District. This hourly rate applies to time spent by TUD personnel for inspections, and any camera testing, pressure testing, vacuum tests, etc. that requires the services of personnel in addition to inspection staff.*

[8] *If the District is requested to perform flow analysis modeling, a charge in the amount of $105.00 per man hour will be required for any time expended over and above thirty (30) minutes. Should a deposit for flow analysis modeling be required the minimum project administrative charge of $80.00 shall apply.*

[9] *In the event that District field crews are requested or required for assistance with construction, the charges above will apply to actual time expended. Expended time outside normal working hours will be charged at 1 ½ times the labor rates listed above.*

[10] *This inspection labor deposit amount includes one man hour at the construction labor rate to perform hot- tap.*

EXHIBIT E

CAPACITY CHARGES CALCULATIONS

E.1 SUPPLY

COST DETERMINATION UNTREATED WATER SUPPLY

Current Year - 2014 Inflator – 2.00%

PG&E Water Purchase

This option was evaluated in the past however, this would not come into play until TUD's demand begins to exceed, 18,150 AF per the 1996 HDR report. Additionally, based on new regulations put in place since 1996, there may not be water available to purchase due to elements beyond PG&E's control.

Conservation Through Ditch Lining

Year	Project	Cost[1]	Present Value[2]	Estimated Recovery (AF)[3]
2003	Ditch Gunite	$80,000	$99,470	50
2004	Ditch Gunite	$80,000	$97,520	50
2005	Ditch Gunite	$80,000	$95,607	50
2006	Ditch Gunite	$100,000	$117,166	50
2007	Ditch Gunite	$100,000	$114,869	50
2008	Ditch Gunite	$100,000	$112,616	50
2009	Ditch Gunite	$100,000	$110,408	50
2010	Ditch Gunite	$100,000	$108,243	50
2011	Ditch Gunite	$100,000	$106,121	50
2012	Ditch Gunite	$100,000	$104,040	50
2013	Ditch Gunite	$100,000	$102,000	50
Total			$1,168,060	
	Estimated Recovery 2003-2013 (AF)			550
	Cost / AF (2014)			$2,124

[1] Budgeted amount for each year. Total length of ditch lined varies each year.

[2] Cost adjusted to reflect present day cost.

[3] The savings each year would vary but is assumed as the average each year.

Conservation of Supply, End Loss Solution

Year	Project	Cost[1]	Present Value[2]	Estimated Recovery (AF)[3]
2014	Matelot to Columbia Pipeline	$250,000	$250,000	125
2014	End Loss Reservoir or equivalent, Construction, Controls, Land Acquisition for the end of either the Roaches or Montezuma Ditches	$400,000	$400,000	125
Total			$650,000	
	Estimated Recovery from end loss (AF)			250
	Cost / AF (2014)			$2,600

[1] Estimated cost 2014

[2] 2014 values

[3] The savings are estimated based on conserving end loss.

Groundwater Development

Year	Project	Cost[1]	Present Value[2]	Estimated Development (AF)[3]
2014	New Municipal Well - 50 GPM for 50 Years	$150,000	$150,000	80
Total			$150,000	
	Groundwater development adjusted for uncertainty and unreliability (AF)		2	40
	Cost / AF (2014) for water supply by groundwater well			$3,750

[1] Includes drilling, development, permitting, pump installation, land acquisition and appurtenances

[2] 2014 values

[3] Assumes 50 gpm sustained yield 24/7 for 50 years

New Melones Reservoir

Year	Project	Cost[1]	Present Value[2]	Estimated Development (AF)[3]
2014	Infrastructure Upgrades	$500,000	$500,000	500
Total			$500,000	
	Estimated Conservation (AF)			500
	Cost / AF (2014) for capitol upgrades		1	$1,000
	Cost / AF for annual water purchase and pumping 50 years	$700	Note [4]	$1,200
	Total Cost / AF			$2,200

[1] Estimated upgrades to the pump system and facilities

[2] 2014 values

[3] Estimated annual pumping volume, however there is uncertainty in current pumping infrastructure to provide this level of capacity

[4] Annual costs for purchasing water are highly variable. For purposes of this estimate, an inflator of 2% per year is applied.

Equivalent Single Family Residence (ESFR)	GPD	264
Supply water volume required to serve the Equivalent Single Family Residence (ESFR) treated water volume	1.3	343
Conversion Gallons / Acre Feet	Gal/AF	325,851
Cost per Acre Foot to develop new water supply	$/AF	$2,860
Days in a Year	Day/Year	365
Connection Fee (Supply Component)		$845.75

E.2 TREATMENT

Capacity Charges - Treatment Component
January 2014

	Average Day Demand	Max Day Factor	Max Day Demand
ESFR	264	2	528

Note: WTP rate is dependent on Max Day Demand (MDD). Typical MDD is double the Average Day Demand (ADD).

		Treatment Capacity				
	Date	GPM	MGD	Construction Cost	Present Construction Cost (2% Inflation)	Total Cost Per MGD
Monte Grande WTP	2008/2013	700	1	$1,663,000	$1,872,808.10	$1,872,808

Note: Construction inflation of 2% is less than historical running average of the CPI.

	$/acre	Acres	Purchase Price
Land Purchase	$40,000.00	5	$200,000

Note: Land Price based on recent land listings on the MLS.

	Construction Cost	Design Cost (10%)	Land Purchase	Total Cost	$/gal	$/ESFR
2 MGD Plant	$2,809,212	$280,921	$200,000	$3,290,133	$1.65	**$869**

Note: 1.5x multiplier used for 2 MGD plant.

	$/gal	Max Day Demand	CT Storage $/ESFR
Contact Time Volume	$1.38	528	**$729**

Note: Contact time is required for the treatment process. This is achieved in the storage tank (clearwell) at the WTP. The required volume is based on the max day demand (MDD)

	Treatment Construction	CT Volume	Total
Cost/ESFR	$869	$729	**$1,597**

E.3 STORAGE

Current Year = 2014

Inflation = 2.00%

TREATED WATER STORAGE CONNECTION FEE

CAPITAL COSTS

Land Acquisition

Tank Capacity	**Typical Height**	**Typical Diameter**	**Tank Footprint**	**Tank Perimeter Access Road Width**	**Total Footprint[1]**
(gal)	*(ft)*	*(ft)*	*(sf)*	*(ft)*	*(acres)*
500,000	24	60	2826	10	0.115

Assume 0.50 Acres

Parcel Size	**Average Cost[2]**	**Total Cost[3]**	**Cost/Gallon**
(acres)	*($/acre)*	*($)*	*($/gal)*
0.5	$ 80,000	$ 40,000	**$ 0.08**

per Gallon

Notes:

[1] Calculated total theoretical footprint does not include areas for access road to the site, drainage ditches, cut/fill slopes, and avoidance of other geographical features. Therefore, the minimum parcel size is assumed to be 0.50 acres.

[2] Costs for land acquisition do not include surveying, lot line adjustments, easement acquisitions, rezoning, etc.

[3] Costs assume that TUD would be able to acquire only a 0.5 acre parcel and that the land owner would not require purchase of entire parcel which may be larger than just 0.5 acres.

[4] In some cases, the District may accept a parcel of land (if deemed suitable) to be used for constructing storage facilities. In those instances, the storage component of the developer's connection fees may be reduced by the portion of the connection fee calculation that is associated with land acquisition.

Steel Water Storage Tanks

Tank Location	Construction Year	Capacity	Capitalized Value[1]	Contract Value[2]	Capitalized Value / Gallon	Capitalized Present Value[3]	Capitalized Present Value / Gallon
		(gal)	*($)*	*($)*	*($/gal)*	*(Current Yr. $)*	*(Current Yr. $/gal)*
Sonora WTP	2004	1,000,000	$1,331,500	n/a	$1.33	$1,623,091	$1.62
Comstock	2005	1,500,000	$792,700	$563,079	$0.53	$947,350	$0.63
Chapparal	2006	1,000,000	$801,500	$494,495	$0.80	$939,085	$0.94
Shale Rock	2007	292,000	$360,000	$360,000	$1.23	$413,527	$1.42
Big Hill Clearwell	2007	420,000	$597,500	$400,000	$1.42	$686,340	$1.63
Monte Grande Clearwell	2008	500,000	$514,000	$489,150	$1.03	$578,847	$1.16
Skyline Tank	2008	600,000	$694,000	$542,500	$1.16	$781,557	$1.30

Avg. Cost per Gallon	$1.07	$1.24	
Avg. Cost per Gallon Cost <1,000,000	$1.21	$1.38	
Avg. Cost per Gallon Cost ≥1,000,000	$0.89	$1.06	
Avg. Cost per Gallon Cost 600,000≥Capacity≥400,000	$1.20	**$1.36**	**per Gal.**

Notes:

---

1 Capitalized value includes survey, geotechnical investigation, design, CEQA compliance, permitting, electrical service, SCADA, and all TUD labor associated with site work and piping.

2 Contract value represents the amount paid to the tank supplier and erector, only. In most cases it does not include site work.

3 Capitalized Present Value represents the cost to construct the asset in current year dollars.

Total Cost per Gallon

Steel Tank	**$ 1.36**

Land Acquisition	**$ 0.08**
Total	**$ 1.44**

per Gallon

(in Current Year Dollars)

VOLUME ALLOCATION

Average Day Demand

Average Day Demand per ESFR[1]	**7- Day Demand per ESFR**[2,3]
(gpd/ESFR)	*(gal/ESFR)*
264	**1,848**

Gallons per ESFR

Notes:

1 Calculated average demand system wide based on meter usage data. Does not include system loss due to leakage. Also, does not distinguish between service location by elevation.

2 To accommodate the typical duration of the ditch outage. Does not distinguish between services located above or below Phoenix Reservoir.

3 Assumes all storage is in the form of treated water contained in steel potable water storage tanks.

Fire Flow Storage

Fire Flow Req'd[1,2]	**Duration**	**Fire Flow Storage Req'd**	**Usable Demand Based Storage = (Total Storage - Fire Flow Storage)**	**Tank Capacity in ESFR**	**Fire Flow Storage per ESFR**
(gpm)	*(min)*	*(gal)*	*(gal)*	*(ESFR)*	*(gal/ESFR)*
500	120	60,000	440,000	238	**252**

Gal. per ESFR

Notes:

1 Assumes residential fire flow requirements based on Tuolumne County Ordinance Code 15.20.020.

2 Tuolumne County Ordinance Code bases fire flow on density not zoning:

Density	**Fire Flow Requirement**
(du/ac)	*(gpm)*
<0.5	0
0.5<du/ac≤1	250
1<du/ac≤6	500
6<du/ac≤8	750
8<du/ac≤15	1250

Volume per ESFR

Average Day Demand	**1848**
Fire Flow Storage	**252**
Total	**2100**

Gallons per ESFR

CONNECTION FEE CALCULATION

Total Cost per Gallon	Total Gallons/ESFR	Connection Fee/ESFR
(Current Yr. $/gal)	*(gal/ESFR)*	*($/ESFR)*
$1.44	**2,100**	**3,034**

$ per ESFR

Notes:

1 All costs assume TUD crews do site work. Site work costs may vary greatly, especially if retaining walls are needed.

2 At District's discretion, it may allow or request the Developer to construct storage improvements to District standards in-lieu of paying connection fees.

EXHIBIT F

AMENDMENTS

	Date	Resolution No.
Adopted:	January 26, 1993	2-93
Amended:	March 8, 1994	14-94
	March 22, 1994	19-94
	January 24, 1995	7-95
	July 23, 1996	47-96
	September 10, 1996	59-96
	May 12, 1998	39-98
	May 23, 2000	42-00
	February 13, 2001	11-01
	October 23, 2001	75-01
	April 9, 2002	18-02
	March 11, 2003	26-03
	March 25, 2003	30-03
	June 22, 2004	43-04
	August 10, 2004	56-04
	May 10, 2005	24-05
	July 12, 2005	45-05
	March 14, 2006	11-06
	July 11, 2006	43-06
	September 25, 2007	108-07
	October 12, 2010	53-10
	December 10, 2013	47-13
	February 13, 2014	4-14
	February 25, 2014	9-14
	July 22, 2014	40-14
	April 28, 2015	16-15
	November 17, 2015	54-15
	October 18, 2016	36-16
	April 09, 2019	03-19
	November 12, 2019	24-19

Appendix M

TUD Safe Yield Analysis

WESTERN HYDROLOGICS
WATER & HYDROPOWER CONSULTING

MEMORANDUM

TO: Glen Nunnelley | Ed Pattison

FROM: Jared Emery | Jeff Meyer

DATE: May 14, 2021

RE: ***Tuolumne Utility District Water Supply Yield Study***

Western Hydrologics performed additional modeling studies to assist Tuolumne Utility District in evaluating potential Phoenix Project water supply yield assuming a modified potential South Fork Stanislaus River operation.

The safe yield modeling studies were performed using a Stanislaus River operations model that was developed previously to perform several analyses on the upper Stanislaus River. The operations model includes physical capacities of the reservoirs and canals, storage and flow requirements, and discretionary releases mimicking decisions made by operators by calibrating model logic to historical storage and flows. The model went through a validation phase comparing model results to historical operations and documenting the reasons for deviations from historical operations to develop a validated baseline.

Data Sources

South Fork Stanislaus River hydrology used in the analysis was calculated from USGS streamgage data and is described in the document *Stanislaus River Basin Hydrology Development* (Western Hydrologics, 2021). Demands and losses along the Main Tuolumne Canal were provided by TUD engineering staff and are developed from TUD canal gage data.

Modeling Assumptions

The Upper Stanislaus River model schematic used in the modeling studies is shown as Figure 1. Flow capacities used in the model are shown in Table 1.

Table 1 – Flow Capacities

Tuolumne Main Canal Capacity	50 cfs
Phoenix Powerhouse Capacity	23 cfs
Phoenix Powerhouse Bypass Capacity	0 cfs

Pinecrest Reservoir Labor Day minimum storages are set according to the amendment to the water quality certification for PG&E's Spring Gap-Stanislaus Project. The Labor Day minimums from the water quality certification used in the modeling are shown in Table 2. For end of spill dates earlier than June 18th, a minimum lake level of 5603 feet on Labor Day was assumed in the modeling.

Table 2 – Minimum Labor Day Lake Levels at Pinecrest Reservoir

End of Spill Date	Minimum Labor Day Lake Level (feet)
July 15 or later	5608
July 1-14	5606
June 25-30	5605
June 18-24	5603
Earlier than June 18	Licensee may propose an alternative lake level

In the Yield Study the minimum flow below Lyons Reservoir was set at 5.5 cfs in dry years, assuming no dry year potential variance from FERC for lower flow releases, such as occurred in 2014. Diversions through the Philadelphia Diversion Dam were eliminated completely, with no diversions throughout the modeling period.

The model was run with a strict lower limit of 1,000 AF at Lyons Reservoir. Demand was set such that the lowest storage in Lyons Reservoir throughout the modeling period was just over 1,000 AF. Pinecrest Reservoir was kept to an end-of-year minimum storage of 3,500 AF.

Table 3 – Minimum Flow and Storage Requirements

Minimum Instream Flow below Lyons Reservoir in Dry Years	5.5 cfs
Minimum Lyons Reservoir Storage	1,000 AF
Minimum Pinecrest Reservoir Storage on Labor Day	3,500 AF

The yield study scaled up the existing demands and canal losses, shown in Table 4, until Lyons Reservoir reached the 1,000 AF lower limit to determine available system yield under these parameters. The losses from Phoenix Reservoir were assumed to be constant and did not get scaled up in the yield study.

Table 4 – Existing Demands on the Main Tuolumne Canal, average monthly cfs

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Section 4 Canal	2.7	2.5	2.6	2.7	3.7	4.7	5.6	5.6	5.4	3.5	3.5	3.1
Columbia Canal	3.5	3.4	3.6	3.8	4.7	5.6	6.7	7.0	6.7	4.1	4.4	3.9
Delivery from Phoenix Reservoir	5.7	5.4	5.7	6.9	9.4	12.1	14.3	14.5	13.4	10.1	7.4	6.2
Losses from Main Tuolumne Canal	2.7	3.7	4.5	5.5	5.9	5.8	5.0	4.2	3.7	2.7	3.3	2.9
Losses from Phoenix Reservoir	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Total at Main Tuolumne Canal	15.6	16.0	17.4	19.9	24.6	29.3	32.6	32.3	30.2	21.4	19.5	17.1

Results

An exceedance chart of Annual Unimpaired Inflow at Lyons Reservoir shown as Figure 2, illustrates that 1977 is the driest year on record, 30% drier than the second driest year (2014). Modeled Lyons and Pinecrest storage in the 1976-1977 period are shown as Figure 3. Notice that Lyons storage gets as low as 1,088 AF several days after Labor Day, when Pinecrest Reservoir is free to dispatch storage below the Labor Day minimum. The lag between Labor Day and Lyons storage recovering is due to the ramping rate below the Philadelphia Diversion Dam. This lag can range from eight days in wetter years to as long as two weeks in drier years.

As illustrated in Figure 2, 1977 is the critical period for this system. Under these conditions, a minimum of 20,100 AF of diversions into the Main Tuolumne Canal on a consumptive use pattern was available in each year, including 1977. This is considered the Safe Yield for the Pinecrest-Lyons system assuming no Philadelphia diversions. In most years, additional water will be available for generation at Philadelphia Powerhouse. The potential for this available diversion is shown in Figure 4. Additional diversions for generation at Phoenix Powerhouse should be available more than 90% of the time.

Figure 1 - Model Schematic

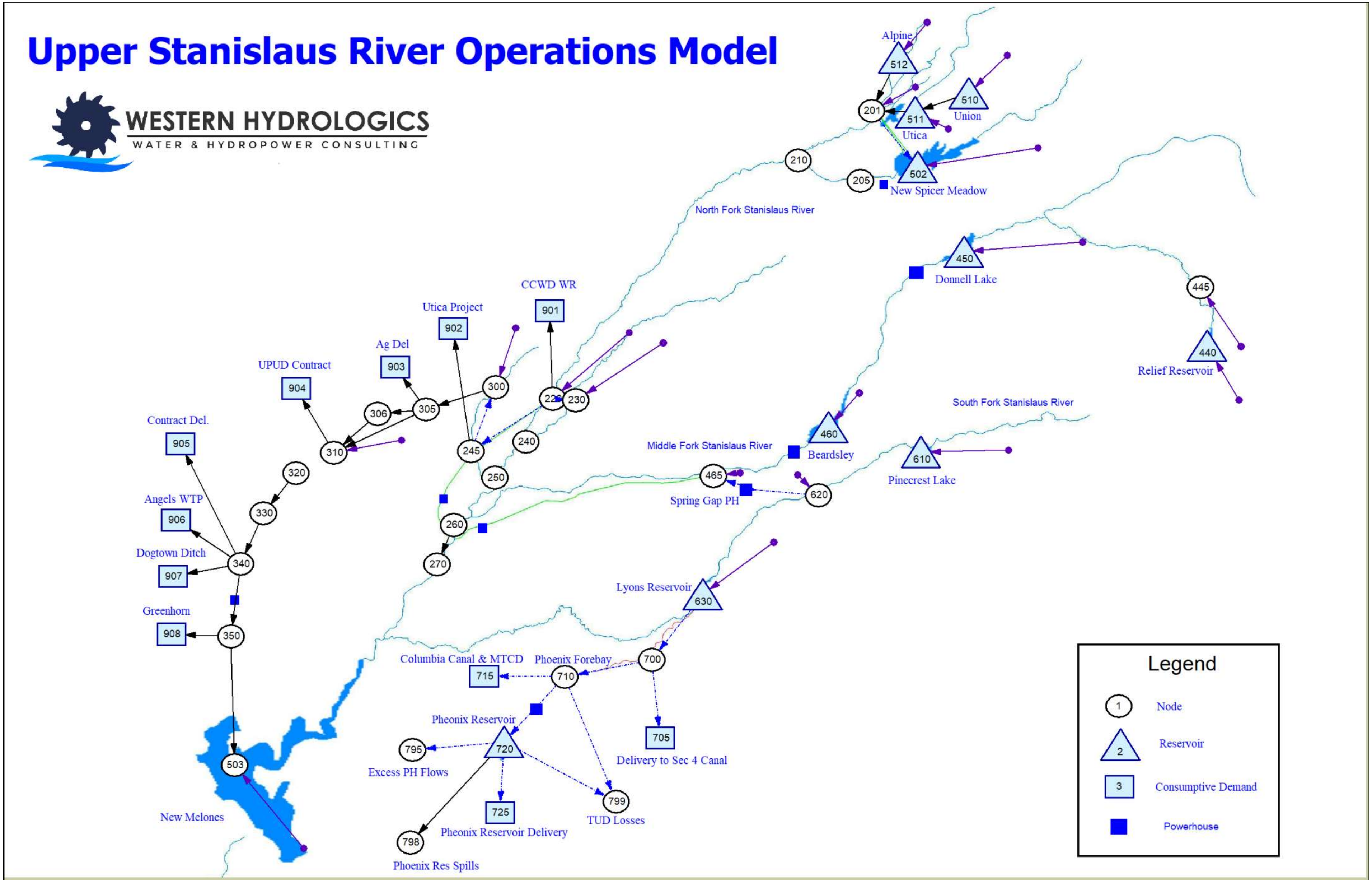


Figure 2 - Annual Unimpaired Flow at Lyons Reservoir, 1922-2017

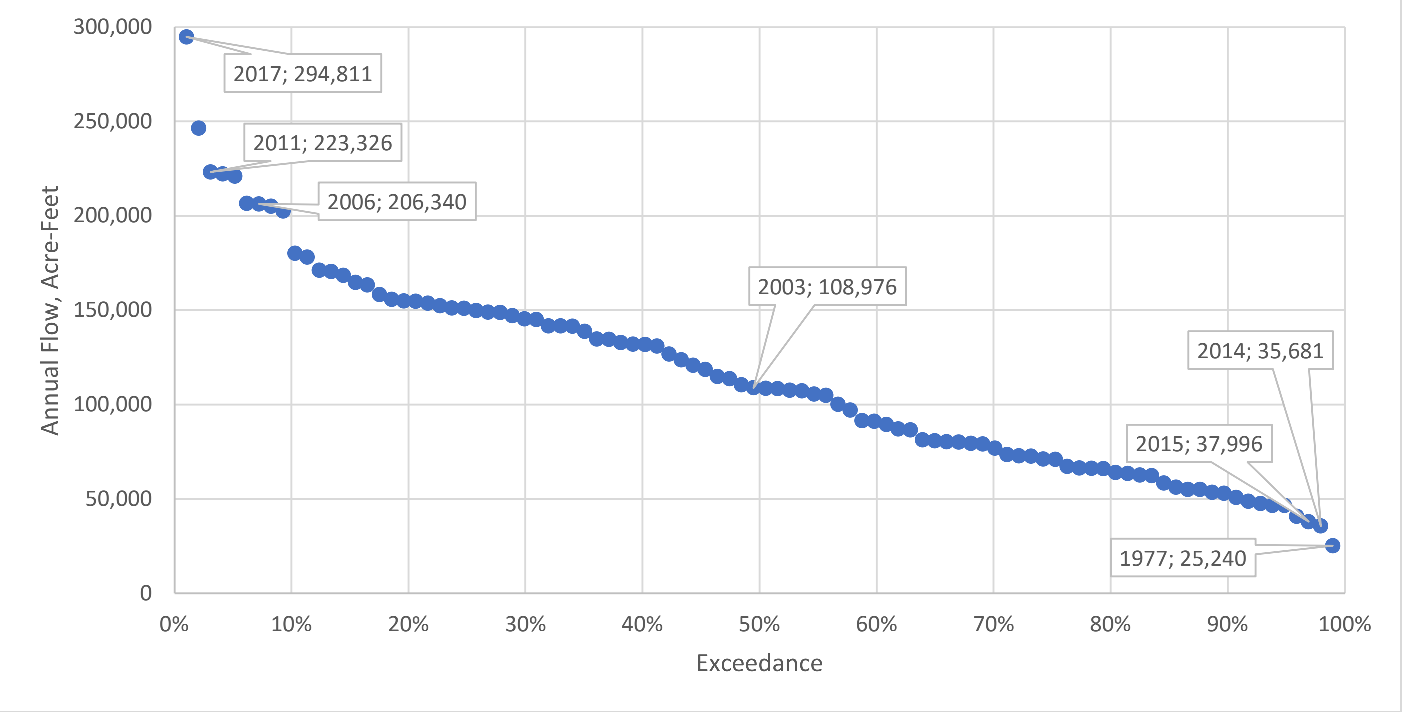


Figure 3 - Pinecrest and Lyons Storage, 1976-1977

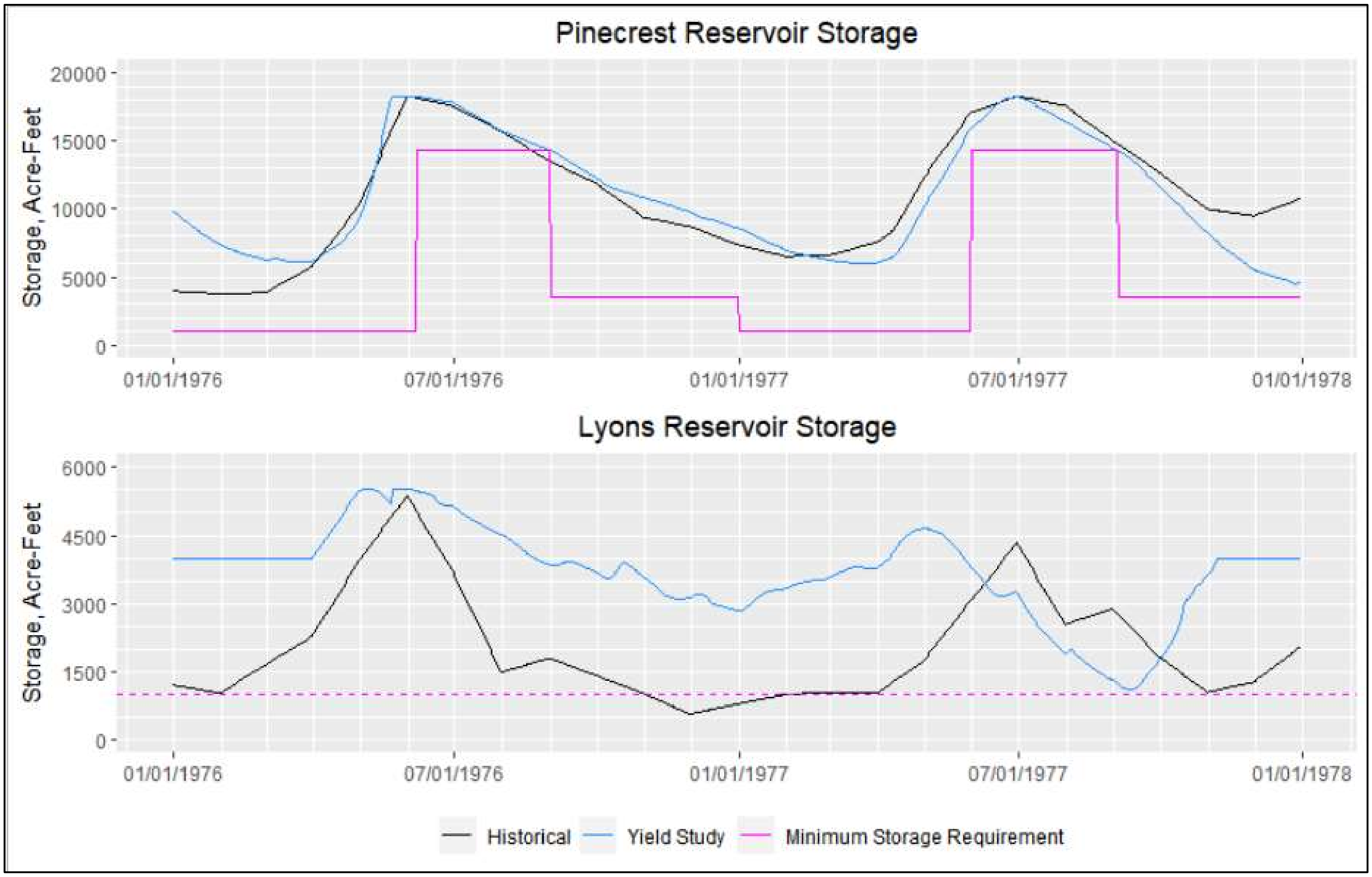
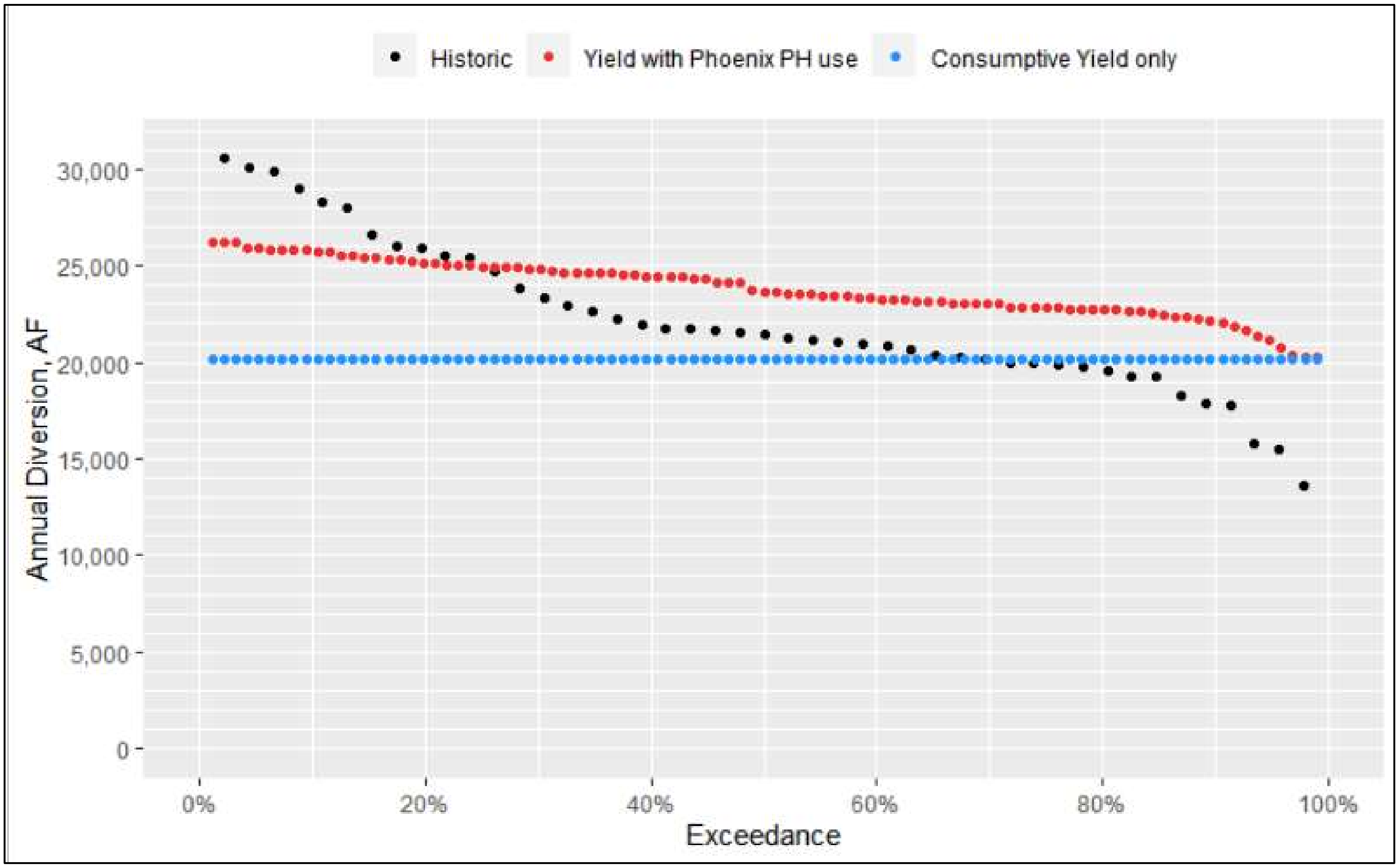


Figure 4 - Diversions into Main Tuolumne Canal Exceedance, 1922-2017 (Historic 1972-2017)

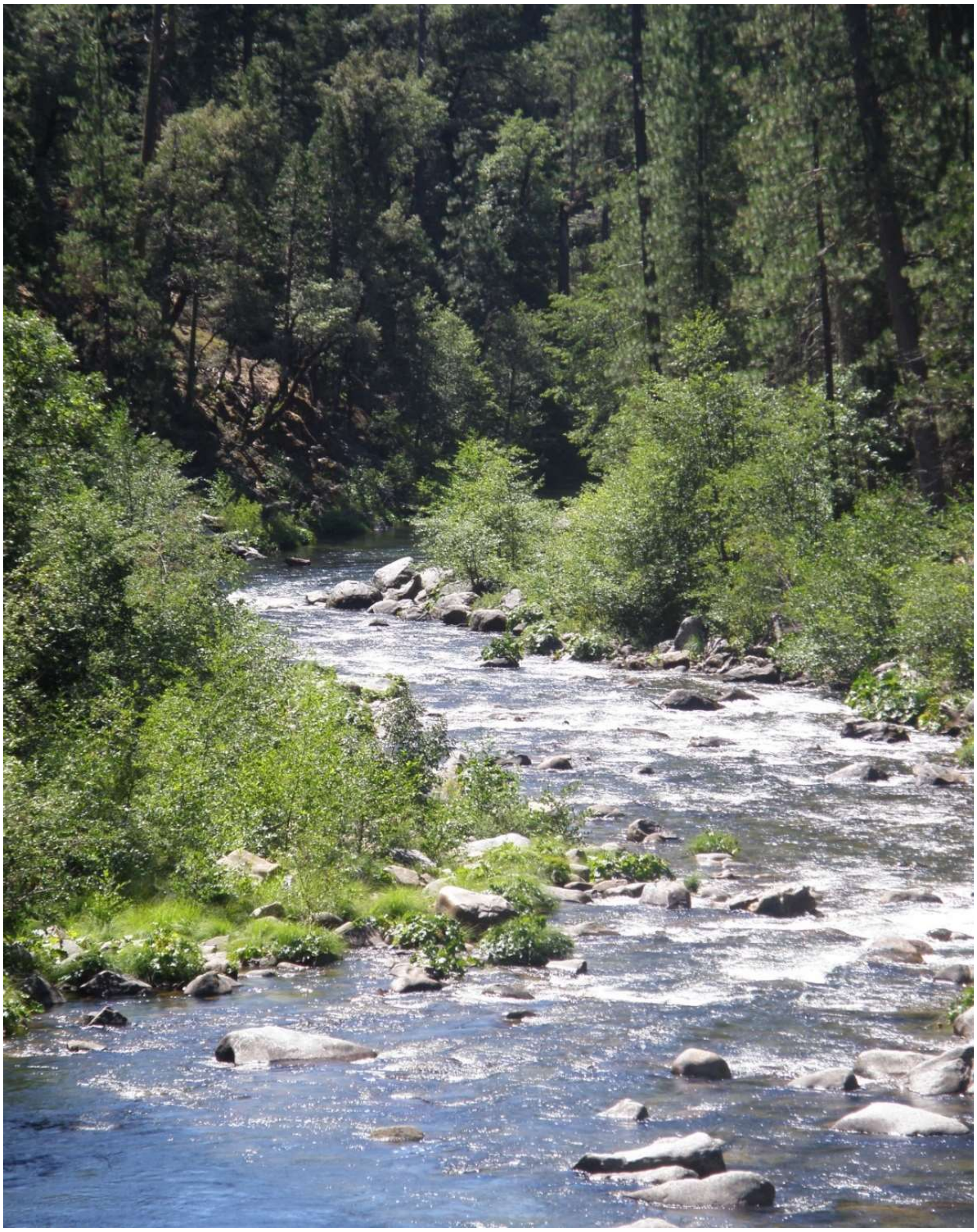


References

Western Hydrologics, *Stanislaus River Basin Hydrology Development*, 2021.

Stanislaus River Basin Hydrology

1922-2017



Western Hydrologics, April 2021

Introduction

This document describes the calculation of unimpaired hydrology of the Stanislaus River basin at several locations for use in a Stanislaus River operations model. The Stanislaus River flows southwest from the Sierra Nevada Mountains and is tributary to the San Joaquin River near Vernalis, CA. The Stanislaus River provides approximately 8% of the San Joaquin River's watershed area and averages 22% of the total impaired flow in the San Joaquin River at Vernalis.

The Stanislaus River Basin was split into multiple localized watersheds for input to a Stanislaus River operations model. Watersheds were designed to correspond with inflow points to reservoirs, diversions, and major streamgages. Some watersheds were further split into sub-watersheds for the hydrology development. A table listing the Stanislaus River basin watersheds is shown in Table 1.

Table 1 - Upper Stanislaus River Watersheds

Watershed No.	Watershed Description	Watershed Area (Sq Mi)	Fraction of Total
1	Alpine Reservoir	5.3	0.6%
2	Union Reservoir	13.8	1.5%
3	Utica Reservoir	2.3	0.3%
4	North Fork Stanislaus above North Fork Diversion Dam	7.4	0.8%
5	Highland Creek above New Spicer Meadow	45.4	5.0%
6	North Fork Stanislaus, NFDD to Avery streamgage	91.8	10.1%
7	Beaver Creek	29.3	3.2%
8	Mill Creek	8	0.9%
9	Angels Creek	6	0.7%
10	Middle Fork Stanislaus above Relief Reservoir	47.5	5.2%
11	Middle Fork Stanislaus, Relief Reservoir to Donnell Lake	135	14.9%
12	Middle Fork Stanislaus, Donnell Lake to Beardsley Lake	29	3.2%
13	Middle Fork Stanislaus, Beardsley to Sand Bar Div Dam	9	1.0%
14	South Fork Stanislaus above Pinecrest Lake	44.8	5.0%
15	South Fork Stanislaus, Pinecrest Lake to Philadelphia Diversion Dam	3.3	0.4%
16	South Fork Stanislaus, Philadelphia Div Dam to Lyons Reservoir	18.8	2.1%
17	Local Inflow to New Melones Reservoir	408.3	45.1%

Computational Approaches

Calculation of Inflow

Development of hydrology for the Stanislaus River Basin utilized four approaches for calculating or estimating the unimpaired flow in each watershed. Different combinations of data availability required different approaches for various watersheds and often different approaches for various time periods at an individual watershed. The four approaches are described below.

Mass Balance

Mass balance calculations calculate inflow to a watershed by adding releases, losses, and storage gains within that watershed. Often flows released from upstream facilties will then be subtracted from the downstream watershed's total inflow to calculate the local inflow to the downstream watershed. The flow originating within that watershed is often referred to as accretion flow or local inflow. The general equations for calculating inflow to a reservoir's watershed using a mass balance are:

$$Inflow = \left(Storage_{Today} - Storage_{Yesterday}\right) + Evaporation + Releases$$

and

$$\begin{aligned} Local\ Inflow = {} & \left(Storage_{Today} - Storage_{Yesterday}\right) + Evaporation + Releases \\ & - UpstreamReleases \end{aligned}$$

Correlation with a reference watershed

When calculated unimpaired inflows are available for a long period, but missing a number of years (usually years early in the hydrology development period), the missing data will be estimated using correlation with a reference watershed with a complete record. This method derives a correlation between calculated monthly unimpaired flow volumes and the reference watershed's monthly unimpaired flow volumes where data exists for both watersheds. Where monthly flow volumes have a strong linear correlation with a reference watershed, that linear factor will be applied to flows in the reference watershed to obtain estimates of unimpaired flows in the watershed of interest where flow data is missing.

Watershed area

When flow data is unavailable or unreliable, unimpaired flow in a watershed will need to be estimated without any information about flow volumes or patterns in that watershed. In these situations, the unimpaired flow in a nearby reference watershed is scaled by watershed area to obtain an estimate of unimpaired flow in the watershed of interest. This watershed area scaled flow is calculated as:

$$Flow_u = Flow_r \frac{A_u}{A_r}$$

Where:

$Flow_u$ = estimated unimpaired daily flow in watershed of interest

$Flow_r$ = gaged daily flow in reference watershed

A_u = area of watershed of interest

A_r = area of reference watershed

When using this method, the reference watershed is carefully selected to ensure that it has similar characteristics to the watershed of interest including overall watershed size and elevation range.

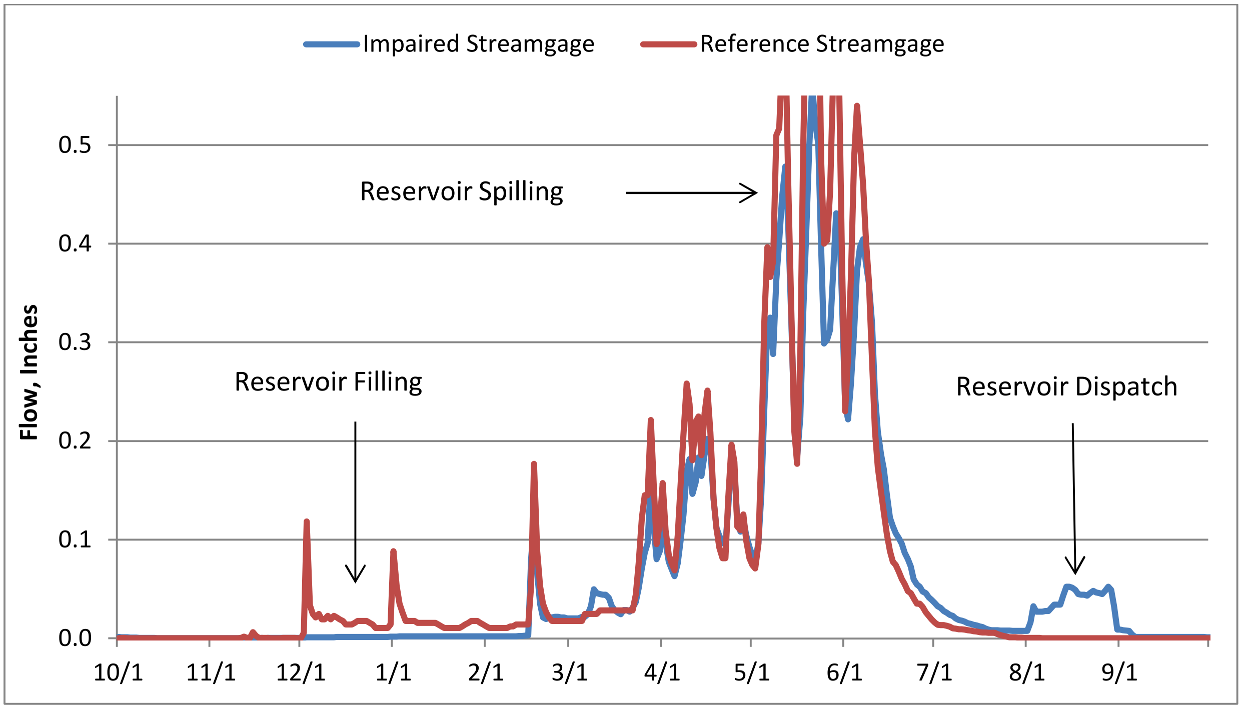
Watershed Contribution Factors - Percent of total basin flow

Early in the hydrology development period, it is common to find some river basins have only one streamgage capturing the flow of all watersheds of interest in that basin. This is the case with both the North Fork Stanislaus and Middle Fork Stanislaus river basins prior to the 1950s. This total basin flow cannot be divided amongst the watersheds using watershed area, because the higher elevation watersheds contribute less flow during the rainy season and more flow during the snowmelt season. To account for the temporal aspect of the contribution of each watershed, daily watershed contribution factors were developed by analyzing the long-term average contribution of each watershed to the total flow in the basin at each point in the season. The resulting watershed contribution factors describe each watershed's fraction of the total flow in the basin for each day of the year.

Obtaining Unimpared Flow from Impaired Streamgages

When a stream is impaired by a relatively small reservoir and has a highly representative reference gage, the unimpaired flow can be estimated from the impaired record. For this approach to work, the reservoir needs to be small enough that it fills each year and cannot have a variable carryover from one year to the next. When the impaired stream and an unimpaired reference gage are divided by watershed area to obtain watershed runoff in units of depth and plotted together, the reservoir fill and dispatch seasons can often be identified visually, as shown in Figure 1. Once these time periods are identified, reservoir dispatch can be subtracted from the impaired gage, and that volume is distributed over the reservoir fill period.

Figure 1 - Highland Creek and Cole Creek WY 1955



Daily inflow patterns

Daily calculations of unimpaired flow to a watershed are often noisy and erratic due to measurement errors and reporting precision. The combination of these factors can result in mass balance calculations yielding inflows with wide oscillations, negative inflows, and other hydrograph anomalies that do not make physical sense. It is usually necessary to process the calculated inflows into a hydrograph that makes sense through various smoothing techniques. Additionally, some inflows can only be accurately calculated on an annual basis, and these annual volumes need to be disaggregated into daily flows using reference streamgages. Three approaches were used to develop calculated hydrology into daily inflow hydrographs that make physical sense: distribution of annual volumes on pattern, distribution of monthly volumes on pattern, and using a running average of the calculated inflow.

Annual volume distribution

When annual inflow volumes can be accurately calculated but monthly flow patterns cannot be discerned from the available data, calculated annual flow volumes are distributed to a daily pattern using the following formula:

$$Daily\ Unimpaired\ Flow = Daily\ Reference\ Flow * \frac{Annual\ Unimpaired\ Volume}{Annual\ Reference\ Volume}$$

Monthly Volume distribution

When calculated inflow volumes are accurate on a monthly basis but are noisy on a daily basis, monthly volumes are distributed to daily flows using the following formula:

$$Daily\ Unimpaired\ Flow = Daily\ Reference\ Flow * \frac{Monthly\ Unimpaired\ Volume}{Monthly\ Reference\ Volume}$$

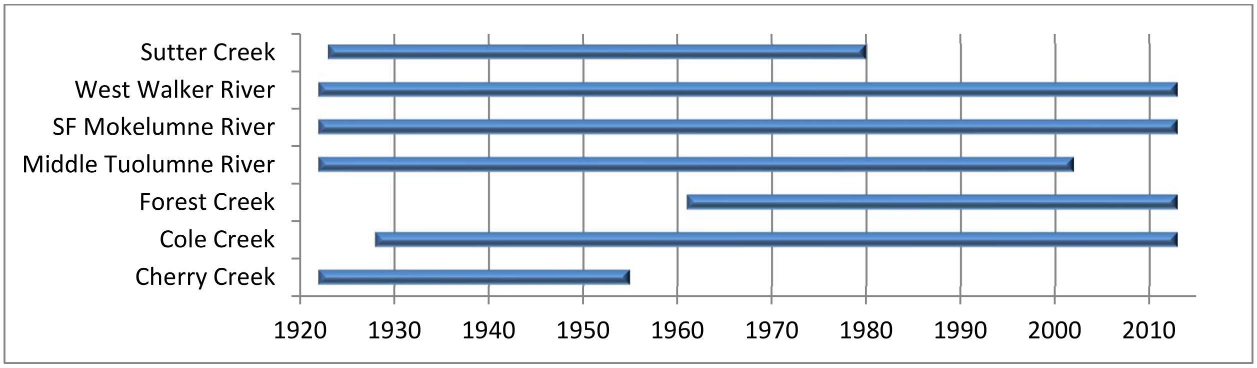
Running average

When daily data is available for mass balance inflow calculations, often the resulting daily inflows are mostly representative but somewhat erratic. This can be smoothed by averaging the inflow over a longer period of time. When employing a running average the winter and spring runoff period are averaged over a 3-day or 5-day period because inflow is large compared to the reservoir throughput volumes in the spring runoff period and winter rain events can produce inflow hydrographs that span a short period of time and could be neglected with a longer averaging period. During the summer and fall, inflow is averaged over a 15-day period because inflow is much smaller than reservoir throughput volumes and has more of a tendency to lose the signal in the noise.

Reference Streamgages

It is necessary to use some streamgages located outside of the Stanislaus River basin to provide patterns of daily flow and estimate missing years of data. These reference streamgages are located in adjacent river basins and have been selected due to a long record of daily unimpaired flow and similar watershed characteristic to watersheds within the Stanislaus Basin. Most of the daily unimpaired flows developed in this hydrology dataset are smoothed with one of these reference streamgages. Figure 2 shows the period of record of the reference gages that are used in the development of Stanislaus River hydrology.

Figure 2 - Reference Streamgages Period of Record



Cole Creek, a tributary to the North Fork Mokelumne River, is gaged above the diversion to Salt Springs PH and Lower Bear River Reservoir (Cole Creek near Salt Springs Dam Ca, USGS # 11315000). This streamgage has been recording flow in Cole Creek since water year 1928 and measures the flow at elevation 5930’, with Cole Creek’s headwaters at approximately elevation 7600’. This reference streamgage is representative of the medium elevation watersheds that have a significant rainfall contribution and significant snowmelt contribution.

West Walker River is gaged below the confluence with Little Walker River (West Walker River below Little Walker River near Coleville CA, USGS # 10296000), and has been directly gaged since water year 1939. The headwaters of West Walker River are adjacent to the headwaters of the Middle Fork Stanislaus to the east of Relief Reservoir's watershed, around elevation 10,200', and Walker River terminates at Walker Lake in Nevada. This reference streamgage is representative of high elevation snowmelt dominated watersheds and is used for estimating daily flows at Relief Reservoir.

Forest Creek is gaged above the confluence with the Middle Fork Mokelumne River (Forest Creek near Wilseyville CA, USGS # 11316800). This streamgage has been recording flow in Forest Creek since water year 1961, and captures the flow around elevation 2970'. Forest Creek's headwaters are located around elevation 6700'. This reference streamgages is representative of low to medium elevation watersheds that are rainfall dominated with a small snowmelt contribution.

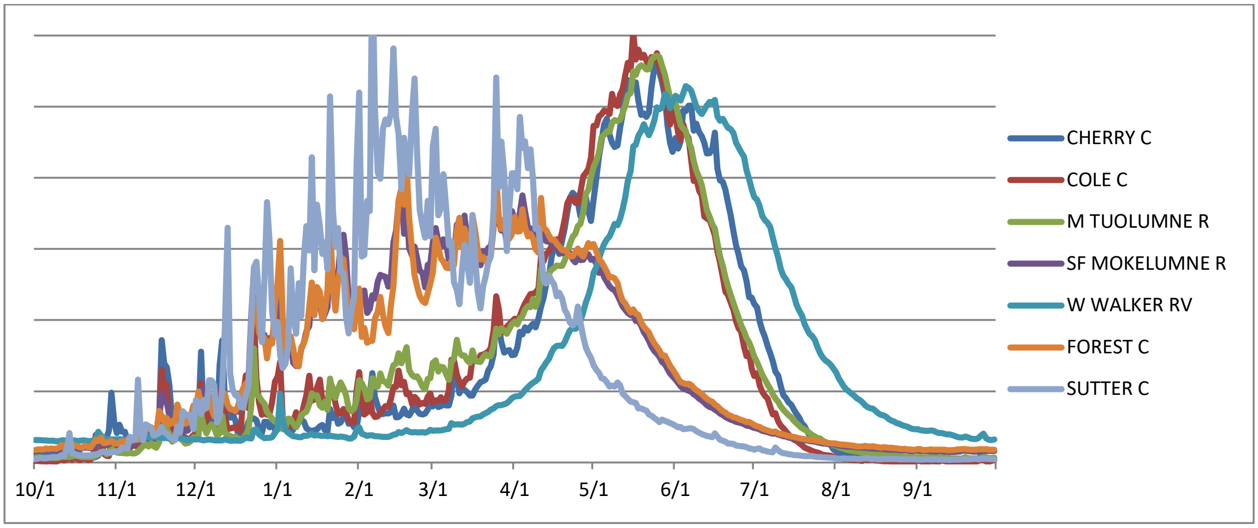
South Fork Mokelumne River is an unimpaired reach of the Mokelumne that has been directly gaged since water year 1912. South Fork Mokelumne River was gaged at one location from 1912 to 1934 (SF Mokelumne River near Railroad Flat Ca, USGS # 11317500), then gaged at another location approximately 8 miles downstream beginning water year 1934 (SF Mokelumne River near West Point Ca, USGS # 11318500), below the confluence with Licking Fork Mokelumne River. Scaling up the Railroad Flat streamgage by watershed area estimates the flow at West Point from 1922 to 1933, obtaining a complete record of the South Fork Mokelumne River at West Point for the entire period of hydrology development. The headwaters of the South Fork Mokelumne River are located around elevation 6200'. This reference streamgage is representative of low to medium elevation watersheds that are mostly rainfall dominated with some contribution from low elevation snowmelt.

Middle Fork Tuolumne is an unimpaired reach of the Tuolumne River that has been directly gaged since water year 1917 (Middle Tuolumne River at Oakland Recreation Camp, USGS # 11282000). The headwaters of the Middle Tuolumne River are located around 6000'. This reference streamgage is representative of lower elevation watersheds that are rainfall dominated and have some snowmelt runoff.

Cherry Creek, a tributary to the North Fork Tuolumne River, was directly gaged near Hetch Hetchy Lake beginning 1910 and continuing until Cherry Lake was constructed in 1954-1955. Cherry Creek's headwaters are located around 8100'. This streamgage is representative of medium to high elevation watersheds that are snowmelt dominated with some rainfall contribution, and is useful for smoothing inflows during the early portion of the hydrology development period.

Sutter Creek is a low elevation stream tributary to Dry Creek, a Westside stream tributary to the Mokelumne River. The headwaters of Dry Creek are at approximately 3600', with most of the watershed below 3000 feet. This reference streamgage is representative of low elevation watersheds that are rainfall dominated and have no snowmelt runoff.

Figure 3 - Reference Streamgages Average Unit Hydrograph



Evaporation

There are no historical evaporation measurement stations in the Upper Stanislaus River Basin, and there is one historical evaporation measurement station in the lower Stanislaus River, at Knights Ferry. There are higher-elevation historical evaporation measurement stations in adjacent river basins; Salt Springs in the Mokelumne River Basin, and Lake Eleanor in the Tuolumne River Basin. These historical evaporation records were analyzed, and the average monthly evaporation pattern for the Salt Springs and Lake Eleanor stations were very similar. The Salt Springs evaporation record was selected for use at reservoirs in the upper Stanislaus basin because it has the longest and most complete record of the higher elevation evaporation stations. The Knights Ferry evaporation record was selected for use at lower elevation reservoirs because of its proximity to New Melones and Tulloch Reservoirs. Salt Springs and Knights Ferry are both Class-A pans operated by the National Weather Service.

Period of record averages over each month were taken from CDWR Bulletin 73-79, and converted to reservoir evaporation rates using Eleanor Pan A Coefficients. These monthly evaporation rates are used with storage-area relationships at each reservoir to estimate evaporation for each day in mass balance calculations. The evaporation rates used in hydrology development are listed in Table 2.

Table 2 - Monthly Evaporation Rates

Month	Upper Basin Reservoirs		Lower Basin Reservoirs	
	Monthly Evaporation, Inches	Daily Evaporation, Inches	Monthly Evaporation, Inches	Daily Evaporation, Inches
Oct	4.83	0.16	4.54	0.15
Nov	2.75	0.09	1.79	0.06
Dec	2.21	0.07	0.86	0.03
Jan	1.68	0.05	0.81	0.03
Feb	1.44	0.05	1.12	0.04
Mar	2.30	0.07	2.20	0.07
Apr	3.35	0.11	3.46	0.12
May	4.55	0.15	5.51	0.18
Jun	6.12	0.20	7.97	0.27
Jul	7.78	0.25	8.89	0.29
Aug	7.98	0.26	8.35	0.27
Sep	7.06	0.24	6.82	0.23
Total	52.05	N/A	52.31	N/A

North Fork Stanislaus River

Methodology

Both the unimpaired and historically impaired hydrology had to be developed for the North Fork Stanislaus River. . A streamgage on the North Fork Stanislaus at Avery (USGS # 11294500) has a continuous record for the entire hydrology development period except water year 1924. This streamgage is located approximately at the upstream extent of McKays Point Reservoir. Before the construction of the North Fork Stanislaus River Project, Beaver Creek diversions were tributary to the North Fork Stanislaus above the Avery streamgage, and there are 13,640 AF of storage impairing the river above this point. The impaired flow at this point needs to be unimpaired of Beaver Creek diversions and upstream storage. Impaired Flow in the North Fork Stanislaus below the confluence with Beaver and Mill Creeks was also developed, to obtain the impaired flow at the upstream extent of the New Melones local inflow watershed.

The releases from the Upper Utica Project are gaged beginning in 1953, and releases from Spicer Meadow Reservoir are gaged beginning in 1955. Prior to 1955, the North Fork Stanislaus at Avery (USGS # 11294500) is distributed into each watershed using watershed contribution factors. Diversions from Beaver Creek, diversions into the Utica Canal, and diversions from Mill Creek are estimated when records are unavailable and used to develop an impaired flow below the confluence with Beaver and Mill Creeks. Beginning in water year 1955, direct calculations are used for inflows and impaired streamflows.

Upper Utica Project and North Fork Diversion Dam

Setting

The Upper Utica Project consists of three reservoirs in the headwaters of the North Fork Stanislaus River; Lake Alpine, Utica Reservoir, and Union Reservoir. The reservoirs were built between 1902 and 1910 and impair the North Fork Stanislaus for the entire hydrology period. North Fork Diversion Dam was built in the 1980s as part of the New Spicer Dam and North Fork Stanislaus River Project. The North Fork Diversion Dam has a total watershed area of 28 square miles, with 8 square miles of watershed area below Upper Utica Project reservoirs. Lake Alpine is on Silver Creek, tributary to the North Fork Stanislaus just above the North Fork Diversion Dam. Union is on the North Fork Stanislaus and releases into Utica, which releases to the North Fork Stanislaus.

Data Availability

Intermittent USGS Storage records are available for Upper Utica Project reservoirs beginning water year 1981. Beginning in water year 2001, storage records are near daily for Alpine and Utica, while still intermittent at Union until 2010. USGS streamgage records for releases from Upper Utica Project reservoirs are available beginning in water year 2006. Streamgage records on the North Fork Stanislaus approximately at the location of the North Fork Diversion Dam

(USGS # 11293500) exist from water year 1953 until the diversion dam was buiit, at which time the North Fork Stanislaus was gaged below the diversion dam (USGS # 11293600) and diversions were gaged at the tunnel outlet (USGS # 11293580).

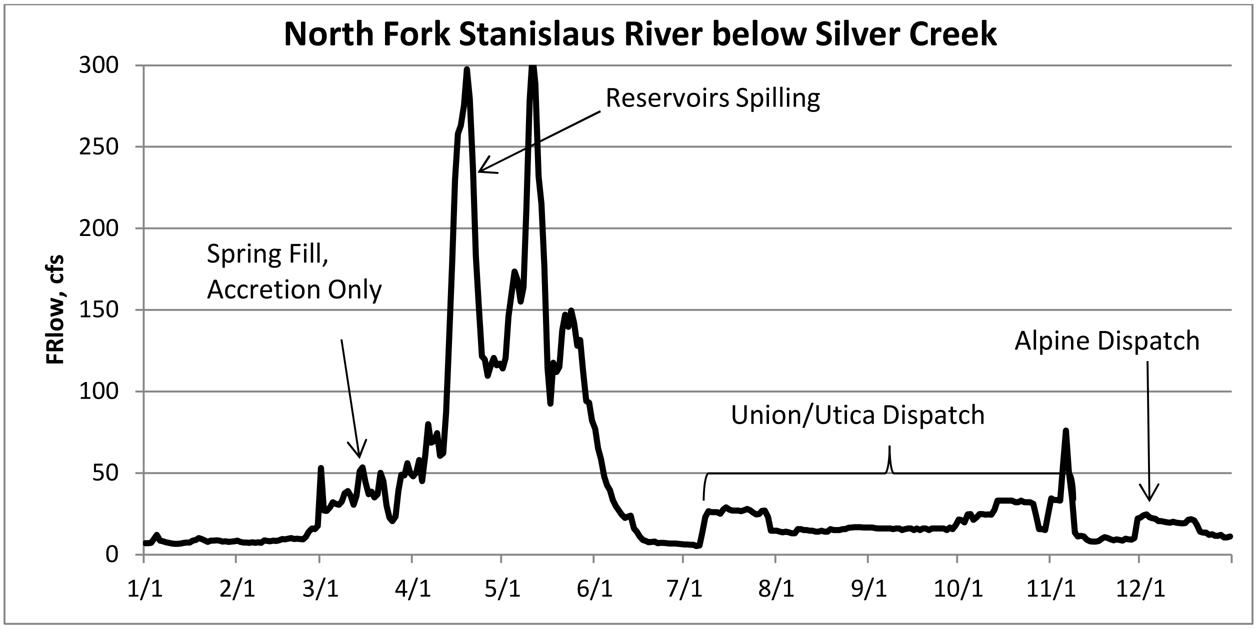
The intermittent storage records were developed into a daily storage record by interpolating between available data points. In some years a storage value is recorded during the low point in late fall, and another value is not recorded until July at the end of spill (examples include years 1995 through 1998). In these years, an artificial storage point was placed on the date of the best guess of beginning of spill at the reservoirs maximum storage. This helped move the captured inflow into the season in which it was captured instead of being grouped with the spill. These interpolated storage records were used in the inflow calculations.

Approach

Release records are not available until 2006, but reservoir releases can be estimated using the streamgage on the North Fork Stanislaus and storage records beginning in 1981. Using storage records and estimated releases, inflows to the project reservoirs can be calculated along with an accretion term for the watershed area between the reservoirs and the streamgage. Because of the intermittent storage records, these inflows are only accurate on a seasonal basis and are aggregated into annual volumes and distributed into a daily record using a reference gage.

Historically the Upper Utica Project reservoirs have been operated in a passive manner. These reservoirs are high elevation and difficult to access during times of the year. The reservoirs are generally set to release minimum flows in late fall, and fill throughout the winter until spilling sometime between February and April. They continue to spill or release minimum flows until the storage is dispatched, sometime between August and November. Often, these seasons can be seen visually when looking at an annual hydrograph of the North Fork Stanislaus River below Silver Creek, shown in Figure 4. There are clearly three flow sections, the early spring when reservoirs are filling and releasing minimums and all flow in excess of the minimum flow releases are from accretions below the reservoirs, then the reservoirs spill and flow downstream increases dramatically followed by a snowmelt recession, followed by reservoir dispatch.

Figure 4 - North Fork Stanislaus River below Silver Creek, 1994



Using storage records, we can determine which reservoirs are dispatching and their approximate release volume. When storage records are intermittent, the majority of records that are present are during the dispatch season indicating that most storage dispatches are fairly clearly defined by the storage record. Storage records can help estimate the date of spill at each reservoir, and this estimation is also informed by comparing the inches of runoff from each watershed throughout the year and adjusting spill dates when one watershed is out of line with the others.

North Fork Stanislaus at North Fork Diversion Dam Total Flow

The flow in the North Fork Stanislaus River above the North Fork Diversion Dam was directly gaged from 1953 through 1987, and can be calculated using a mass balance on the diversion dam for 1988 through 2017. These two datasets are combined to form a continuous record of the total flow in the North Fork Stanislaus River at the North Fork Diversion Dam from 1953 through 2017.

Unimpaired Inflows

Unimpaired inflows for the four watershed areas are calculated in an iterative method. Reservoir releases are estimated as minimum flow when storage is below the reservoir's maximum storage, and spill flow otherwise. Reservoir Dispatch Flows are estimated as each reservoir's storage withdrawal minus evaporation anytime storage withdrawal values are greater than minimum flows, and zero otherwise. North Fork Stanislaus accretions above the Diversion dam are calculated as the total flow at the diversion dam minus estimated releases from Alpine and Utica Reservoirs.

The flow during spill is estimated by dividing the total flow into segments for each watershed. When all reservoirs are spilling, inflow to each watershed is estimated as that watershed's fraction of the total watershed area, shown in Table 3. When only one reservoir is spilling, the other reservoir is assumed to be releasing minimums. That minimum is subtracted from the total flow at the diversion dam and the remaining flow is split by watershed area among the spilling reservoirs.

Table 3 - Upper Utica Project Watershed Areas

Watershed	Watershed Area (Sq Mi)	Fraction of Total
NF Diversion Dam (Accretions below reservoirs)	7.4	0.26
Lake Alpine	5.3	0.18
Union Reservoir	13.8	0.48
Utica Reservoir	2.3	0.08

Inflow to each reservoir is calculated with a mass balance using the estimated release and interpolated storage records and estimated evaporation. The resulting watershed runoffs are compared, accounting for watershed area, and when resulting runoffs are very dissimilar spill dates and dispatch flows are reevaluated until the runoff unit hydrographs generally agree. The resulting monthly inflow volumes are distributed into a daily inflow pattern using Cole Creek as a reference gage.

New Spicer Meadow Reservoir

Setting and Data Availability

Spicer Meadow Reservoir has been in operation since 1929 at a storage capacity of 4,060 AF. In the late 1980s New Spicer Meadow dam was built, and first filled in 1988-1989 with an upgraded capacity of 189,000 AF. Highland Creek below Spicer Meadow was gaged beginning water year 1955. Storage records are available beginning with the completion of New Spicer Meadow dam in 1988.

Approach

Beginning in water year 1989, Highland Creek inflow to New Spicer Meadow is calculated using a mass balance. From 1955 through 1988 the streamgage on Highland Creek below Spicer Meadow is unimpaired using a reference watershed. These two datasets are combined to form a continuous Highland Creek flow record 1955-2017.

Highland Creek Mass Balance

The equation to calculate the Highland Creek inflow New Spicer Meadow is the change in storage (USGS # 11293770) plus the release to Highland Creek (USGS # 11294000) minus the diversion from North Fork Diversion Dam (USGS# 11293580) plus evaporation. The resulting inflows were smoothed using a rolling average.

North Fork Stanislaus Accretions between North Fork Diversion Dam and Avery Streamgage

Accretions on the North Fork Stanislaus below New Spicer Meadow and North Fork Diversion Dam are calculated as the North Fork Stanislaus at Avery (USGS # 11294500) minus Highland Creek below New Spicer Meadow (USGS # 11294000) minus the NF Stanislaus below the NF Diversion Dam (USGS # 11293500 prior to 1988, USGS # 11293600 beginning water year 1988).

Beaver Creek

Inflows to Beaver Creek Diversion Dam are calculated using a mass balance starting in 1990, and are estimated as 0.2322 times the accretions on the North Fork Stanislaus prior to 1990.

The Beaver Creek diversion tunnel was upgraded in the late 1980s to a capacity of 400 cfs. Prior to this, it is assumed that the Beaver Creek Diversion tunnel had a capacity of roughly 60 cfs (the direct diversion limitation on their water right). To estimate diversions from Beaver Creek, which would be included in the flow measure at the Avery streamgage, it is assumed that Beaver Creek can perfectly divert 60 cfs at all times when the estimated flow in Beaver creek is greater than the assumed 3 cfs bypass release.

Watershed Contribution Factors

The long term record of unimpaired flow in the North Fork Stanislaus at Avery needs to be distributed into subwatersheds for the period before additional streamgages were placed in the North Fork Stanislaus basin. To determine the contribution of each watershed to the total flow in the North Fork Stanislaus at Avery, an analysis of the watershed contributions was performed using the data developed for 1990-2017. One would expect that lower-elevation watersheds would contribute more in the winter and spring rainfall season and relatively less during the late spring and summer when flows are mostly the result of snowmelt. Correspondingly, higher elevation watersheds would contribute less during the rainfall season and relatively more during the snowmelt season. Watersheds with higher elevations will have larger contributions later in the runoff hydrograph. Figure 5 shows the average hydrographs of each of the NF Stanislaus watersheds above the Avery streamgage, and Figure 6 shows the average contribution of each watershed throughout the water year. These watershed contribution factors, expressed as a fraction of the total watershed flow, are multiplied by the total unimpaired flow at Avery to calculate each watershed’s flow for the 1922-1954 period.

Figure 5 - North Fork Stanislaus Average Hydrographs

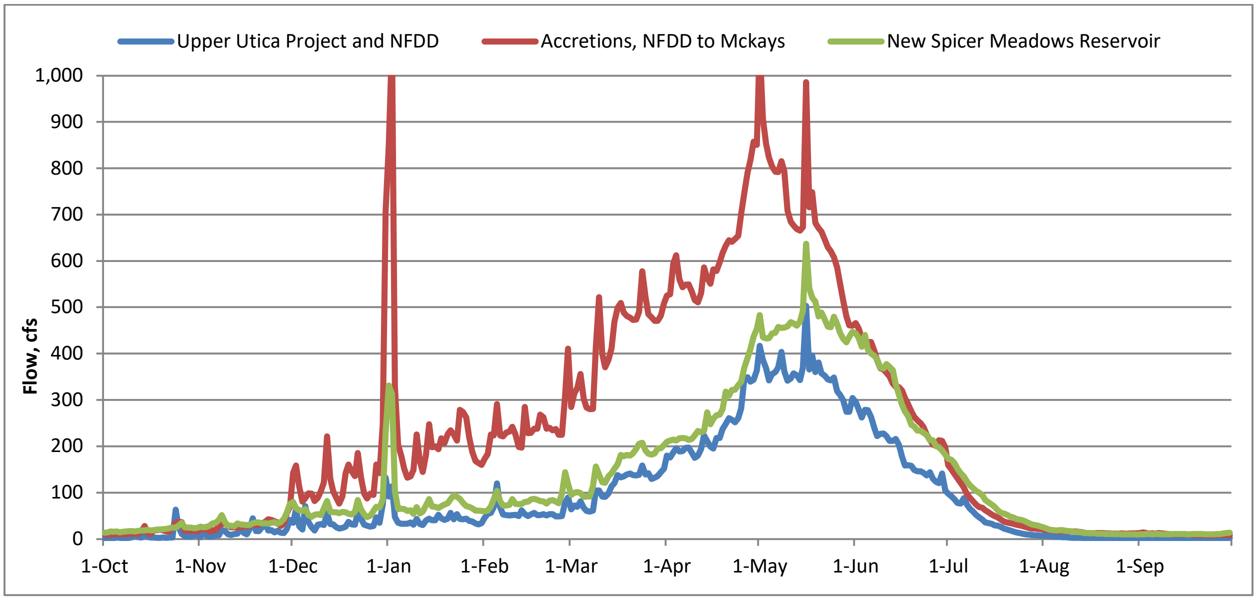
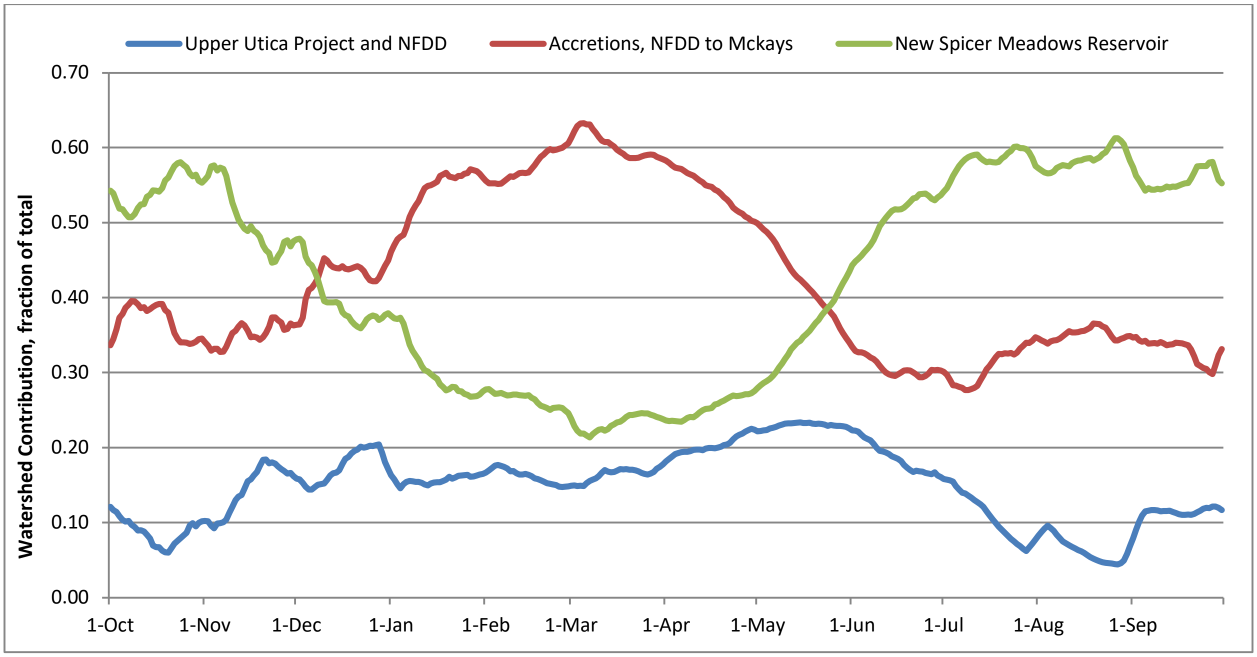


Figure 6 - North Fork Stanislaus Average Daily Watershed Contributions



Utica Ditch Assumptions

To calculate the historical impaired flow in the North Fork Stanislaus, it is necessary to estimate the flow going through the Utica Ditch (later the Mill Creek Tap). The Utica Ditch was directly gaged beginning in 1976, and needs to be estimated from 1922 through 1975. During the 1922-1975 period there was no Schedule of Maximum Delivery, and it is assumed that the Utica system took 88 cfs of combined Utica Ditch diversions from the North Fork Stanislaus and diversions from Mill Creek, with Mill Creek being diverted first.

With this assumption, the diversion from the NF Stanislaus is equal to the minimum of available NF Stanislaus River flows minus 1 cfs of bypass, or 88 cfs minus Available Mill Creek Diversions, where Available Mill Creek Diversions are defined as Total Mill Creek flow minus 3 cfs.

Mill Creek

Monthly streamgage records are available on Mill Creek above Hunters Reservoir 1970 to 1985. This record is extended using a monthly regression with South Fork Mokelumne, and monthly volumes are disaggregated into a daily pattern using South Fork Mokelumne.

Angels Creek

Monthly streamgage records of Angels Creek above Murphy's Afterbay are available 1970-1986. This record is extended using Sutter Creek 1922-1969, and extended using South Fork Mokelumne 1987-2017. The monthly record is disaggregated into a daily pattern using the same reference gage that was used for the extension.

Middle Fork Stanislaus River

Flows in the Middle Fork Stanislaus River need to be developed for both the unimpaired and the historically impaired condition. A streamgage on the Middle Fork Stanislaus River at Sand Bar Flat has a continuous record for the entire period of hydrology development. Relief Reservoir impaired the Middle Fork Stanislaus beginning in 1910, and in 1957 the Tri-Dam project was built, placing an additional 162,000 AF of storage on the Middle Fork Stanislaus.

Beginning in 1958 Middle Fork Stanislaus inflows can be calculated by mass balance on individual watersheds. From 1922 to 1957, unimpaired flows at MF Stanislaus at Sand Bar Flat are distributed using monthly watershed factors.

Relief Reservoir

Relief Reservoir is a 15 TAF reservoir in the headwaters of the Middle Fork Stanislaus on Summit Creek. A streamgage below the confluence of Summit Creek and Kennedy Creek measures the releases from Relief Reservoir in addition to natural flows in Summit and Kennedy Creeks. Performing a mass balance on Relief Reservoir using this streamgage calculates the inflow to the streamgage's entire watershed, so the calculated inflow is split by watershed area into flow originating above the reservoir and flow originating below the reservoir on Kennedy Creek.

Daily storage records at Relief Reservoir are available from USGS beginning 1981 and monthly storage records are available from CDEC beginning 1959. From 1959 to 1980, daily storage records are interpolated between monthly values, and the monthly inflow volumes are smoothed using West Walker River. From 1939 to 1958 annual release volumes are distributed into a daily record using West Walker River. The difference between reservoir inflow and reservoir outflow gives estimated storage during this period, which is used to unimpair the Middle Fork Stanislaus at Sand Bar Flat.

Beginning in 1959, Inflow to Relief Reservoir and Kennedy Creek is calculated as change in storage at Relief Reservoir (USGS # 11291000 and CDEC Station ID RLF) plus estimated evaporation plus Middle Fork Stanislaus at Kennedy Meadows (USGS # 11292000). The calculated inflows are aggregated into annual volumes and distributed into a daily record using West Walker River. Inflows to Relief Reservoir are highly correlated to West Walker River, with a monthly correlation coefficient of 0.96.

The calculated inflow to Releif Reservoir and Kennedy Creek is split into flow in Summit Creek above Relief Reservoir and flow in Kennedy Creek and Summit Creek below Relief Reservoir. The flows are spit using the watershed areas listed in Table 4.

Table 4 - Relief Reservoir Watershed Areas

Watershed	Area (acres)	Area (percent of total)
Kennedy Meadows Gage	30,400	100 %
Relief Reservoir	15,616	51.4 %
Kennedy Creek	14,784	48.6 %

Donnells Reservoir

Donnells Reservoir began storage in April 1957, and USGS storage records are available beginning October 1957. Release records are available beginning 1956, but the streamgage measuring flow below Donnells Reservoir is approximately 8 river miles below the reservoir and just above the highwater mark of Beardsley Reservoir. Performing a mass balalnce on using this release gage calculates the inflow to Donnells and accretions between Donnells and Beardsley. This calculated inflow is split by watershed area into flow originating above the reservoir and flow originating below the reservoir. This split by watershed area is checked by ensuring that the flow originating above the reservoir is greater than or equal to the sum of the streamgage below Relief Reservoir and the streamgage on Clark Fork Stanislaus River.

A mass balance on Donnells Reservoir is calculated as the change in storage in Donnells Reservoir (USGS # 11297700), plus estimated evaporation plus Donnells Total Release. Beginning in water year 1975, Donnells Total Release is calculated as the sum of the Middle Fork Stanislaus at Hells Half Acre Bridge (USGS # 11292700) and Donnell Powerhouse (USGS # 11292610). From 1958 through 1974, Donnells Total Release is calculated as the total inflow to Beardsley minus estimated Beardsley accretions.

Local inflow to Donnells Reservoir is calculated as Total Inflow to Donnells Reservoir minus the streamgage below Relief Reservoir (USGS # 11292000). The calculated local inflow is smoothed using a running average of the calculated daily values.

The calculated local inflow to Donnells reservoir is split into flow originating avove the reservoir (water that can be stored by the reservoir) and flow below Donnells but above the Hells Half Acre Bridge streamgage. The local inflow is split by watershed areas as listed in Table 5.

Table 5 - Donnells Watershed Areas

Watershed Description	Area (acres)	Area (Percent of total)
MF Stanislaus at Hells Half Acre Bridge, total area	183,680	N/A
Kennedy Meadows streamgage	30,400	N/A
MF Stanislaus at Hell Half Acre Bridge minus Kennedy Meadows	153,280	100 %
Donnells Reservoir below Kennedy Meadows	86,400	56.4 %
MF Stanislaus between Donnells and Beardsley	66,880	43.6 %

Beardsley Reservoir

Beardsley Reservoir began storage in January 1957, and USGS storage records are available beginning October 1957. Release records are available beginning 1956.

Beardsley Reservoir Total Inflow is calculated as the change in storage in Beardsley Reservoir (USGS # 11292800), plus estimated evaporation plus Beardsley Total Release. Beardsley Total Release is calculated as the sum of the Middle Fork Stanislaus below Beardsley (USGS # 11292900) and JWS Powerplant (USGS # 11292860).

Beardsley Reservoir Local Inflow is calculated as Beardsley Reservoir Total Inflow minus Donnells Reservoir Total Release. Local inflow to Beardsley reservoir is small compared to the volume of water being moved through the Donnells and Beardsley powerhouses, about 5% of the total flow volume being moved through the Beardsley Reservoir, and therefore the resulting local inflow is quite noisy on both a daily and monthly basis. The resulting local inflow is aggregated on an annual basis and distributed into a daily pattern using SF Mokelumne at West Point (1958-1960) and Forest Creek (1961-2017). The total local inflow to Beardsley Reservoir is equal to the local inflow calculated in this section plus the inflow calculated as part of the Donnells Reservoir inflow and split into flow below Donnells Reservoir in the Donnells Reservoir inflow split.

Sand Bar Flat

Middle Fork Stanislaus River was historically gaged at Sand Bar Flat beginning 1905, and Sand Bar Dam was constructed in 1939. The historical gage above at Sand Bar Flat was taken out of service in 1966, and a low-flow-only streamgage was constructed below Sand Bar Dam in 1969. Sand Bar Dam is approximately 2.5 miles below Beardsley Dam, and the local inflow to Sand Bar Flat has a watershed area about 11% of the total watershed area of the Middle Fork Stanislaus at this location. However local inflow to Sand Bar Flat is small compared to the total volume of water passing this location (8.5% of the total flow 1958-1966), which in combination with the lack of streamgage records for high flow events beginning in 1969 creates difficulties in calculating local inflow to Sand Bar Flat. Evaluating the calculated local inflow when gages are available shows local inflows with no correlation to nearby streams, even on an annual basis. This suggests that Calculated local inflows are a result of measuring errors in powerhouse flows more than an actual measure of hydrologic availability. For this reason, Sand Bar Flat local inflows are estimated by scaling Lyons Reservoir Local Inflow down by watershed area.

Total Impaired Flow at Sand Bar Flat

The total impaired flow at Sand Bar Flat is continually gaged, but by a different series of streamgages throughout the time period. From 1922 through 1966, the total impaired flow in the Middle Fork Stanislaus at Sand Bar Flat is recorded by Middle Fork Stanislaus at Sand Bar Flat (USGS # 11293000), which includes imports from the South Fork Stanislaus. The release from Beardsley is recorded first by Middle Fork Stanislaus River below Beardsley (USGS # 11292900) and then by Middle Fork Stanislaus River below Beardsley Total Flow (USGS # 11292901) after JWS powerplant was constructed in 1985, but this only captures releases from Beardsley and not the imports from South Fork Stanislaus. From 1967 through 1984, impaired Middle Fork Stanislaus at Sand Bar Flat is calculated as Middle Fork Stanislaus below Beardsley (USGS # 11292900) plus Philadelphia Canal (USGS # 11297000) plus estimated accretions from Beardsley to Sand Bar Flat. From 1985 through 2017, impaired Middle Fork Stanislaus at Sand Bar Flat is calculated as Middle Fork Stanislaus below Beardsley Total Flow (USGS # 11292901) plus Philadelphia Canal (USGS # 11297000) plus estimated accretions from Beardsley to Sand Bar Flat.

Watershed Contribution Factors

The long term record of unimpaired flow in the Middle Fork Stanislaus at Sand Bar Flat needs to be distributed into individual watersheds for the period before Tri-Dam reservoirs were constructed in the Middle Fork Stanislaus basin. To determine the contribution of each watershed to the unimpaired flow in the Middle Fork Stanislaus at Sand Bar Flat, an analysis of the watershed contributions was performed using the data developed for 1958-2017. One would expect that lower-elevation watersheds would contribute more in the winter and spring rainfall season and relatively less during the late spring and summer when flows are mostly the result of snowmelt. Correspondingly, higher elevation watersheds would contribute less during the rainfall season and relatively more during the snowmelt season. Watersheds with higher elevations will have larger contributions later in the runoff hydrograph. Figure 7 shows the average hydrographs of each of the MF Stanislaus watersheds, and Figure 8 shows the average contribution of each watershed throughout the water year. These watershed contribution factors, expressed as a fraction of the total watershed flow, are multiplied by the unimpaired flow at Sand Bar Flat to estimate each watershed’s flow for the 1922-1957 period.

Figure 7 - Middle Fork Stanislaus Average Daily Hydrographs, 1958-2017

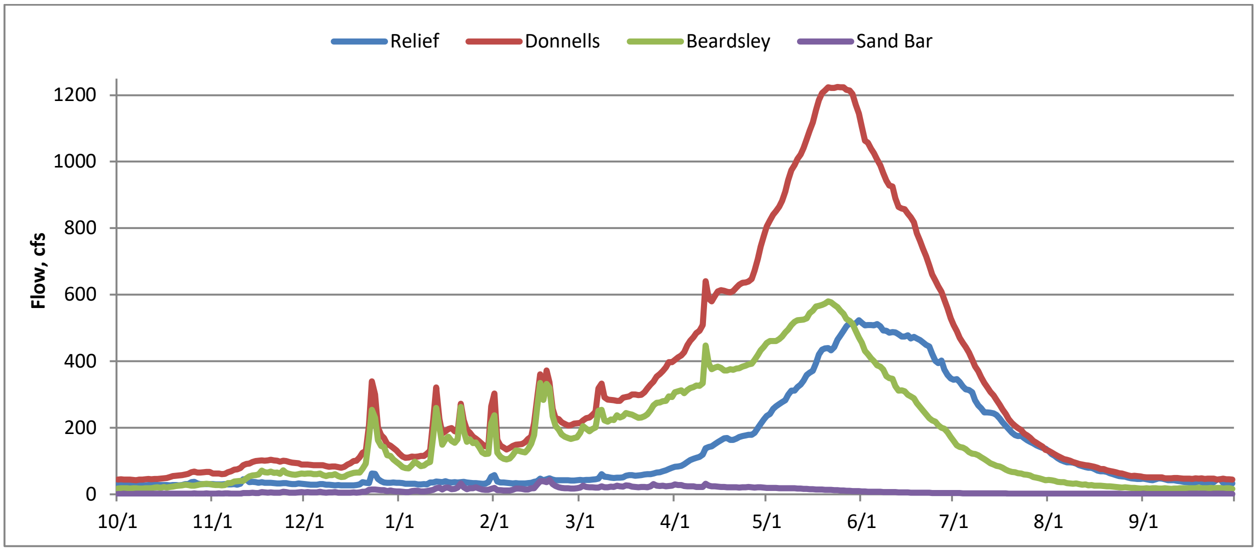
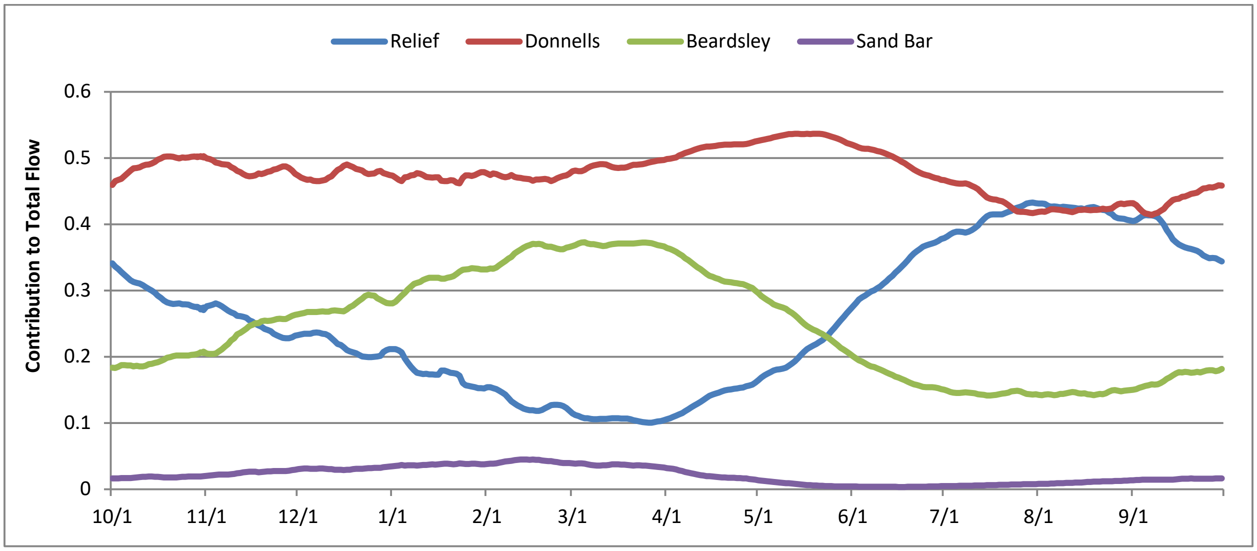


Figure 8 - Middle Fork Stanislaus Average Daily Watershed Contributions, 1958-2017



South Fork Stanislaus River

South Fork Stanislaus River is impaired by Pinecrest Lake and Lyons Reservoir. There are two major diversions exporting water to the Middle Fork Stanislaus River and to Tuolumne County. The basin is well-gaged beginning in 1937, and ungaged before 1937. Watershed inflow can be calculated directly by mass balance for 1938-2017, and inflows for 1922-1937 need to be estimated using correlation with a reference watershed.

Pinecrest Lake

Pinecrest Lake began storing water in 1916, USGS daily storage records are available beginning in 1981, and CDEC monthly storage records are available beginning in 1960. Release records from Pinecrest lake are available beginning 1939. Inflows to Pinecrest Lake are calculated using a mass balance 1960-2017, and annual release volumes are distributed using Cherry Creek daily pattern for 1939-1959. For 1922-1938, inflows are estimated using a correlation with a reference watershed.

Inflows to Pinecrest Lake are calculated using a mass balance as storage change in Pinecrest lake (USGS # 11295901 or CDEC ID SWB) plus release from Pinecrest (USGS # 11296500) plus estimated evaporation. Daily inflows are smoothed using a rolling average.

For 1922-1938, inflows to Pinecrest Lake are estimated as 0.3249 times the flow in Cherry Creek.

Lyons Reservoir

Lyons reservoir began storing water in 1930, USGS daily storage records are available beginning in 1981, and CDEC monthly storage records are available beginning in 1973. Release records are available beginning 1938, including exports to Tuolumne basin.

The total inflow to Lyons Reservoir is calculated as change in storage (USGS # 11297700 or CDEC ID LYN) plus estimated evaporation plus total release from Lyons Reservoir. Total release from Lyons Reservoir is calculated as releases to South Fork Stanislaus (USGS # 11298000) plus exports to Tuolumne Canal (USGS # 11297500). Local Inflow to Lyons Reservoir is calculated as Total Inflow to Lyons Reservoir plus Philadelphia Canal exports to Middle Fork Stanislaus (USGS # 11297000) minus releases from Pinecrest Lake (USGS # 11296500). Calculated local inflow to Lyons Reservoir is smoothed using MF Tuolumne (1973-2002) and Forest Creek (2003-2017).

For 1938-1972, local inflows to Lyons reservoir are calculated on an annual basis, and the annual volumes are distributed to a daily pattern using Middle Fork Tuolumne. The annual local inflows to Lyons reservoir are calculated as total release from Lyons Reservoir (USGS # 11298000 plus USGS # 11297500) minus release from Pinecrest (USGS # 11296500) plus Philadelphia Canal exports to Middle Fork Stanislaus River (USGS # 11297000) plus average annual evaporation at Lyons Reservoir (428 AF, averaged over 1973-2017).

For 1922-1937, total flow in the South Fork Stanislaus River at Lyons has better correlations to reference watersheds than local inflow to Lyons. For this reason, a total unimpaired flow at Lyons Reservoir is estimated and Pinecrest inflows are subtracted to estimate local inflows to Lyons Reservoir. Total flow Lyons reservoirs is estimated as 1.3679 times the flow in Middle Fork Tuolumne River. Local inflow to Lyons is then estimated as the estimated total flow in South Fork Stanislaus at Lyons minus estimated unimpaired South Fork Stansialus at Pinecrest.

New Melones Local Inflow

Local Inflows to New Melones are defined as inflow to New Melones originating below McKays Point Reservoir on the North Fork Stanislaus, below Sand Bar Flat on Middle Fork Stanislaus, below Lyons Reservoir on South Fork Stanislaus, below Hunters Reservoir on Mill Creek, and below Angels Powerhouse on Angels Creek. Total inflow to New Melones is calculated, and then the upstream extents of the New Melones local inflow watershed are subtracted to obtain local inflow.

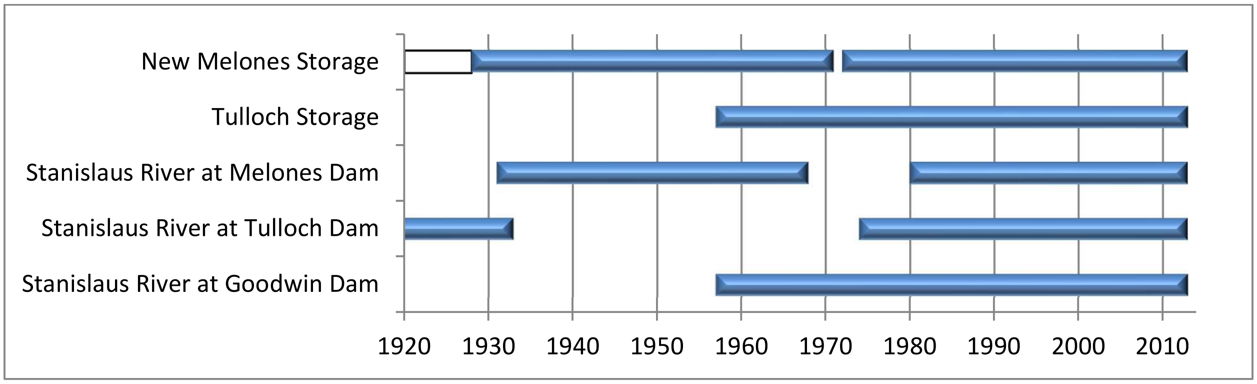
Methodology

New Melones Release records are not available for the entire period of record. When New Melones release records are not available, New Melones releases need to be estimated from Tulloch Inflows. Tulloch’s watershed area is 108% of New Melones watershed area, so Tulloch local inflows are small compared to the total flow at this point. Local Inflows to Tulloch are calculated when data is available, and then local inflows to Tulloch are estimated using a regression with a nearby reference watershed. Those estimated Tulloch local inflows are subtracted from the calculated Tulloch total inflow to obtain total outflow from New Melones.

With a consistent release record from New Melones, New Melones total inflow is calculated on a mass balance, and then local inflow to New Melones are calculated using a mass balance approach.

The data sources on this part of the Stanislaus River are intermittent, with various streamgages coming on and offline throughout the period of record. The availability of data sources are shown graphically in Figure 9, and discussed in detail in each watershed’s section.

Figure 9 - Lower Stanislaus River Data Availability



Tulloch and Goodwin Total Inflow

Tulloch Reservoir was built in 1957. Goodwin Dam is a small diversion dam located about one mile downstream of Tulloch Dam. The Stanislaus River from Tulloch Dam to Goodwin Dam has such a small watershed area (6 square miles compared to 986 square miles of Stanislaus River watershed at this location) that outflows from Tulloch Reservoir and inflows to Goodwin Dam are considered to be equivalent. The effect of this assumption will be to lump any actual local inflows to Goodwin Dam in with local inflows to Tullcoh Reservoir. Goodwin Dam has no long term storage (capacity 680 AF), so outflows from Goodwin Dam are considered equivalent to inflows into Goodwin Dam minus estimated evaporation.

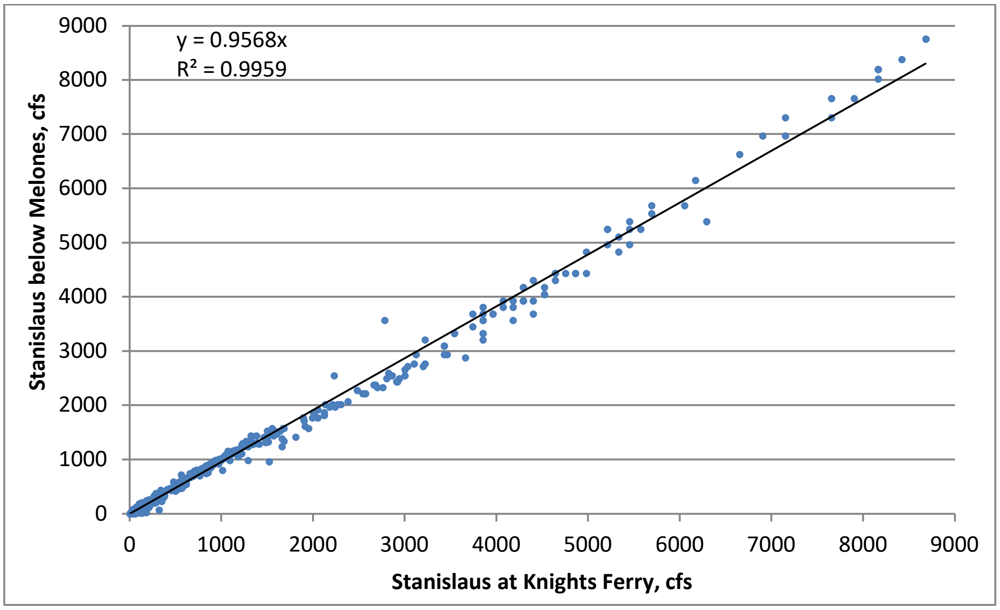
The Stanislaus River was gaged approximately at the location of Tullooch dam from 1915 to 1932. Releases from Tulloch were recorded when the Tulloch Powerhouse began operation in 1974. Releases from Goodwin Dam are fully gaged beginning in 1957. From 1933 through 1956, there is not sufficient data to calculate flow at Tulloch or Goodwin Dams. During this time, impaired total inflow to Tullcoh and Goodwin is estimated as gaged New Melones releases plus estimated Tulloch Local Inflows. Total inflow to Tulloch Reservoir and Goodwin Dam is calculated 1922-1932 as the gaged flow at Tulloch Dam (Stanislaus River at Knights Ferry, USGS #), 1933-1956 as gaged flow below Melones Dam () plus estimated local inflows to Lake Tulloch, 1957-2017 using a mass balance calculated as change in storage at Tulloch (Tulloch Reservoir, USGS # 11299995) plus releases from Goodwin (Stanislaus River below Goodwin Dam, USGS # 11302000, plus Oakdale Canal Diversion, USGS # 11301000, plus South San Joaquin Canal Diversion, USGS # 11300500) plus estimated evaporation.

New Melones Inflow

Melones reservoir began storage in 1920, and USGS storage records of Melones Reservoirs (and later New Melones Reservoir) are available beginning June 1927. USGS streamgage records below New Melones are available 1931-1967 (Stanislaus River below Melones PP, USGS # 11299500) and 1980-2008 (Stanislaus River below New Melones PP, USGS # 11299200). CDEC records of daily New Melones total outflow are available beginning in 1988. When New Melones release records are unavailable, New Melones relesases need to be estimated from Tulloch and Goodwin Inflows.

Total Release from New Melones is estimated 1928 through January 1931 as 0.9568 times the streamgage Stansialus River at Knights Ferry (USGS # 11300000). This factor was derived from a daily correlation between flows at Knights Ferry and Flows below Melones Dam for calendar years 1931 and 1932. Although this is a small sample size, there is a very strong correlation between these daily flows, shown in Figure 10, with a correlation coefficient greater than 0.99.

Figure 10 - Daily Flows in Stanislaus River at Knights Ferry and below Melones Dam, 1931-1932



Total Inflow to New Melones is calculated 1928-1931 using a mass balance on New Melones Reservoir, using the estimated release based on Stanislaus at Knights Ferry as the release record. Total Inflow to New Melones is calculated 1931-1967 using a mass balance on New Melones Reservoir, using Stanislaus River below Melones PP (USGS # 11299500) as the release record. Total Inflow to New Melones is calculated 1968-1981 and 1987 using a mass balance on New Melones Reservoir with releases from New Melones estimated as the total inflow to Lake Tulloch minus estimated Lake Tulloch local inflows. Total Inflow to New Melones is calculated 1982-1986 and 1988-2017 using a mass balalnce on New Melones reservoir using Stanislaus River below New Melones PP (USGS # 11299200) as the release record. These calculations are combined to form a continuous record of inflow to New Melones reservoir 1922-2017. The releases assumed at New Melones during each period are combined to form a continuous record of releases from New Melones for 1922-2017.

Tulloch Local Inflow

Local Inflow to Lake Tulloch is calculated using a mass balance, calculated as total inflow to Lake Tulloch minus release from New Melones. Annual local inflows to Lake Tulloch calculated with a mass balance are often negative, especially the 1996 through 2017 period, which averages -6000 AF per year. This is probably due to gage errors in either the New Melones and Tulloch powerhouses or both. Annual local inflows to Lake Tulloch have a good correlation to a nearby reference watershed for the 1931-1957 period, when releases from Melones were well gaged and Tulloch reservoir had not been constructed. The correlation obtained during this time period is used to estimate annual local inflows to Lake Tulloch for 1958-2017 and 1922-1930.

New Melones Local Inflow

New Melones local inflow is calculated using a mass balance on the New Melones local inflow watershed. This mass balance is done on a daily basis 1938-2017 and on an annual basis 1922-1937. The calculation for this mass balance on a daily basis is:

$$
\begin{aligned}
&\mathit{New\ Melones\ Local}\\
&\qquad = \mathit{New\ Melones\ Total} \ - \ \mathit{SF\ Stanislaus\ below\ Lyons}\\
&\qquad - \mathit{MF\ Stanislaus\ at\ Sand\ Bar\ Flat}\ (\mathit{including\ Stanislaus\ PP})\\
&\qquad - \mathit{NF\ Stanislaus\ below\ Mill\ Creek}\ (\mathit{including\ Collierville\ PH})\\
&\qquad - \mathit{Angels\ Creek\ below\ Angels\ PH}
\end{aligned}
$$

The calculation for the mass balance on an annual basis for 1922-1937 uses unimpaired SF Stanislaus at Lyons in place of the impaired SF Stanislaus below Lyons, which is only available beginning in 1938. The South Fork Stanislaus is impaired by Pinecrest 1922-1929 and is impaired by both Pinecrest and Lyons 1930-1937 but there is no record of storages or flows during this period, leaving the hydrologist with no good options to estimated impaired South Fork Stanislaus flows 1922-1937 without an iteration between hydrology development and simulation models. It is assumed that there are no exports from the South Fork Stanislaus Basin before 1938.

Summary and Checks

Basin Anchor Point – New Melones Inflow

Various checks were performed to evaluate the calculated hydrology and ensure that the total basin flow was not over- or underestimated over the period of record. Unfortunately there is no single streamgage that can be used as an anchor point for the entire 1922-2017 period. We have recorded flows at Tulloch 1922-1933, at Melones 1931-1968, and at Goodwin 1957-2017. New Melones inflows are estimated from flows at Tulloch and Melones, and that extended New Melones record is used as an anchor point, with special care taken to ensure that the developed hydrology also agrees with recorded flows at Goodwin Dam. The annual average total inflow and outflow at Goodwin, Tulloch, and New Melones for the 1922-2017 period are shown in Table 6.

Table 6 - Average Annual Inflow and Outflow Volumes in Stanislaus River, 1922-2017

Reservoir	Total Inflow, AFA	Total Outflow, AFA	Difference, AFA
Goodwin	1,067,328	1,067,004	324
Tulloch	1,071,518	1,067,328	4,191
New Melones	1,066,474	1,038,975	27,499

The difference between inflow and outflow at Goodwin is equal to the average annual evaporation at Goodwin, 324 AF per year. The difference between inflow and outflow at Lake Tulloch comes from various sources. Average annual evaporation from Lake Tulloch is 4,740 AF per year when Tulloch is operating, but Tulloch did not store water until 1957 so the annual average evaporation from Tulloch over 1922-2017 is 2,880 AF. At the end of water year 2017, Tulloch storage was 61,000 AF compared to zero storage in 1922. This translates to an average of 663 AF per year being diverted to storage (61,000 AF over 92 years). The losses at Lake Tulloch are summarized in Table 7, with remaining unexplained losses of 645 AF per year, 0.06% of the annual average flow at Tulloch dam and easily within gaging errors.

Table 7 - Average Annual Losses at Lake Tulloch

Difference between Inflow and Outflow	4,191 AF
Evaporation Losses	2,883 AF
Stored Water	663 AF
Unexplained Losses	645 AF

The difference between inflow and outflow at New Melones comes from various sources. Annual average evaporation is equal to 2,447 AF at Old Melones, and 18,983 AF at New Melones, with an average of 8,640 AF for the entire 1922-2017 period. At the end of water year 2017, New Melones Storage was 1,047,055 AF compared to the 6,000 AF that Old Melones regularly reached in the fall of the 1920s. This storage gain over 92 years corresponds to 11,316 AF of storage gain each year. The losses at New Melones Reservoir are summarized in Table 8, with the remaining unexplained losses of 3,900 AF, 0.37% of the total flow at New Melones and well within streamgaging error.

Table 8 - Average Annual Losses at New Melones Reservoir

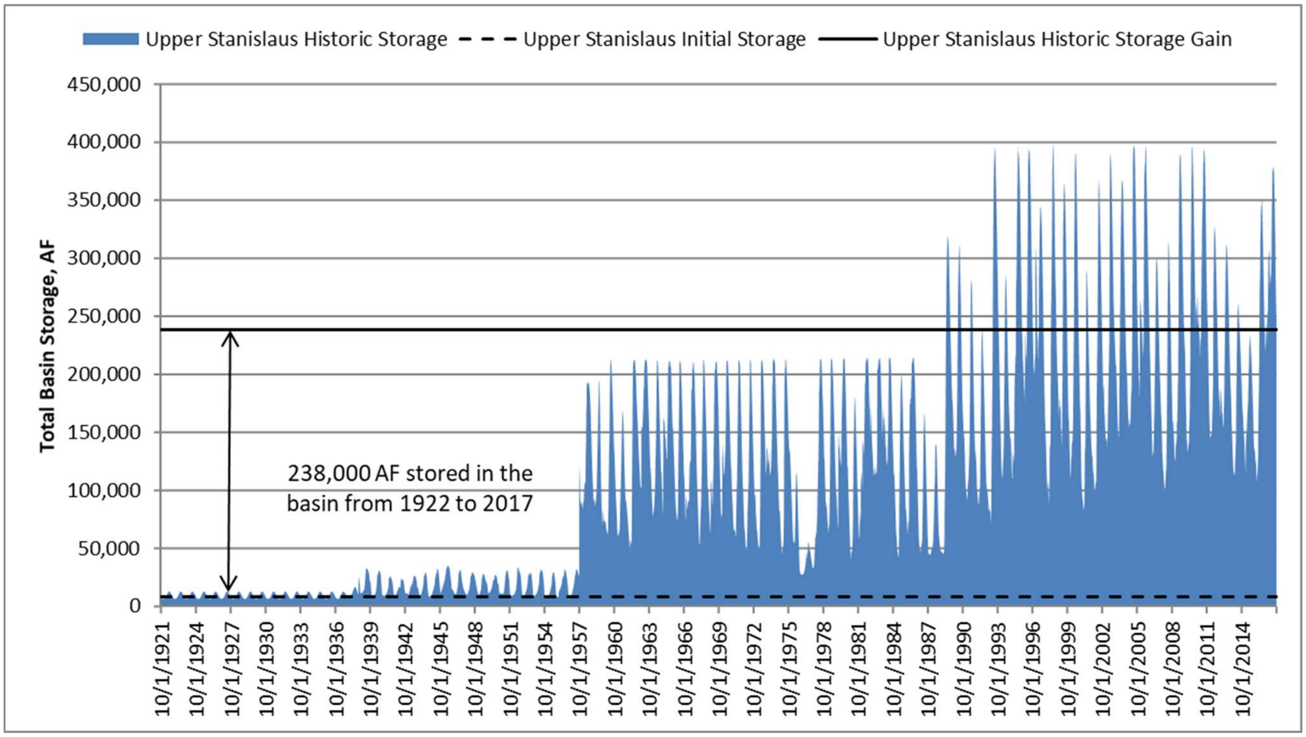
Difference between Inflow and Outflow	27,500 AF
Evaporation Losses	8,500 AF
Stored Water	11,300 AF
Unexplained Losses	3,900 AF

Upper Stanislaus River Checks

Four checks were performed to ensure that Stanislaus River hydrology portrays an accurate volume of water going into New Melones Reservoir. All the unimpaired flows developed for the basin were added together and compared to impaired flow into New Melones Reservoir, and also the unimpaired flows in each Fork of the Stanislaus River were added and compared to the impaired flow at the bottom of that river basin.

When comparing developed unimpaired flows to recorded impaired flows the volumes will not be equal. Three main sources of the inequality are evaporation, stored water, and exports. Part of the unimpaired flow is captured and evaporated in reservoirs, and that evaporated water does not show up at the impaired streamgage. Storage reservoirs typically do no empty completely each year, and larger reservoirs hold larger volumes of water year-to-year. When compared to the basin in 1922, the Stanislaus River basin has approximately 70,000 AF of unimpaired water permantently stored in the basin, and on September 30, 2017 had 246,800 AF of water stored upstream as shown in Figure 11. This stored water is unimpaired water that does not (or has not yet) shown up at the impaired streamgage, and dividing by 96 (the number of years in the hydrology development period) yields an annual average gain in storage. Additionally, the South Fork Stanislaus River exports around 18,000 AF per year to the Tuolumne River basin, which is unimpaired Stanislaus River water that does not show up as New Melones inflow or South Fork Stanislaus Releases. Accounting for these three aspects will give a truer comparison between the unimpaired and impaired hydrology. We will use the term Adjusted Unimpaired to label unimpaired flow that has had evaporation, exports, and stored water subtracted off.

Figure 11 - Upper Stanislaus River Historic Storage



New Melones Inflow

The annual average inflow to New Melones is shown in Table 9 with the calculated unimpaired flows and adjustments. The difference between the calculated impaired flow and calculated adjusted unimpaired flow is 18,952 AF annual average – 1.8% of the total basin flow.

Table 9 - Stanislaus River at New Melones Hydrology Balance, Annual Average Acre-Feet 1922-2017

Unimpaired Stanislaus River at New Melones	1,117,019
Upper Stanislaus Evaporation	7,859
Upper Stanislaus Stored Water	2,484
Upper Stanislaus Exports	18,597
Adjusted Unimpaired Stanislaus River at NML	1,088,079
Impaired Inflow to New Melones	1,069,127
Difference	18,952

North Fork Stanislaus River

The North Fork Stanislaus River unimpaired flows are compared to the computed impaired flow below Beaver and Mill Creeks plus exports to the Angels Creek system. The unimpaired flows do not include Angels Creek flows because there is no impaired Angels Creek to compare to. The only check on Angels Creek is within the larger check on New Melones Inflow. The difference between the calculated impaired flow and calculated adjusted unimpaired flow is 13,172 AF annual average, 3.8% of the total flow in the North Fork Stanislaus.

Table 10 - North Fork Stanislaus Hydrology Balance, Annual Average Acre-Feet 1922-2017

Unimpaired North Fork Stanislaus	345,234
North Fork Stanislaus Evaporation	3,277
North Fork Stanislaus Stored Water	1,020
Adjusted Unimpaired North Fork Stanislaus	340,936
Impaired North Fork Stanislaus + Utica Exports	327,764
Difference	13,172

Middle Fork Stanislaus River

The Middle Fork Stanislaus River unimpaired flows are compared to the computed impaired flow at Sand Bar Flat. The difference between the calculated impaired flow and calculated adjusted unimpaired flow is 1,163 AF annual average, 0.2% of the total basin flow.

Table 11 - Middle Fork Stanislaus Hydrology Balance, Annual Average Acre-Feet 1922-2017

Unimpaired Middle Fork Stanislaus	476,414
Middle Fork Stanislaus Evaporation	3,138
Middle Fork Stanislaus Stored Water	1,259
Imports from South Fork Stanislaus	23,619
Adjusted Unimpaired Middle Fork Stanislaus	495,635
Impaired Middle Fork Stanislaus	496,799
Difference	-1,163

South Fork Stanislaus River

The South Fork Stanislaus River unimpaired flows are compared to the recorded impaired flow below Lyons Reservoir. The difference between the calculated impaired flow and calculated adjusted unimpaired flow is 264 AF annual average, 0.2% of the total basin flow.

Table 12 - South Fork Stanislaus Hydrology Balance, Annual Average Acre-Feet 1922-2017

Unimpaired South Fork Stanislaus	110,297
South Fork Stanislaus Evaporation	1,444
South Fork Stanislaus Stored Water	205
South Fork Stanislaus Exports	42,216
Adjusted Unimpaired South Fork Stanislaus	66,432
Impaired South Fork Stanislaus	66,168
Difference	264

Summary Tables and Figures

The average annual unimpaired flow in each of the major Stanislaus River basins are listed in Table 13.

Table 13 - Average Annual Contributions of Major Stanislaus River Basins

Basin	Average Annual Unimpaired Flow, Acre-Feet
Stanislaus River at New Melones	1,117,000
Local Inflow to New Melones	185,100
North Fork Stanislaus	345,200
Middle Fork Stanislaus	476,400
South Fork Stanislaus	110,300
Angels Creek	770

Figure 12 - Average Unimpaired Basin Hydrographs

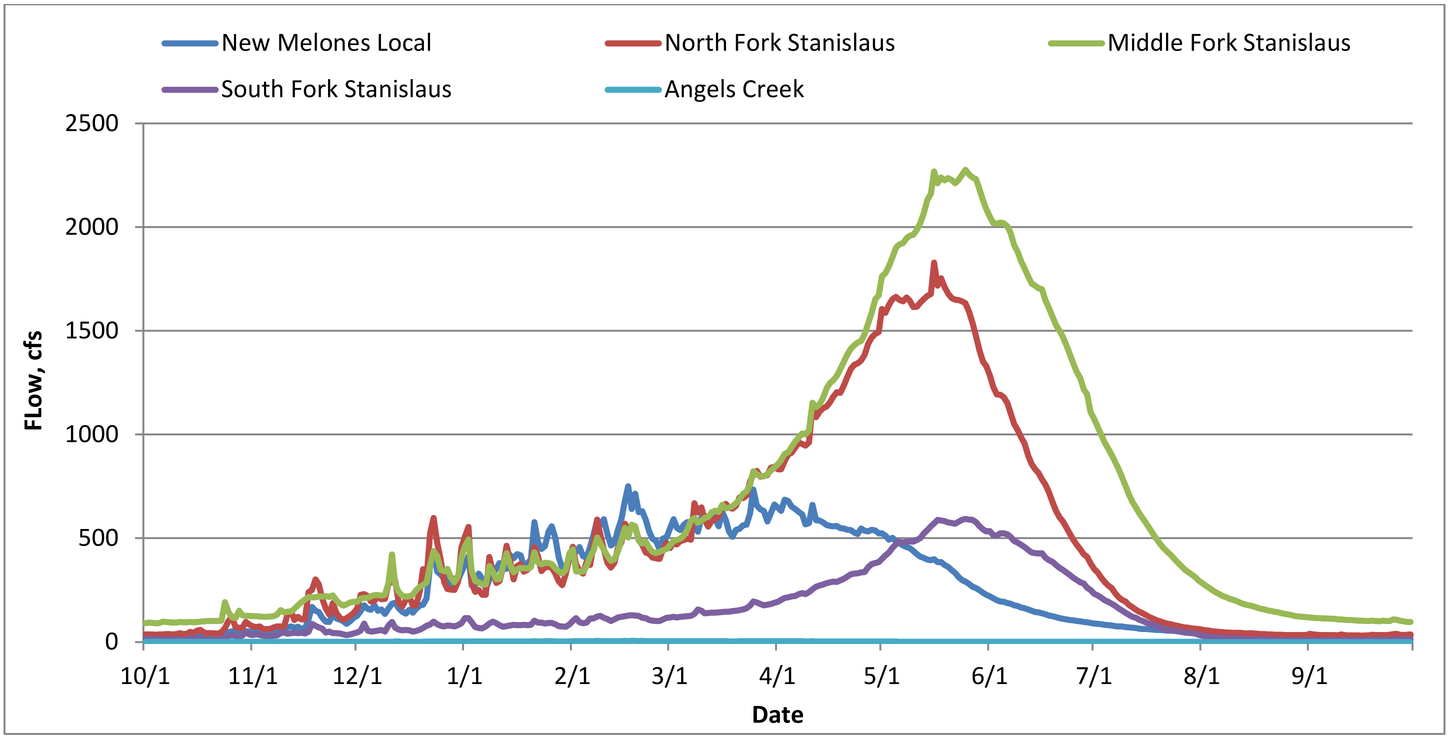
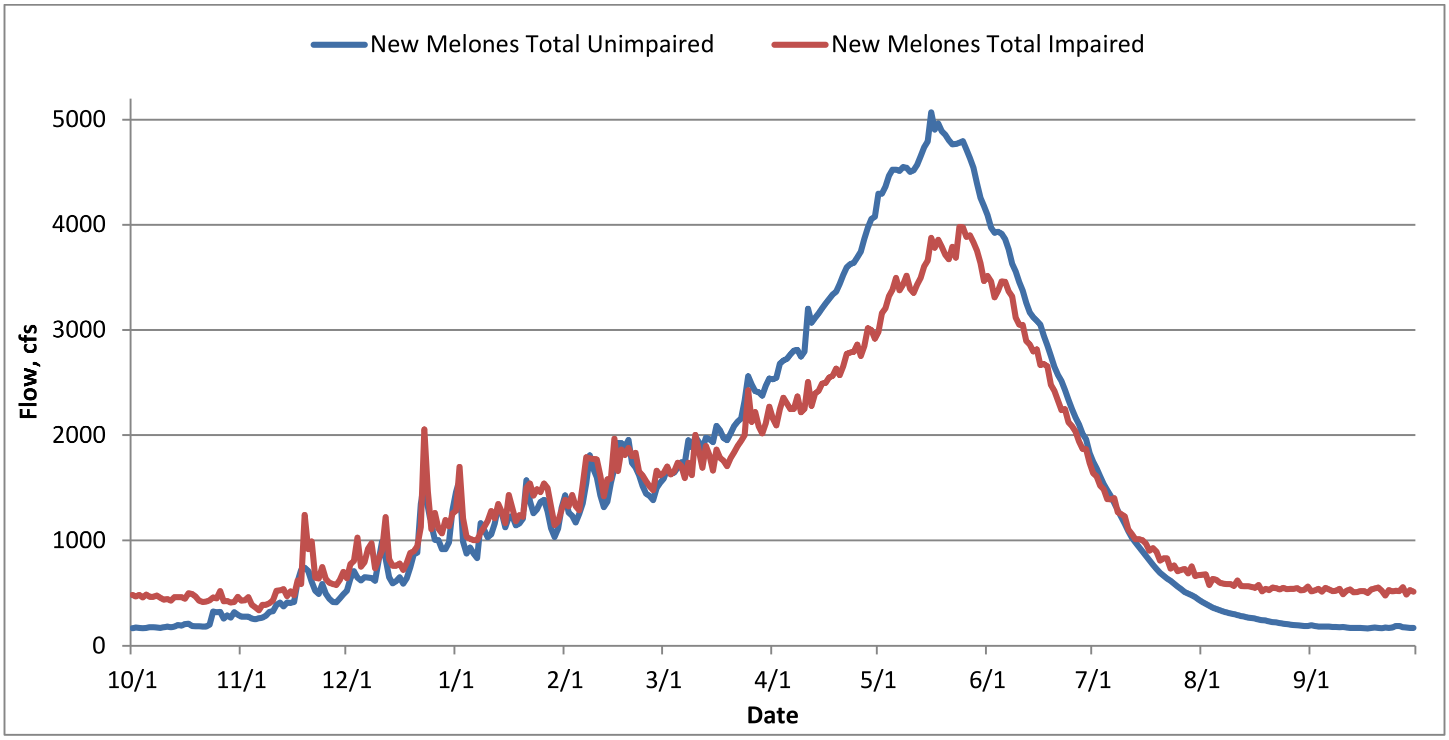


Figure 13 - Impaired and Unimpaired Stanislaus River at New Melones Average Hydrographs, 1922-2017



Appendix N

TUD Water Shortage Contingency Plan (WSCP)

June 2021

2020 Water Shortage Contingency Plan for Tuolumne Utilities District

Final Report

Appendix N

Kennedy Jenks

Appendix O

DWR Energy Use Tables 2016 to 2020

Urban Water Supplier: *Tuolumne Utilities District*

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

Table O-1A: Recommended Energy Reporting - Water Supply Process Approach

Enter Start Date for Reporting Period 1/1/2020
End Date 12/30/2020

☐ Is upstream embedded in the values reported?

		Urban Water Supplier Operational Control							
		Water Management Process						**Non-Consequential Hydropower (if applicable)**	
	Water Volume Units Used	Extract and Divert	Place into Storage	Conveyance	Treatment	Distribution	Total Utility	Hydropower	Net Utility
Volume of Water Entering Process	AF	*431.8*	*671.7*	*143.9*	*4798.2*	*4482.56*	*4482.56*	*0*	*4482.56*
Energy Consumed (kWh)	*N/A*	*130587*	*197643*	*38114*	*1028072*	*718019*	*2112435*	*0*	*2112435*
Energy Intensity (kWh/vol.)	*N/A*	*302.4*	*294.2*	*264.9*	*214.3*	*160.2*	*471.3*	*0.0*	*471.3*

Quantity of Self-Generated Renewable Energy
0 kWh

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

Data Quality Narrative:

Energy consumtion is metered data from PG&E billing. Volume of water entering process: treatment, is derived from the sum of monthly treated water production data in 2020. Conveyence, Place into Storage, Extract and Divert figures are calculated as a percent of overall consumption of energy to treat water. The percent is then multiplied by the total production of water. This figure is the amount of water that passed through each task. Distribution: Energy consumtion is metered data from PG&E. Distribution: Volume of water entering process is derived from the sum of monthly treated water distribution data in 2020.

Narrative:

All water management processes are only utilizing electrical energy and do not produce eletrical energy during the water treatment process.

Urban Water Supplier: *Tuolumne Utilities District*

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

Retail Potable Deliveries

Table O-1A: Recommended Energy Reporting - Water Supply Process Approach

Enter Start Date for Reporting Period 1/1/2019

End Date 12/31/2019

☐ Is upstream embedded in the values reported?

		Urban Water Supplier Operational Control							
		Water Management Process						**Non-Consequential Hydropower (if applicable)**	
	Water Volume Units Used	Extract and Divert	Place into Storage	Conveyance	Treatment	Distribution	Total Utility	Hydropower	Net Utility
Volume of Water Entering Process	AF	*374.552*	*702.285*	*140.457*	*4681.9*	*4324.114*	*4324.114*	*0*	*4324.114*
Energy Consumed (kWh)	*N/A*	*107663*	*199882*	*39228*	*982323*	*683356*	*2012452*	*0*	*2012452*
Energy Intensity (kWh/vol.)	*N/A*	*287.4*	*284.6*	*279.3*	*209.8*	*158.0*	*465.4*	*0.0*	*465.4*

Quantity of Self-Generated Renewable Energy

0 kWh

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

Metered Data

Data Quality Narrative:

Energy consumtion is metered data from PG&E billing. Volume of water entering process: treatment, is derived from the sum of monthly treated water production data in 2020. Conveyence, Place into Storage, Extract and Divert figures are calculated as a percent of overall consumption of energy to treat water. The percent is then multiplied by the total production of water. This figure is the amount of water that passed through each task. Distribution: Energy consumtion is metered data from PG&E. Distribution: Volume of water entering process is derived from the sum of monthly treated water distribution data in 2020.

Narrative:

All water management processes are only utilizing electrical energy and do not produce eletrical energy during the water treatment process.

Urban Water Supplier: *Tuolumne Utilities District*

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

Retail Potable Deliveries

Table O-1A: Recommended Energy Reporting - Water Supply Process Approach

Enter Start Date for Reporting Period 1/1/2018

End Date 12/31/2018

☐ Is upstream embedded in the values reported?

		Urban Water Supplier Operational Control							
		Water Management Process						Non-Consequential Hydropower (if applicable)	
	Water Volume Units Used	Extract and Divert	Place into Storage	Conveyance	Treatment	Distribution	Total Utility	Hydropower	Net Utility
Volume of Water Entering Process	AF	*3318.773*	*637.546*	*227.695*	*4553.9*	*4303.93*	*4303.93*	*0*	*4303.93*
Energy Consumed (kWh)	*N/A*	*98301*	*207231*	*77717*	*1097829*	*708029*	*2189107*	*0*	*2189107*
Energy Intensity (kWh/vol.)	*N/A*	*29.6*	*325.0*	*341.3*	*241.1*	*164.5*	*508.6*	*0.0*	*508.6*

Quantity of Self-Generated Renewable Energy

0 kWh

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

Metered Data

Data Quality Narrative:

Energy consumtion is metered data from PG&E billing. Volume of water entering process: treatment, is derived from the sum of monthly treated water production data in 2018. Conveyence, Place into Storage, Extract and Divert figures are calculated as a percent of overall consumption of energy to treat water. The percent is then multiplied by the total production of water. This figure is the amount of water that passed through each task. Distribution: Energy consumtion is metered data from PG&E. Distribution: Volume of water entering process is derived from the sum of monthly treated water distribution data in 2018

Narrative:

All water management processes are only utilizing electrical energy and do not produce eletrical energy during the water treatment process.

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

Retail Potable Deliveries

Table O-1A: Recommended Energy Reporting - Water Supply Process Approach

Enter Start Date for Reporting Period 1/1/2017

End Date 12/31/2017

☐ Is upstream embedded in the values reported?

		Urban Water Supplier Operational Control							
		Water Management Process						Non-Consequential Hydropower (if applicable)	
	Water Volume Units Used	Extract and Divert	Place into Storage	Conveyance	Treatment	Distribution	Total Utility	Hydropower	Net Utility
Volume of Water Entering Process	AF	*301*	*643.8*	*106.5*	*4631.4*	*4301.9*	*4301.9*	*0*	*4301.9*
Energy Consumed (kWh)	*N/A*	*94728*	*202553*	*33517*	*1126100*	*708777*	*2165675*	*0*	*2165675*
Energy Intensity (kWh/vol.)	*N/A*	*314.7*	*314.6*	*314.7*	*243.1*	*164.8*	*503.4*	*0.0*	*503.4*

Quantity of Self-Generated Renewable Energy

0 kWh

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

Metered Data

Data Quality Narrative:

Energy consumtion is metered data from PG&E billing. Volume of water entering process: treatment, is derived from the sum of monthly treated water production data in 2020. Conveyence, Place into Storage, Extract and Divert figures are calculated as a percent of overall consumption of energy to treat water. The percent is then multiplied by the total production of water. This figure is the amount of water that passed through each task. Distribution: Energy consumtion is metered data from PG&E. Distribution: Volume of water entering process is derived from the sum of monthly treated water distribution data in 2020.

Narrative:

All water management processes are only utilizing electrical energy and do not produce eletrical energy during the water treatment process.

Urban Water Supplier: *Tuolumne Utilities District*

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

Retail Potable Deliveries

Table O-1A: Recommended Energy Reporting - Water Supply Process Approach

Enter Start Date for Reporting Period 1/1/2016

End Date 12/30/2016

☐ Is upstream embedded in the values reported?

		Urban Water Supplier Operational Control							
		Water Management Process						**Non-Consequential Hydropower (if applicable)**	
	Water Volume Units Used	Extract and Divert	Place into Storage	Conveyance	Treatment	Distribution	Total Utility	Hydropower	Net Utility
Volume of Water Entering Process		*219.8*	*659.2*	*131.8*	*4394.4*	*4234.5*	*4234.5*	*0*	*4234.5*
Energy Consumed (kWh)	*N/A*	*70268*	*195972*	*41996*	*976718*	*703146*	*1988100*	*0*	*1988100*
Energy Intensity (kWh/vol.)	*N/A*	*319.7*	*297.3*	*318.6*	*222.3*	*166.1*	*469.5*	*0.0*	*469.5*

Quantity of Self-Generated Renewable Energy

0 kWh

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

Metered Data

Data Quality Narrative:

Energy consumtion is metered data from PG&E billing. Volume of water entering process: treatment, is derived from the sum of monthly treated water production data in 2020. Conveyence, Place into Storage, Extract and Divert figures are calculated as a percent of overall consumption of energy to treat water. The percent is then multiplied by the total production of water. This figure is the amount of water that passed through each task. Distribution: Energy consumtion is metered data from PG&E. Distribution: Volume of water entering process is derived from the sum of monthly treated water distribution data in 2020.

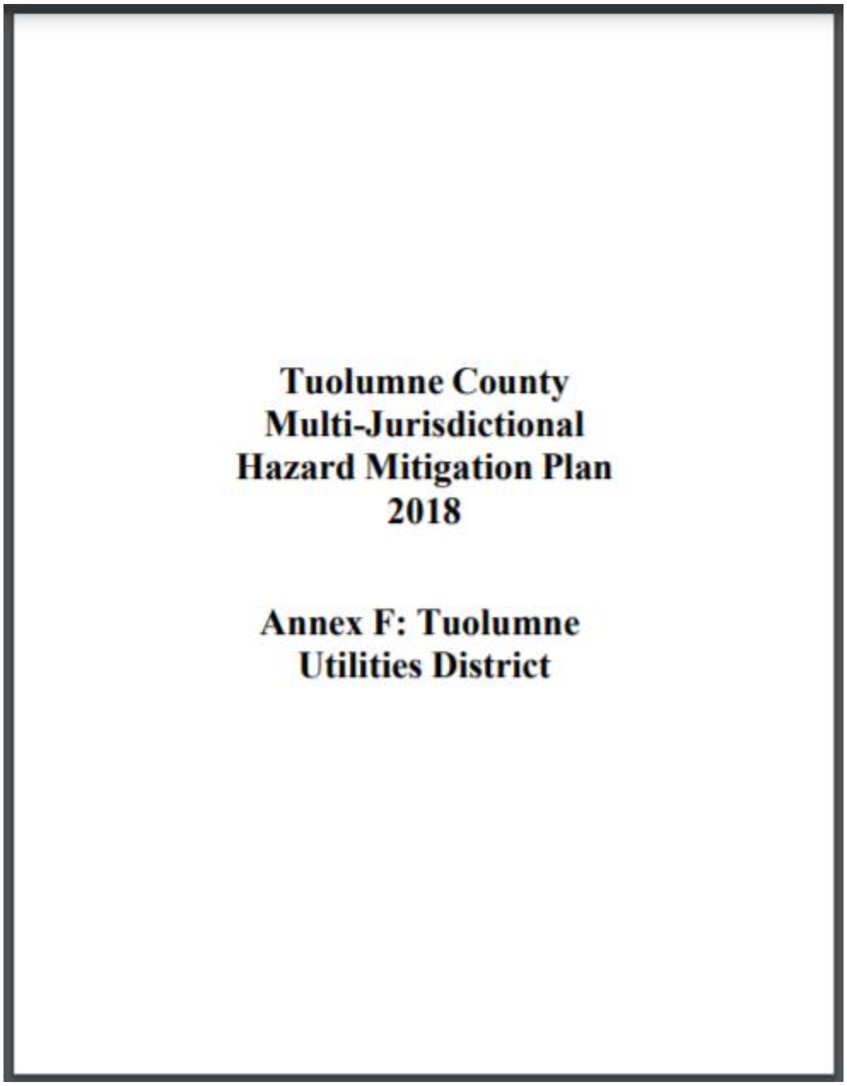
Narrative:

All water management processes are only utilizing electrical energy and do not produce eletrical energy during the water treatment process.

Appendix P

Tuolumne County Local Hazard Mitigation Plan (LHMP)

https://www.tuolumnecounty.ca.gov/DocumentCenter/View/12284/Annex-F-TUD



Tuolumne County
Multi-Jurisdictional
Hazard Mitigation Plan
2018

Annex F: Tuolumne
Utilities District

18885 Nugget Blvd
Sonora, CA 95370

https://tudwater.com/

Kennedy Jenks